SMEs and High Inflation

Final report

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Abbreviations

AI	artificial intelligence
API	Producer price index of agricultural production
B2B	Business-to-business
B2C	Business-to-consumer
B2PS	Business-to-public service
CAN	Contract award notice
CBAM	Carbon Border Adjustment Mechanism
CEFIC	European Chemical Industry Council
CISUTAC	Circular and sustainable textiles and clothing
CPPI	Construction producer price index
CPV	Common procurement vocabulary
CSV	Comma-separated value
DESI	Digital Economy and Society Index
DIHK	German Chamber of Commerce
EAFRD	European Agricultural Fund for Rural Development
EBC	European Builders' Confederation
EC	European Commission
ECB	European Central Bank
ECSEL	European Centre for Ethics and Law
EGD	European Green Deal
EIB	European Investment Bank
EIBIS	European Investment Bank Investment Survey
EII	Energy-intensive industries
EIF	European Investment Fund
EMS	Electronics manufacturing services
EPR	European Payment Report
ETS	Emissions Trading System
ETUC	European Trade Union Confederation
EU	European Union
FIEC	European Construction Industry Federation
FSIWS	Food Startup Inkubator Weihenstephan
FSR	Financial Stability Review
GDP	Gross domestic product
GHG	Greenhouse gas
GVC	Global value chain
HICP	Harmonised Index of Consumer Prices
ICT	Information and communication technology
IEA	International Energy Agency

IMA	Industrial Minerals Association
IMF	International Monetary Fund
LCI	Labour cost index
LPD	Late Payment Directive
LULUCF	Land use, land-use change and forestry regulation
MRO	Main refinancing operations
NACE	Statistical classification of economic activities in the European Union
ODM	Original design manufacturer
OECD	Organisation for Economic Cooperation and Development
OEM	Original equipment manufacturer
PFP	Primary food processor
PPI	Producer price index
PTR	Pass-through rate
RRF	Recovery and Resilience Facility
RRP	Recovery and Resilience Plan
R&D	Research and development
R&D&I	Research and development and innovation
R&I	Research and innovation
RTD	Directorate General for Research and Innovation
SAFE	Survey on the Access to Finance of Enterprises
SMEs	Small and medium-sized enterprises
SPPI	Services producer price index
SVB	Silicon Valley Bank
SWD	Staff working document
TCLF	Textile, clothing, leather and footwear
TED	Tenders Electronic Daily
TTF	Title Transfer Facility
UK	United Kingdom
US	United States
VAT	Value-added tax

Abstract

Since 2021, the European Union has experienced historically high levels of inflation, with year-on-year increases in consumer prices reaching as high as 11.5 % in October 2022. The present study assesses how this environment of high inflation has affected small and medium-sized enterprises (SMEs). The report shows that inflation has increased most in energy-related and agri-food ecosystems. Rising energy prices and shortages of raw materials, and well as the by-products of the pandemic (e.g. supply chain disruptions and labour shortages) were among its key drivers. In terms of impacts, higher inflation is most directly associated with longer collection periods for payments, mixed effects on green investments, and increased difficulties in accessing skilled labour. Its effect on the profitability of SMEs depends on the ability of these businesses to pass rising costs on to consumers, with some firms scoring record profits while others have struggled to remain afloat. The indirect effects of inflation (decreased aggregate demand due to increased interest rates, lower growth and greater economic uncertainty) have had a more widespread impact, in having an especially significant effect on investment decisions. The study concludes with an overview of relevant policies adopted by Member States to support SMEs in this context, and presents actionable measures to address the causes of inflation and mitigate its negative effects, in particular distinguishing those measures that are appropriate only in crisis circumstances, and those measures that should be avoided.

Résumé

À partir de 2021, l'Union européenne a connu une inflation historiquement élevée, les prix à la consommation atteignant des augmentations annuelles allant jusqu'à 11,5 % en octobre 2022. Cette étude évalue l'impact d'une telle inflation sur les petites et moyennes entreprises (PME). Elle montre que c'est dans les écosystèmes liés à l'énergie et à l'agroalimentaire que l'inflation a le plus augmenté. Les prix de l'énergie, les pénuries de matières premières et les effets secondaires de la pandémie (perturbations de la chaîne d'approvisionnement et pénuries de main-d'œuvre, par exemple) ont été parmi les principaux moteurs de l'inflation. En termes d'impact, une inflation plus élevée est plus directement associée à des périodes de recouvrement des paiements plus longues, à des effets mitigés sur les investissements verts et à des difficultés accrues d'accès à la main-d'œuvre qualifiée. L'effet sur la rentabilité des PME dépend de leur capacité à répercuter les coûts sur les consommateurs, certaines entreprises enregistrant des bénéfices records tandis que d'autres luttent pour rester à flot. Les effets indirects de l'inflation (diminution de la demande globale en raison de l'augmentation des taux d'intérêt, d'une croissance plus faible et d'une plus grande incertitude) ont un impact plus généralisé, affectant en particulier les décisions d'investissement. L'étude passe en revue les politiques adoptées par les États membres pour soutenir les PME dans ce contexte et présente des mesures concrètes pour s'attaquer aux causes de l'inflation et atténuer ses effets négatifs.

Executive summary

Rationale

Beginning in 2021, the European Union (EU) has experienced **historically high inflation**, with Since 2021, the European Union (EU) has been experiencing **historically high levels of inflation**, with year-on-year increases in consumer prices reaching as high as 11.5 % in October 2022. High inflation affects businesses – in particular, small and medium-sizes enterprises (SMEs) – in a variety of ways. With SMEs accounting for more than 99.8 % of the total number of firms in non-financial sectors, as well as 64.4 % of employment, and 51.8 % of value added in the EU, the sum of all these impacts – the majority of which do not act independently of one another – can have important consequences on the ability of the EU economy to grow. It is therefore important to understand how inflation has impacted SMEs, both in general and when compared with large firms, as well as to explore the heterogeneity of inflationary effects on firms operating in different industrial ecosystems. The present report contributes to this goal by answering the following research questions:

1. How has inflation evolved over time and across industrial ecosystems?

2. What are the main and SME-specific inflation drivers?

3. What are the past and expected future impacts of sustained high inflation on SMEs compared with large enterprises, considering both those firms that can pass costs on to their consumers, and those that cannot?

4. What recent and relevant policies have been adopted by the Member States to support SMEs in the context of rising inflation?

Methodology

To answer these questions, the study adopted a **mixed-methods approach**. The research team gathered data from institutional databases such as Eurostat (to calculate consumer and producer inflation); the European Central Bank, through with the Survey on Access to Finance of Enterprises (SAFE); the Eurobarometer surveys on SMEs; resource efficiency and green markets; the European Investment Bank Investment Survey (EIBIS); Tender Electronics Daily (TED); as well as private databases providing company information (namely, Technote and Orbis). These data were then used for descriptive statistics, trends analysis, regression modelling and simulations of **the effect of inflation over 2023 and 2024, under different scenarios**: a 'baseline' scenario based on current projections from the EU and international institutions; a 'pessimistic' scenario, in which monetary policy continues to tighten in order to halt inflation; and a 'highly adverse' scenario featuring the addition of a new energy crisis.

Alongside these quantitative exercises, through a series of case studies, the report focuses on **five industrial ecosystems** – agri-food, construction, electronics, energy-intensive industries, and textiles. These attempt to capture the heterogeneity of the effects of inflation on SMEs involved in different economic activities and supply chains. The case studies are based both on **desk research** and on a series of **interviews with business associations, SMEs and sectoral experts**. In addition, further interviews with national authorities served to summarise the measures undertaken at national level to counter inflation, and to provide information about possible additional policy measures needed.

Findings

Key inflation trends and drivers

After hovering around 2 % for the last decade, inflation began to increase in 2021 and skyrocketed in 2022. Between 2018 and the beginning of 2021, year-on-year inflation experienced a modest increase, averaging between 0.8 % and 2.5 %. After this, inflation increased fivefold, reaching more than 10 % in 2022. **This increase was strongest in energy-related industrial ecosystems,** with annual changes during the third quarter of 2022 of up to 28.5 % in the energy-intensive industries, and 55 % in energy-renewables, followed by agri-food (over 15 % in the first half of 2022) and tourism, transportation, retail and construction (between 10 % and 13 %). The health, digital and social economy ecosystems, meanwhile, were less affected by price increases, with inflation reaching less than 5 % in 2022.

The key driver of inflation was the growing cost of energy. In 2021, rising energy costs were the result of a strong economic recovery in the wake of the COVID-19 pandemic, as well as a long and cold winter in the northern hemisphere, which pushed up demand for natural gas. In October 2022, year-on-year energy prices increased by more than 50 % as a result of two factors: first, Russia's unilateral suspension of gas deliveries to some EU Member States; and second, summer heatwaves, which increased energy demand for cooling while simultaneously reducing energy supply due to droughts. Energy-driven inflation explains why the energy-renewables and energy-intensive ecosystems saw greater cost increases than in other ecosystems.

Moreover, the Russian war of aggression against Ukraine led to **shortages of raw materials**, such as wood and pulp for the printing industry, as well as steel, copper, aluminium, wood, clay materials (e.g. bricks, tiles), mineral products (gravel, cement, and concrete), glass, and certain chemical products relevant to energy-intensive industries and the construction sector. Shortages in agricultural products such as fertilisers, cereals (wheat, barley, maize) and sunflower oil severely impacted the agri-food ecosystem, including livestock farming, which also indirectly affected the textiles ecosystem due to the reduced availability and quality of skins and hides. Lastly, minimum volume requirements on orders of semiconductors placed a strain on SMEs, who were forced to purchase greater quantities than they actually needed in order to compete with much larger companies for limited stocks. This was a problem even when inflation was low but became acute when inflation rose.

All of these effects dovetailed with the **by-products of the pandemic**, which in many ways set the stage for the inflationary pressures. First, lockdowns led to supply-chain disruptions as production declined, making access to raw materials more difficult and increasing their prices. The pandemic also increased the costs of transportation and logistics, which made the final price of products on the EU market even more expensive. Furthermore, during the pandemic, average real wages rose in most EU countries, in large part due to wage support and job retention schemes. Labour shortages also increased, which created recruitment bottlenecks in some sectors, especially construction.

The impacts of inflation on SMEs

The present study analyses how high inflation affects SMEs in terms of late payments, bankruptcies, investment, the adoption of digital and green technologies, participation in public procurement, access to skilled labour, and ultimately – profitability. Its findings suggest that high inflation has only a small effect on many of the aforementioned impacts. In particular, high inflation played a minor role in prompting bankruptcies, reducing participation in public procurement, and making it more difficult to access skilled labour, while it may even have accelerated investments towards the twin transition. Conversely, stronger adverse effects are

expected with regard to SMEs' payment practices and on their balance sheets in the short term, although these impacts vary between industrial ecosystems. **While the individual impacts of high inflation are relatively limited, these direct and indirect effects add up from the perspective of a single firm, placing those firms that cannot pass costs on to their customers in a particularly precarious situation. By contrast, firms able to pass costs may use high inflation to their advantage by charging mark-ups greater than needed to offset cost increases.**

The number of days it takes firms to collect payments – which averaged around 64 days across small, medium-sized and large firms in the EU in 2021 – **was estimated to have increased by 1.5 days as a result of the inflation levels observed in 2022**, an additional 0.9 days due to interest rate hikes, and 1.6 days due to a reduction in the rate of GDP growth in 2022. Hence, inflation is exacerbating the problem of late payments and undoing a sizeable share of the work accomplished over the previous decade (between 2013 and 2021, the average collection period decreased by only 13 days). The effect is strongest for firms in the construction ecosystem, due to the deep-rooted culture of late payments in this sector, as well as among SMEs (a 1.7 day increase in the collection period, compared with 0.4 days for large firms). As inflation is expected to decrease over the next two years under the baseline scenario, the impact on late payments is also likely to diminish, with the collection periods forecast to go back to 2021 levels by 2024. In the more pessimistic scenarios, the collection period will remain slightly more elevated.

Longer collection periods increase the risk of bankruptcy. **Indeed, firms across the EU experienced an increase in bankruptcies in the second half of 2022, which in 2023 hit the highest levels seen since 2015**. **Nevertheless, inflation made very little direct contribution to this:** a negligible association was found between higher levels of inflation and the solvency ratio of SMEs (i.e. their ability to meet short-term financial obligations). Instead, the increase in bankruptcies was largely due to regulatory changes (e.g. in Spain, which made bankruptcy proceedings more debtor-friendly), the delayed effect of the pandemic, a greater prevalence of late payments, and increased difficulties in accessing finance due to higher interest rates. In the adverse economic scenarios, the number of firms declaring a default could triple from 2 out of every 1,000 firms to 6 in the construction sector, and double from 7.5 to 17 firms out of every 1,000 in the accommodation and transport sectors, with firms in agri-food also experiencing increased difficulties in staying afloat. In the baseline (and currently more realistic) scenario, the trend in bankruptcy declarations in the EU is still expected to rise, although at a much slower pace (0-5 % across all sectors).

Even though inflation only appears to have a limited influence on firms' bankruptcies, it can potentially limit their capacity to invest and grow. However, **business investment increased in 2022 compared with 2021 – from 13.4 % to 13.9 % of GDP. Instead of seeing their cash holdings lose value due to inflation, businesses instead opted to invest that money.** This increase seems to be driven by SMEs rather than large firms. Business investment is forecast to increase further in 2023 and 2024, although this increase is likely to be lower than that seen in 2022, at around just 0.1 percentage points (to 14 % of GDP).

Investment growth is projected to slow down because higher interest rates and a worsening economic outlook are associated with lower investment expectations, especially for SMEs. The hikes in interest rates enacted by the European Central Bank (ECB), up to 4.50 % in September 2023, are expected to reduce from 31 % to 29.2 % the probability of SMEs reporting positive investment expectations, compared with a fall from 35.6 % to 34.4 % for large firms. Furthermore, viewing future economic uncertainty as a major obstacle to investment reduces the probability of firms reporting positive investment expectations by 14 % among SMEs, and by 10 % among large firms, all else being equal.

With respect to green investment in particular, inflation has a twofold impact. On the one hand, analyses based on 2021 Eurobarometer data suggest that inflation increased the probability of companies investing nothing in becoming more resource efficient, from 30 % to 43 %. Interviews with SMEs also pointed to the **postponement of substantial and long-term investments relating to the green transition**. On the other hand, high energy bills in 2022 motivated companies (especially those in utilities) to become more energy-efficient, **increasing the probability that SMEs would invest in energy efficiency measures from 53 % to 58 %, with no statistically significant effect for large firms.**[1]

Investment is also required in order for SMEs to participate in public procurement, because they need to shoulder the cost of bid preparation as well as the work that needs to be completed before they receive the first payment. High inflation also poses a risk that firms will be unable to deliver services and products for an agreed fixed price. **Based on empirical estimates, however, high inflation is only associated with a small decrease in public procurement participation when all bids for public contracts are considered**. In 2022, it is expected to have reduced the number of bids submitted for public procurement contracts by roughly 1 %, or around 1,000 offers being lost across the EU. Under the baseline scenario, a return back up to the participation levels recorded in 2021 is unlikely because discretionary fiscal support, including expenditures for public procurement, is projected to decline in 2024. In more adverse conditions, the participation of SMEs in public procurement is likely to drop further, because they face more rigid financial constraints, access to credit is further reduced, and there is increased risk aversion with regard to taking on new projects or investments.

Skilled labour is key for firms to be able innovate and participate in the twin transition. **Increased labour and production costs are found to be associated with SMEs finding it more difficult to access skilled labour**. Nevertheless, the risk of a price-wage spiral is found to be modest in the EU overall, and could be avoided even if high inflation persists. Accessing skilled staff is a long-standing, structural barrier for SMEs, which is only marginally linked to the economic cycle, and which is also expected to remain an obstacle in the near future, in each of the three scenarios considered in the analysis.

Studying the individual effects of inflation on late payments, bankruptcies, investments, participation in public procurement and access to skilled labour separately makes it difficult to understand the extent to which inflation affects SMEs overall, given that all of these effects hit SMEs at the same time. Therefore, the final impact explored in the study is profitability. Profitability affects all other impacts: less profitable firms are more likely to make payments late, given that their cushion for absorbing delayed payments is smaller; firms that are not making profits are also at a higher risk of bankruptcy. Investment – whether in green and digital innovations, or the resources needed to bid for public procurement contracts – becomes more difficult for less profitable firms due to their reduced internal financing capacity. Lower profits also mean that companies' ability to offer higher wages deteriorates, leading to difficulties in accessing skilled labour.

Results show a twofold effect of inflation on firms' profitability: **inflation initially reduces profitability as production costs rise, but subsequently increases it when (and if) firms are able to pass costs on to consumers**. This explains why unit profits have increased to a record 9.3 % in 2022 compared with the year before. However, this rise has varied somewhat between ecosystems, since the ability of some firms to pass on costs depends on their position within the value chain, how sensitive the demand for specific products is to price changes, their

[1] The immediate reaction by businesses to save energy in response to the rise in energy bills has also been observed among German SMEs, as evidenced by the KfW Mittelstandspanel conducted in March 2023. For more information, please see KfW Research (2023). Weitere Energieeinsparungen für viel kleine Unternehmen aktuell mit Herausforderungen verbunden – bei einem Drittel Energiesparmaßnahmen geplant. Folkus Volkswirtschaft, Nr. 439, 27. KfW Frankfurt.

types of clients, and firm size. Roughly two-thirds of companies in the EU pass costs onto consumers as one of their strategies to deal with energy cost increases. Most evidence suggests that food-processing firms were able to pass on more of these costs than firms in other sectors, contributing to profit-driven inflation. Qualitative evidence shows that SMEs that signed fixed contracts within the two or three years immediately before the recent increase in inflation – for example, in construction – were unable to increase their prices, and suffered the most from higher production costs, which in turn squeezed their profit margins.

Hence, although the analyses in this report show that the individual impacts of inflation are relatively limited, **the cumulative price increases due to the different drivers of inflation (raw materials, energy, wages) and its by-products (e.g. higher interests on loans) can quickly add up from the perspective of an individual SME**, leading to a significant loss in profitability in those cases in which firms are unable to pass these increased costs on to customers**.** Indeed, the estimated overall effects are small because they tend to average out between those firms that benefitted from the high inflation environment by charging greater mark-ups, and those that were unable to pass cost increases on to consumers, despite the fact that the latter – which are most often SMEs – find themselves in a far more precarious situation. As a consequence, policy action is needed to ensure that vulnerable SMEs remain competitive during this period of high inflation, especially in light of the negative effects of rising interest rates and slowing economic growth.

Policy actions

Based on the findings above, and using information gathered from national authorities and the literature review, the study presents a set of policy actions divided into four types: measures to **address the causes of inflation;** measures to **mitigate the negative effects of inflation**; measures that are **appropriate under crisis circumstances**; and measures to **avoid**. Policy responses should be **coordinated among different government agencies** to account for the various ways in which inflation affects SMEs, as discussed earlier. As this study shows, the effects of inflation on SMEs are not only numerous, but also far from uniform when it comes to individual SMEs. While some SMEs are pushed to the brink financially because of inflation, others may even prosper in a high-inflationary environment. Therefore, **non-targeted measures may result in market-distorting effects and, in the context of high inflation, may stand in the way of bringing it down**. This is why measures aimed at helping SMEs, such as providing funds for the twin digital and green transitions, should be counterbalanced against the need to reduce public spending as a means of bringing inflation down.

Measures to address the causes of inflation

The **promotion of EU energy independence** is essential to address the root cause of inflation, highlighting the importance of successfully implementing the **RePowerEU** programme at both EU and national levels. These actions could be complemented by new trade agreements with third-country energy suppliers, additional opportunities to diversify, and coordinated actions between the Member States when purchasing energy supplies.

It is similarly important to ensure **a sustainable supply of raw materials and production components, simultaneously helping affected firms to find new markets**, given the shock in raw material supply experienced by the Member States. While the **Critical Raw Materials Act** aims to address these shortages, many examples of good practice have also been identified in selected Member States. For instance, Germany is considering a raw materials policy that sets quotas for recycling raw materials, offers support for the warehousing of raw materials, and foresees the establishment of a raw materials fund to increase production capacities. In Lithuania, companies are encouraged to use databases made available by the government to find new raw materials and components suppliers in other countries.

In the electronics ecosystem, the European Chips Act, meant to reduce shortages in chips, is already in place. An additional option would be to encourage SMEs to consider the joint procurement of chips and components that require minimum volume orders. The present study stresses a further need to monitor and anticipate raw material shortages at national level, because SMEs rarely have the resources to do so themselves. It is important to stress that the Joint Research Centre (JRC) has already developed a Raw Materials Information System (RMIS), and additional actions to raise awareness about RMIS, targeted at SMEs, could be useful in ensuring that SMEs take full advantage of the information provided through the RMIS system.

Measures to mitigate the negative effects of inflation

The study highlights that inflation affects the performance of SMEs in a variety of ways, and through different channels. Hence, it would be useful to create **central monitoring units** within national governments with the goal of monitoring the impacts of inflation on SMEs, identifying those sectors and businesses most at risk, and estimating short- and medium-term effects. Central monitoring units would enable a coordinated response to the current high-inflation environment in a similar fashion to the response against COVID-19. This would also ensure that the dangers posed by persistent inflation are consistently monitored and not underestimated, thus laying some groundwork for future responses and promoting best practices.

One of the main indirect effects of inflation is that access to external financing is likely to worsen due to increases in interest rates. Hence, policymakers may seek to **enhance SMEs' access to external finance using a mix of different financial instruments, including credit guarantees, subsidised loans, and equity investments.** Again, examples of best practice can be seen in the ongoing measures of certain Member States', which include loan guarantees up to EUR 1.35 million in the Netherlands, partly covered by the country's Ministry of Economic Affairs and Climate Policy. To increase financing options for investments in sustainability by SMEs, in November 2022 the loan guarantee was expanded to include a green component: by making use of this measure, SMEs can reduce their often sharply increased (energy) costs.

Government support during the pandemic helped to keep millions of businesses afloat. However, such measures may have sustained businesses that were otherwise unviable. With the tapering of these support measures, a greater number of businesses are going bankrupt that might otherwise have exited the market much earlier. Hence, policymakers should entertain the option of **limiting the level of support provided to non-viable businesses, in favour of strengthening national early warning systems** – namely, systems designed to detect insolvency risk at company level, and assist companies in addressing it. Among other actions, Directive 2019/1023/EU already imposes requirements on the Member States to establish early warning tools, restructuring frameworks, the appointment of a practitioner in the field of restructuring in certain circumstances, and pauses on enforcement action and contracts – all of which will help to identify and help struggling SMEs. Nevertheless, more effort is needed in the **design and implementation of early warning systems**. For instance, some Member States impose additional costs on companies that are already struggling, or share alert information with creditors, reducing these companies' chances of access to credit and, ultimately, their business survival. **Furthermore, while early warning systems in some Member States only help with identifying struggling companies, and others provide advice to struggling firms, few combine both of these elements**. As an example of good practice, Member States could follow that of Portugal's MAP tool (Portuguese: *Mecanismo de Alerta Precoce)*, which received the Grand Jury Prize at the 2023 SME Assembly. This provides companies with economic and financial indicators compiled from the Bank of

Portugal's Balance Sheet Centre in order to identify struggling firms and help them to restructure.

While early warning tools can help to detect the risk of insolvency (and consequently, address and reduce it), the factors that lead to business insolvency – such as **late payments** – should also be reduced or eliminated. Here, the study highlights the significant differences that exist between ecosystems when it comes to late payments. In addition, little information currently exists to explain delays in government-to-business transactions. The recent proposal by the European Commission for a **Late Payments Regulation** is therefore timely. The new proposal introduces a maximum payment term of 30 days for both B2B transactions and those in which the debtor is a public authority. Further novelties include compulsory interest payments, a flat compensation fee of 50 EUR for each invoice that is paid late, enforcement measures, and alternative dispute resolution mechanisms.

Lastly, while SMEs are motivated to invest in the twin transition –thanks also to significant funding being available at European and national levels – small businesses are struggling to absorb such funding. This is because usually, only a share of the investment is co-funded from public resources, while SMEs that are facing increases in production costs are not able to provide matching funds. Hence, consideration could be given to **making it easier for SMEs to access investments available for the twin transition**. This could be achieved, for instance, by lowering the co-financing rate required from SMEs, or by making alternative forms of funding available, such as tax credits – which are the primary means of funding energy efficiency improvements for small businesses in the US Inflation Reduction Act, and which involve considerably lower administrative burdens.

Measures that are appropriate under crisis circumstances

While public measures can aid SMEs, some of them may result in market-distorting effects that, in the context of high inflation, may stand in the way of bringing inflation down. Hence, **fiscal support should be targeted at the most vulnerable businesses** that could not otherwise withstand the price shock, despite being viable. To avoid a situation in which governments further subsidise companies that are already profiting from inflation, public authorities should assess how much price increases have affected firms' costs, and what proportion of these increases were passed on to consumers. The latter can be assessed by exploring whether firms' turnover and profitability deviate significantly from historical trends.

To help SMEs address short-term liquidity issues, **payment extensions with regard to tax and social security obligations** may be needed. Nevertheless, such support should be extended only to those companies that have a viable business plan, to avoid a situation in which bankruptcies are artificially postponed.

Lastly, although the study shows that inflation has only a small effect on firms' participation in public procurement, interview feedback suggests that several SMEs that had already signed contracts with public authorities were struggling to deliver the services at the fixed price agreed. To avoid contract cancellations, some Member States have created options to **index the values of public contracts** for certain types of contracts (most prevalently in construction). However, indexation has two downsides: it helps keep inflation high, and it reduces firms' motivation to innovate or to use more sustainable energy sources. As a result, as the inflation outlook improves, public authorities could consider gradually phasing out these measures.

Measures to avoid

Non-targeted and price-distorting support measures may not be appropriate in times of high inflation. Examples of non-targeted support include price caps on electricity, gas, petrol and diesel; tax reductions on certain foods; postponements for value added tax (VAT), social security taxes and pandemic-related loans for all SMEs or businesses; automatic wage indexation, or reductions in VAT tax. While they provided immediate, short-term relief in 2022, such policy actions, by lowering the price of goods of which there is a shortage, such measures disincentivise households and businesses from reducing their consumption of energy and raw materials that are in short supply, thus further fuelling inflation. For this reason, such measures should be avoided in the medium term.

1. Introduction

Over the last two years, firms have faced historically high inflation, with annual increases in consumer prices reaching 11.5 % in October 2022. According to the European Commission, the 24.7 million small and medium-sized enterprises (SMEs)[2] in the European Union (EU) represent 99.8 % of all of its non-financial businesses, accounting for 64.4 % of all employment and 51.8 % of the value added.[3] It is therefore important to understand how inflation has impacted SMEs. This study aims to contribute to this goal by answering the following research questions:

1. **How has inflation evolved over time and across the industrial ecosystems?**[4]
2. **What are the main and SME-specific inflation drivers?**
3. **What are the past and expected future impacts of sustained high inflation on SMEs compared with large enterprises, considering both those firms that can pass costs on to their consumers, and those that cannot?**
4. **What recent and relevant policies have been adopted by the Member States to support SMEs in the context of rising inflation?**

The report is structured as follows. Following the introduction, the methodology is briefly presented in Chapter 2. Chapter 3 reviews recent trends in inflation, its main drivers and the future outlook. Chapter 4 explores the impacts of inflation on SMEs, focusing on how inflation has influenced late payments, bankruptcies, investment, the adoption of digital and green technologies, access to skilled labour, profitability and participation in public procurement. Chapter 5 reviews the recent and relevant policy measures to aid firms during this period of high inflation, and includes existing evidence regarding which measures should be promoted or avoided. Conclusions are presented in Chapter 6.

2. Methodology

The present study relies on a mix of quantitative and qualitative approaches to data collection and analysis, outlined in Annex 1. To briefly summarise the data collection activities, these included the compilation of relevant quantitative data sources, web-scraping, a literature review, and an interview programme. A total of 58 interviews were completed with representatives of Member States, business associations, SMEs and relevant experts.

The quantitative data collected were then analysed using descriptive statistics, regression modelling and simulations of future scenarios. The research team gathered data from institutional databases such as Eurostat (to calculate consumer and producer inflation),[5] the

[2] European Commission. (2022). SME Definition. Available at: https://single-market-economy.ec.europa.eu/smes/sme-definition_en. The legal basis for the definition is contained in the Commission Recommendation of 6 May 2003 concerning the definition of micro, small, and medium-sized enterprises (2003/361/EC), Official Journal of the European Union, L 124/36, 20 May 2003.

[3] European Commission. (2023). SME Performance Review. Available at: https://single-market-economy.ec.europa.eu/smes/sme-strategy/sme-performance-review_en.

[4] Industrial ecosystems encompass all players operating in a value chain. The notion of an ecosystem captures the complex set of interlinkages and interdependencies among sectors and firms spreading across countries in the Single Market. It should be noted that ecosystems are an analytical tool, and not a legal definition nor a fixed nomenclature. To date, the Commission has identified 14 different ecosystems, detailed in Section 2.2.4. See: European Cluster Collaboration Platform. (n.d.). Industrial ecosystems. Available at: https://clustercollaboration.eu/in-focus/industrial-ecosystems/definition. See also: European Commission. (2021). Updating the 2020 New Industrial Strategy: Building a stronger Single Market for Europe's recovery - COM(2021) 350 final. Available at: https://commission.europa.eu/system/files/2021-05/communication-industrial-strategy-update-2020_en.pdf; and Commission. (2021). Annual Single Market Report 2021 - SWD(2021) 351 final. Available at: https://commission.europa.eu/system/files/2021-05/swd-annual-single-market-report-2021_en.pdf.

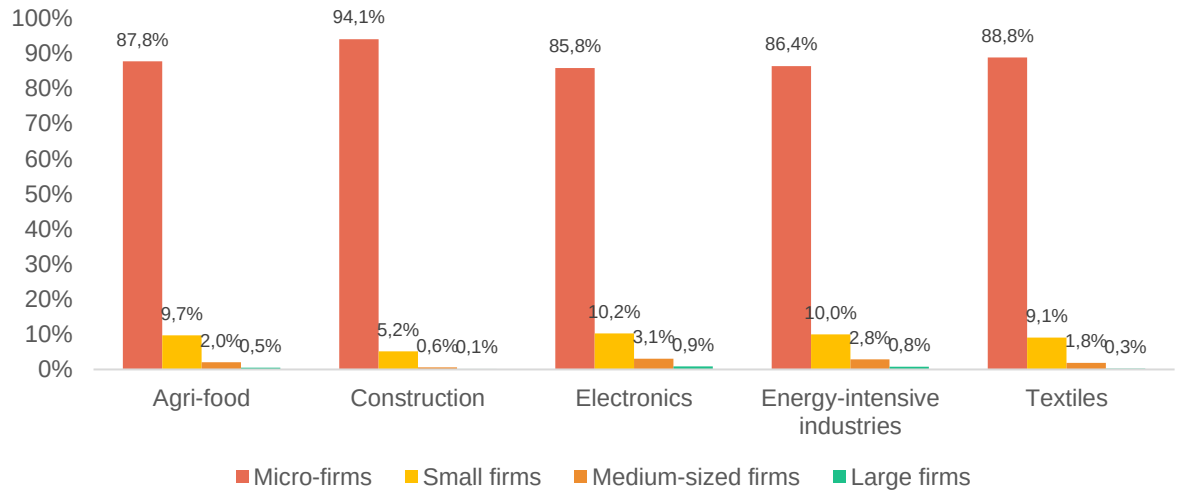
[5] See: https://ec.europa.eu/eurostat/databrowser/explore/all/economy?lang=en&subtheme=prc&display=list&sort=category.

European Central Bank (with the Survey on Access to Finance of Enterprises, SAFE),[6] the Eurobarometer survey on SMEs,[7] resource efficiency and green markets, the European Investment Bank Investment Survey (EIBIS),[8] Tenders Electronic Daily (TED),[9] as well as private databases on firms (namely Technote and Orbis).[10] Please note that some datasets – namely SAFE and EIBIS – disaggregate the economic activities in a different way, which are referred to as 'sectors' rather than 'industrial ecosystems'.

The key independent variable in the regression models was inflation, operationalised for different economic sectors using a combination of agricultural, construction, producer, consumer and labour cost price indices indices to accurately capture cost changes within each ecosystem (for details, refer to Annex 1). Tables accompanying the regression results are presented in Annex 2, and discussed in Chapter 5.

The statistical findings that emerged from this process were corroborated by analysing qualitative data from the literature review and interviews, as well as using additional insights from case studies covering a range of firms operating within the industrial ecosystems of agri-food, construction, electronics, energy-intensive industries, and textiles. These case studies are presented in Annex 3. The five ecosystems above were chosen for three main reasons. First, for the variety of different drivers of inflation they cover; second, due to the differing shares of SMEs within each ecosystem, ranging from the lowest share of 99.1 % in the electronics sector (compared with an average across all sectors of 99.8 %) to the highest share of 99.9 % in construction. Of these, as few as 85.8 % of businesses in electronics were micro-firms, compared with as many as 94.1 % in construction (see Figure 1). Lastly, these sectors were chosen for analysis due to the various types of impacts they were expected to encounter, given the differing production dynamics of each ecosystem.

Figure 1. Share of firms by size in the five selected ecosystems in the EU-27 (2022)



Source: elaborated by PPMI, based on data reported in the SME Performance Review 2023.

[6] See: https://www.ecb.europa.eu/stats/ecb_surveys/safe/html/index.en.html.

[7] See: https://europa.eu/eurobarometer/surveys/detail/2287.

[8] See: https://www.eib.org/en/publications-research/economics/surveys-data/eibis/about/index.htm.

[9] See: https://data.europa.eu/data/datasets/ted-csv?locale=en.

[10] For Technote, see: https://rdistaging.technote.ai/. For Orbis, see: https://login.bvdinfo.com/R0/Orbis.

3. Recent inflation trends, drivers and future outlook

The following section provides an overview of how the inflation experienced by businesses in the EU has evolved over the last few years, including a discussion of what factors have driven these changes. The section then goes on to develop three scenarios for how inflation may change over the next two years, each of which is considered in Chapter 4 regarding the impacts of inflation on SMEs.

3.1. Inflation trends

Key points

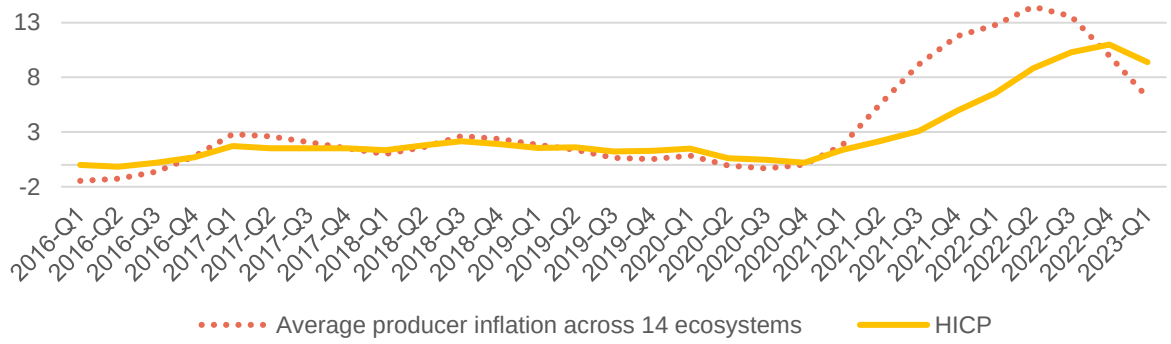
- Between 2018 and the beginning of 2021, year-on-year inflation increased modestly, roughly averaging between 0.8 % and 2.5 %. Since then, inflation has surged five-fold, reaching more than 10 % in Q3 2022, before subsiding in early 2023, following interest rates hikes by the European Central Bank (ECB) and various national central banks.
- Until 2020, producer inflation went hand in hand with consumer inflation (according to the Harmonised Index of Consumer Prices, HICP). However, between Q1 2021 and Q3 2022, producer inflation outpaced HICP, meaning that the inflation experienced by producers increased faster than firms were able to pass these costs on to consumers.
- Producer inflation increased most in those ecosystems that are more reliant on energy inputs, such as energy-intensive industries, the energy-renewables ecosystem, construction, mobility, electronics, retail and agri-food, reaching 53 % year-on-year change in the energy-renewables ecosystem in 2022.

Figure 2 shows the average trends in inflation across all ecosystems at quarterly intervals, based on the operationalisation described in Section A.1.1.1.A.1.2.1. As shown in the figure, there is a modest year-on-year increase in inflation, averaging around 1 % between 2016 and the beginning of 2021. After this point, average changes in inflation compared with the same quarter in the previous year reached more than 10 % in 2022.The figure also includes the HICP for comparison. While average annual changes in inflation across ecosystems and the HICP remained relatively consistent until Q1 of 2021, the former outpaced the HICP in the four subsequent quarters, signalling that production costs rose more quickly than firms were able to pass these costs on to consumers. Only at the end of 2022 did the HICP exceed producer inflation, which reflected lower pressures from input costs such as energy,[11] but also the increasing importance of demand-side drivers of the HICP, compared with supply-related factors.[12] This, in turn, allowed some firms to achieve record profits in 2022, to the detriment of consumers (see Section 4.7 for more on this).

[11] On the lower energy price pressure, see: European Commission. (2023). Decomposing producer price inflation in the euro area – quarterly update. Available at : https://single-market-economy.ec.europa.eu/single-market/services/economic-analysis/producer-price-inflation-euro-area_en.

[12] ECB (2022). The role of demand and supply in underlying inflation – decomposing HICPX inflation into components. Available at: https://www.ecb.europa.eu/pub/economic-bulletin/focus/2022/html/ecb.ebbox202207_07~8b71edbfcf.en.html.

Figure 2. Changes in inflation compared with the same quarter in the previous year (%) in the EU-27, Q1/2016-Q1/2023, aggregate values and HICP



Source: elaborated by PPMI, based on data from Eurostat and national sources.

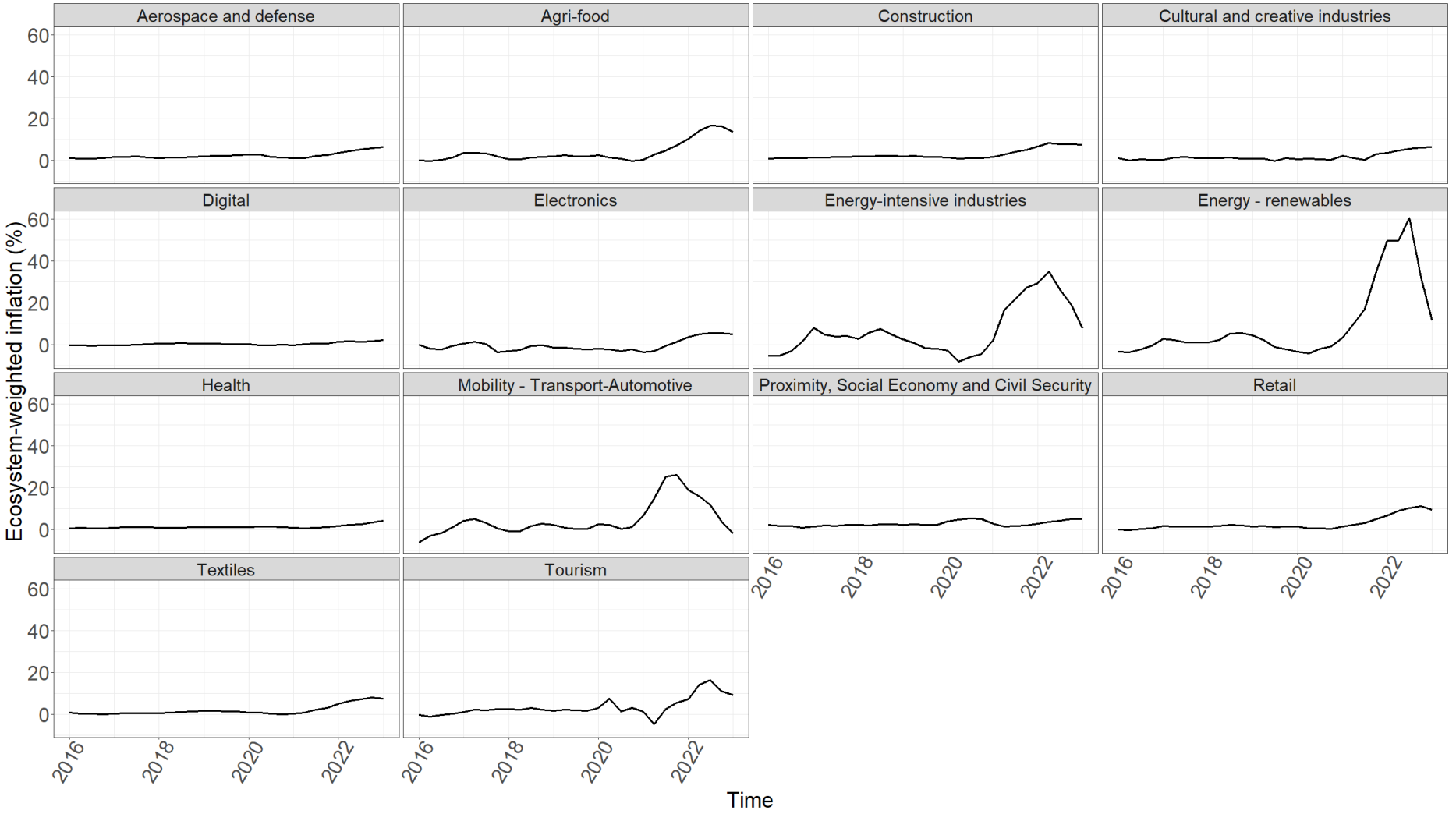
As Figure 3 shows, during 2021 and 2022, inflation in most ecosystems increased by around 5-10 % compared with the same quarter in the previous year. The recent increase in inflation had already begun in 2021, and was driven strongly by those ecosystems that are more reliant on energy inputs, such as energy-intensive industries, the renewable energy-renewables ecosystem, construction, mobility, electronics, retail, and agri-food. The strong inflationary pressures within these ecosystems are likely to have been due to the fact that increases in producer prices were mostly driven by supply shortages, especially for equipment and materials, which in 2021-2022 accounted for around 90 % of the total pressure.[13]

Starting in 2022, service-focused ecosystems – namely, tourism; retail; cultural and creative industries; and the proximity, social economy and civil security ecosystem, also experienced an increase in inflation, albeit to a lesser extent. Unlike manufacturing firms, this increase was possibly the result of rising wage costs, as well to the changing nature of inflation, which by 2022 had switched from being supply-driven to being demand-driven.[14] This can also be seen in the steep drop-off in energy-related producer prices, as shown in the renewables and energy-intensive industries ecosystems.

[13] European Commission (2023). Decomposing producer price inflation in the euro area – quarterly update. Available at : https://single-market-economy.ec.europa.eu/single-market/services/economic-analysis/producer-price-inflation-euro-area_en.

[14] Eurointelligence Professional Daily Morning Newsbriefing. (2023). Eurostat inflation data, February 2023. Available at: https://ec.europa.eu/eurostat/documents/2995521/16138299/2-02032023-AP-EN.pdf/91fa331d-8f61-adff-5e42-d92a64b6ee81. See also: Pasimeni, P. (2022). Supply or Demand, that is the Question: Decomposing the Euro Area Inflation. Luxembourg: Publication Office of the European Union.

Figure 3. Changes in inflation compared with the same quarter in the previous year (%) in the EU-27, Q1/2016-Q1/2023, by ecosystem



Source: compiled by PPMI, based on data from Eurostat and national banks.
Note: Ecosystem-weighted inflation, which employs a mixture of producer and consumer prices, depending on which NACE codes are included in the 14 ecosystems.

3.2. Drivers of inflation

Key points

- The pandemic set the stage for inflationary pressures by creating supply-chain disruptions, increasing the costs of transportation and logistics, impacting demand and wages, and generating labour shortages.
- Russia's war of aggression against Ukraine has exacerbated pre-existing supply chain disruptions, in particular due to blockades of ports, and has led to shortages in key raw materials (e.g. fertilisers, cereals, oils, etc.). Russia's halting of gas supply to EU countries has also resulted in further increases in energy prices.
- Ecosystem-specific drivers also played a part. Extreme weather and population growth has affected the agri-food sector. Shortages of skilled workers, as well as national policies aimed at boosting demand in the construction sector, have resulted in greater workload and higher costs for contractors. The electronics ecosystem has also suffered a shortage of semiconductors and electronic components.

3.2.1. The COVID-19 pandemic

The pandemic set the stage for inflationary pressures in 2022 in several ways. First, lockdowns led to **supply-chain disruptions** as production declined.[15] This is clearly illustrated by the textile ecosystem. Large EU brands in the apparel and footwear sectors rely heavily on outsourcing and foreign suppliers for specific intermediate products and raw materials (e.g. combed wool, dyes[16] and chemical components) that are necessary for their manufacturing activities, and for which the EU offer is insufficient.[17] When supply chains were disrupted, access to these raw materials became more limited, leading to an increase in their prices.[18] The seasonal nature of clothes and footwear sales requires products to be available in the market in due time, which further forced EU companies to accept high price increases from their suppliers (especially given that contract clauses and penalties could be extremely severe). Given the integration of European SMEs into global value chains, similar transmission mechanisms applied to other ecosystems as well.

Second, the pandemic increased **transportation and logistics costs**, including road transport but especially sea transport. These increased costs made the final prices of products on the EU market even more expensive. The cost of transporting a container from Asia increased by more than 600 % between September 2020 and September 2021 (e.g. the Shanghai-Rotterdam Drewry Container Index, an indicator that tracks the freight costs of 40-foot containers via major routes, increased from USD 2,186 to USD 14,807 during the period October 2020-October 2021). Shipping costs remained high for most of 2022.[19]

[15] Magableh, G.M. (2021). Supply Chains and the COVID-19 Pandemic: A Comprehensive Framework. *European Management Review*, 18(3), 363-382.
[16] European Commission (2022). Annual Single Market Report 2022. Commission Staff Working document, p. 12. Available at https://ec.europa.eu/docsroom/documents/48877.
[17] Related to this is the recent work by the Commission on SCAN (Supply Chain Alert Notification), which helps to identify significant inflationary pressures and/or shortages. An empirical application of SCAN in 2022 reveals inflationary pressures mostly affected basic metals, wood products and chemicals. See: Amaral, A. et al. (2022). "SCAN" (Supply Chain Alert Notification) monitoring system. Luxembourg: Publication Office of the European Union.
[18] Pasimeni, P. (2022). Supply or Demand, that is the Question: Decomposing the Euro Area Inflation. Luxembourg: Publication Office of the European Union.
[19] Drewry World Container Index Database. Available at: https://en.macromicro.me/collections/4356/freight/44756/drewry-world-container-index.

A third pandemic-related impact affected the **demand side**. During the pandemic, there was a sudden drop in demand for certain goods and a panic buying of others, causing price fluctuations due to limited supplies. Sudden increases in online orders further complicated delivery chains.[20]

Lastly, the pandemic also impacted **wages**. Average real wages rose in most EU countries in 2020, in large part due to mechanisms such as **wage support and job retention schemes**.[21] An additional factor influencing wage growth was **labour shortages** during the late-pandemic period.[22] During 2020, due to reduced demand, much of the workforce was either furloughed or had been terminated.[23] Moreover, a growing number of workers in contact-intensive industries decided to move to other jobs in order to avoid becoming infected with COVID-19.[24] However, by 2021, improvements in market conditions due to a slowing down of the pandemic, together successful economic interventions by governments, meant that there was an increased demand for workers. Such sudden increases created recruitment bottlenecks in some sectors and consequently 'overheated' the labour market, pushing wages up.[25]

3.2.2. Russia's war of aggression against Ukraine

Russia's war of aggression against Ukraine was the key driver of inflation observed in 2022, building on the pandemic-related price pressures. The sanctions imposed against Russia following its invasion meant that the supply of **energy** to the EU fell, leading to year-on-year prices rising by 53 % in October 2022 (see Figure 4). This explains why the energy-renewables and energy-intensive ecosystems saw greater price increases relative to other ecosystems (see Section 3.1). This increase in energy prices was so primarily due to the EU's dependence on Russian energy: in August 2021, 41 % of all gas imported into the EU came from Russia.[26]

[20] Magableh, G.M. (2021). Supply Chains and the COVID-19 Pandemic: A Comprehensive Framework. *European Management Review*, 18(3), 363-382.
[21] Molina, O. (2020). Impact of the COVID-19 crisis on wages and wage setting. Available at: https://www.eurofound.europa.eu/publications/article/2021/impact-of-the-covid-19-crisis-on-wages-and-wage-setting
[22] Frohm, E. (2021). Labour Shortages and Wage Growth. *ECB Working Paper 2576/2021*. Available at: https://www.ecb.europa.eu/pub/pdf/scpwps/ecb.wp2576~3f8114fc02.en.pdf.
[23] Ando, S., Balakrishnan, R., Gruss, B., Hallaert, J.-J., Jirasavetakul, L.-B.F., Kirabaeva, K., Klein, N., Lariau, A., Liu, L.Q., Malacrino, D., Qu, H., & Solovyeva, A. (2022). European Labor Markets and the COVID-19 Pandemic: Fallout and the Path Ahead. *IMF Departmental Papers DP/2022/004*. Available at: https://doi.org/10.5089/9798400200960.087.A001.
[24] *Ibid*.
[25] Adăscăliței, D. (2021). The pandemic aggravated labour shortages in some sectors; the problem is now emerging in others. Available at: https://www.eurofound.europa.eu/nb/publications/blog/the-pandemic-aggravated-labour-shortages-in-some-sectors-the-problem-is-now-emerging-in-others.
[26] European Commission (c.d.). REPowerEU. Available at: https://commission.europa.eu/strategy-and-policy/priorities-2019-2024/european-green-deal/repowereu-affordable-secure-and-sustainable-energy-europe_en.

Figure 4. HICP and some of its components, January 2021–May 2023

Source: elaborated by PPMI, based on Eurostat table PRC_HICP_MANR.

While higher energy prices were by far the biggest contributor to the overall rise in inflation, Russia's war of aggression against Ukraine also impacted prices in other ways. The war **exacerbated pre-existing supply chain disruptions**, in particular due to port blockades and shortages of truck drivers, which caused reductions in exports.[27] Furthermore, the war led to reduced supply and shortages of certain **raw materials**, affecting multiple industries.

For example, the war disrupted the supply of fertiliser from Russia, the world's largest exporter,[28] affecting the agri-food ecosystem. Furthermore, Ukraine and Russia are two of the world's leading producers of agricultural products. Prior to the war, exports from both countries had accounted for 34 % of the global total for wheat, 27 % for barley, and 56 % for sunflower oil. In addition, Ukraine had previously exported 15 % of all maize globally, with 11 million tonnes exported to the EU each year, as well as 61 % of sunflower cake – critical inputs into animal feed.[29] The reduced supply of cereals caused by Russia's war of aggression in Ukraine impacted livestock farming activities in the EU as well as the availability and quality of skins and hides, also affecting production costs in the textiles ecosystem, among others.

With regard to energy-intensive industries, in 2022 the European printing industry association Intergraf announced that the graphic industry was experiencing unprecedented shortages of paper supply.[30] The war in Ukraine and its impact on the supply of wood and pulp (key raw material for paper manufacturing, extracted from wood) were also reported as an added challenge to the sector.[31]

In construction, the war prompted shortages of raw materials and increases in the price of building materials including steel, copper, aluminium and wood – as well as, more recently,

[27] *Ibid*.
[28] Saleh, H. (2023). Ukraine war fallout benefits one of world's biggest fertiliser groups, Financial Times, 8 February. Available at: https://www.ft.com/content/850d8c0a-a853-4b0e-aba3-d63d18ab0c93.
[29] European Parliament (2023). At a Glance. Question time: Food price inflation in Europe. Available at: https://www.europarl.europa.eu/thinktank/en/document/EPRS_ATA(2023)739298.
[30] Intergraf (2022). Shortages of paper causes chaos among printers and their customers. Available at: https://www.intergraf.eu/communications/press-releases/item/373-shortage-of-paper-causes-chaos-among-printers-and-their-customers.
[31] *Ibid.*

clay materials (e.g., bricks, tiles), mineral products (gravel, cement, and concrete), glass and certain chemical products.[32] These were driven both by the reduced supply of raw materials from Russia as well as the higher transportation costs associated with rises in fuel prices.[33]

3.2.3. Ecosystem-specific inflation drivers

The case studies on those ecosystems selected for in-depth analysis (see Annex 3) helped to identify additional drivers of inflation in the agri-food, construction and electronics ecosystems.

Extreme weather experienced in Europe in 2022 increased inflation in the **agri-food** ecosystem. Severe drought resulted in pasture failures and reductions of approximately 16 % in maize, 15 % in soya bean and 12 % in sunflower crops – all of which are important to animal nutrition.[34] In addition, over a longer time horizon, food prices are growing due to **population growth** in Asia and Africa.[35]

With regard to **construction**, **the scarcity of skilled labour** has affected the entire value chain,[36] from highly skilled engineers and architects to technicians and blue-collar workers. Such shortages can result in higher salaries,[37] the hiring of under-skilled and less efficient professionals, or understaffed operations. These outcomes translate into higher operational costs. While supply challenges in relation to materials and equipment were particularly severe in the manufacturing segments of the ecosystem, such as the production of building products, the shortage of labour mainly affected service activities (builders, engineering and architectural firms).[38]

This shortage of labour supply has also been exacerbated by **national policies aimed at driving demand**, introduced to support the economy. One such example is the Italian Construction Tax Benefit (the so-called 'Superbonus 110 %')[39], which aims to exert a counter-cyclical demand effect on the construction sector in order to help Italy's economy to recover from the collapse in demand due to the COVID-19 pandemic. The Superbonus is an incentive to homeowners to improve the energy efficiency of their homes and reduce their seismic risk. Specifically, it is a tax incentive of up to 110 % of building costs, capped at a maximum ceiling, aimed at improving the energy efficiency of dwellings.

The take-up of the scheme has been huge, so the package is driving unprecedented demand for both builders and materials, pushing up construction prices while the supply of materials cannot keep pace with demand, resulting in a marked inflationary effect on the prices of construction products. Such policies are not isolated to Italy: a similar plan for the US post-pandemic recovery led to an increase in US imports of building materials from Europe.[40] Nevertheless, over the medium and long term, the savings in energy consumption resulting from this scheme are expected to have a downward impact on prices, thus partially offsetting the upward pressure seen in the short term.

One inflation driver specific to the **electronics** ecosystem is a **shortage of semiconductors and electronics components**. Not only has this shortage increased over the last two years,

[32] European Commission (2023). Transition pathway for Construction, p. 11.
[33] Pasimeni, P. (2022). Supply or Demand, that is the Question: Decomposing the Euro Area Inflation. Luxembourg: Publication Office of the European Union.
[34] Eurostat (2023). Annual inflation more than tripled in the EU in 2022. Available at: https://ec.europa.eu/eurostat/web/products-eurostat-news/w/ddn-20230309-2.
[35] Interreg Europe Policy Learning Platform on SME competitiveness (2022). Policy brief on: Supporting the agrifood sector. Available at: https://www.interregeurope.eu/find-policy-solutions/policy-briefs/supporting-the-agrifood-sector.
[36] Eures (2023). Report on Labour shortages and surpluses. Luxembourg: Publications Office of the European Union.
[37] Eurostat (2023). Annual increase in labour costs at 5.7% in euro area. Euroindicators 32/2023, p.7
[38] European Commission (2021). Annual Single Market Report 2021. Commission Staff Working document
[39] For more information, see the Italian revenue agency website: https://www.agenziaentrate.gov.it/portale/superbonus-110%25.
[40] European Commission (2021). Scenarios for a transition pathway for a resilient, greener and more digital construction ecosystem, p. 7 Available at https://ec.europa.eu/docsroom/documents/47996.

but it has become increasingly difficult for SMEs to access components, as **the electronics market is highly concentrated among a few global players** who are able to dominate in terms of purchasing power. SMEs are faced with a costly situation in which, to compete with large firms, they **have to place minimum volume orders** that are greater than their production needs, thereby shouldering an excessive financial burden that affects their overall business operations.

3.3. Economic short-term outlook and projections of inflation

Key points

- In a baseline scenario with no further increases in interest rates after 2023 and an increased rate of GDP growth between 2023 and 2024, the HICP is projected to be 4-7% in 2023, followed by 2-3 % in 2024.
- In a pessimistic scenario, characterised by a further tightening of monetary policy in 2023 and a modest rate of GDP growth, the HICP is projected to be 7-8 % in 2023, and 3-4% in 2024.
- In a highly adverse scenario, with a further tightening of monetary policy and a new energy price crisis with a negative GDP growth rate, the HICP is projected to be 8-12 % in 2023, and 5-10 % in 2024.

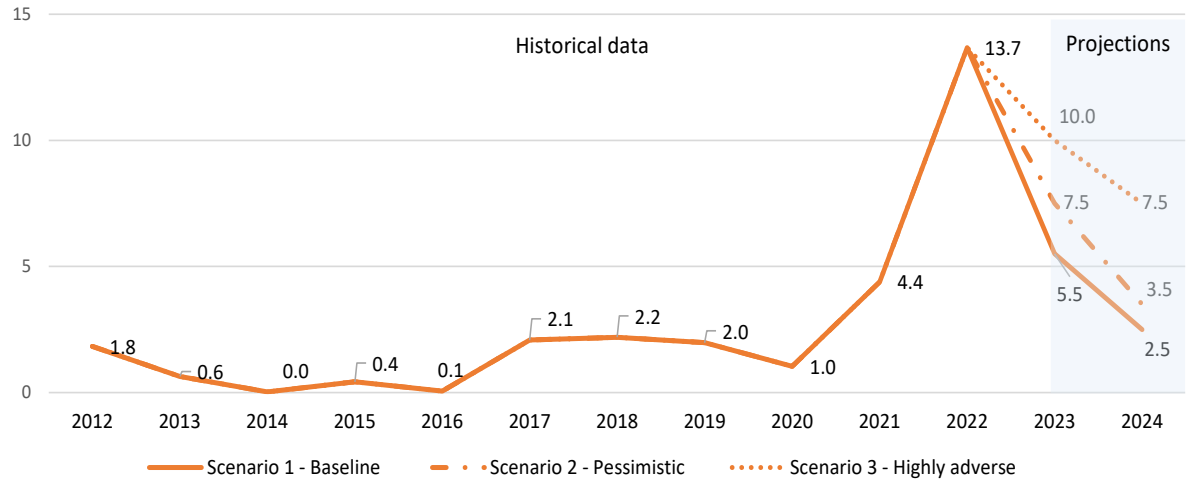
Having reviewed how the inflation experienced by businesses has evolved thus far along with its main drivers, this section considers three scenarios for the further evolution of inflation in 2023 and 2024. Each of the impacts assessed in detail in this report will be evaluated against each of the three scenarios. Figure 5 and Figure 6 show inflation projections for each of the three scenarios, using the inflation operationalisation outlined in Annex 1. Meanwhile, Table 1 provides details of the three scenarios, including expectations for GDP and monetary policy by the ECB. The assumptions common to all scenarios over this short-term forecast horizon are that:

- the public fiscal stimulus remains constant across all scenarios;
- the pandemic will not cause any major disruptions to the EU economy;
- geopolitical tensions with Russia and all of the stipulated sanctions remain in place.

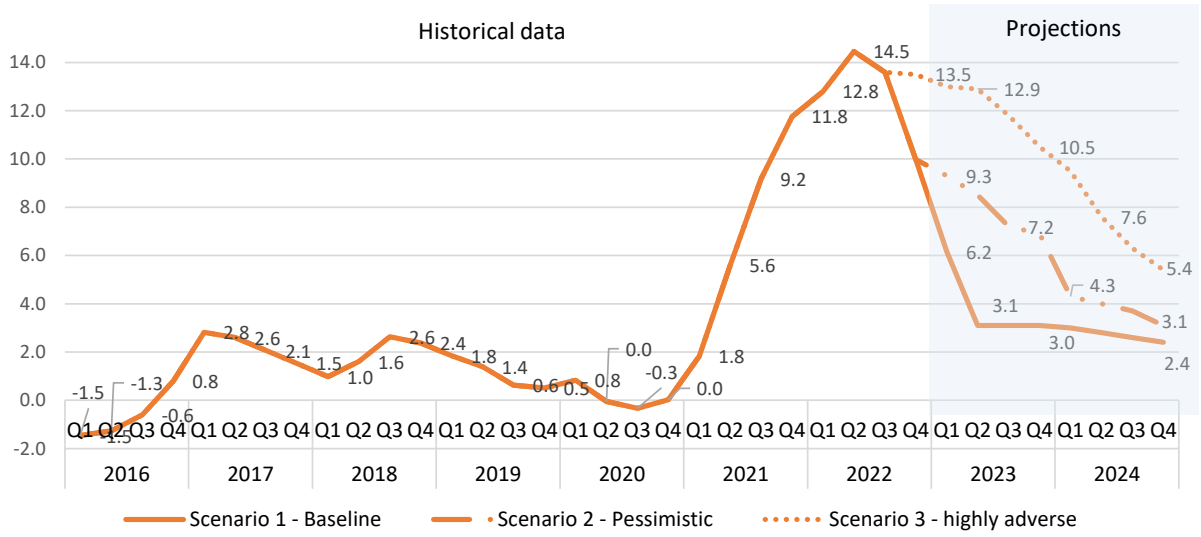
In a context of great uncertainty, in which the Russian war of aggression against Ukraine continues to be a major cause of instability in the EU, the scenarios build on specific assumptions starting from the most recent available macroeconomic short-term outlooks released between September and October 2023 by the European Commission and other international organisations.[41]

[41]European Commission (September 2023). European Economic Forecast – Summer 2023. Institutional Paper 255| September 2023. Available at: https://economy-finance.ec.europa.eu/economic-forecast-and-surveys/economic-forecasts/summer-2023-economic-forecast-easing-growth-momentum-amid-declining-inflation-and-robust-labour_en.

Figure 5. Average year-on-year change in inflation in the EU-27 (%), 2012-2024



Note: the projections for 2023 and 2024 reported in the figure are the mid-points of simulated inflation (HICP) ranges reported in Table 1.

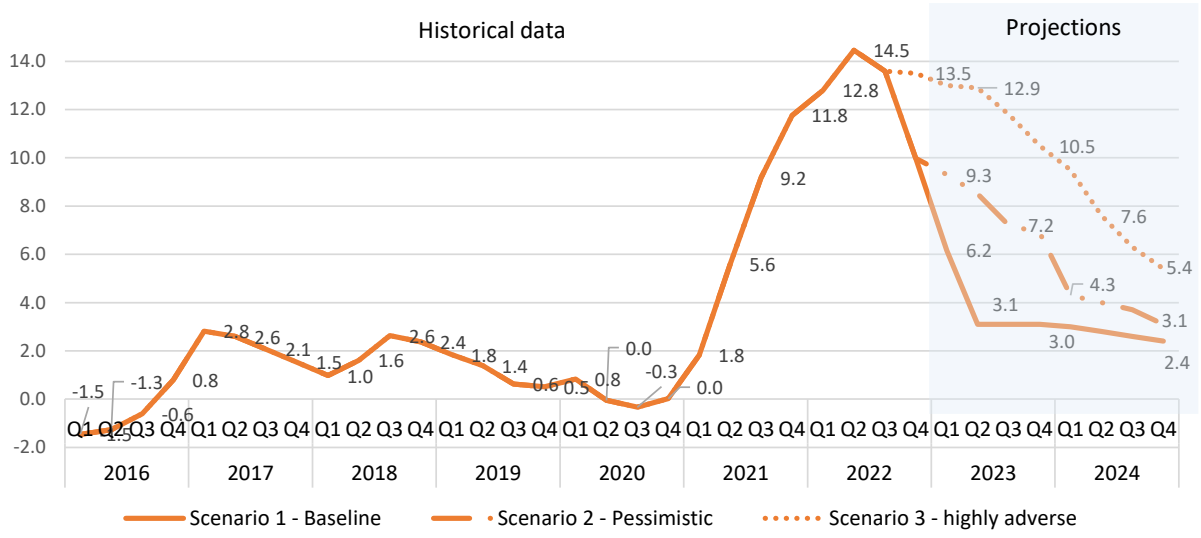


Source: elaborated by PPMI and CSIL.

Table 1

Source: elaborated by PPMI and CSIL.

Figure 6. Change in inflation compared with the same quarter of the previous year (%), EU-27 Q1/2016-Q4/2024



Source: elaborated by PPMI and CSIL.

Table 1. Short-term outlook scenarios for the EU

Scenario	Likelihood	Interest rate	Annual growth in the Gross domestic Product (GDP)	Inflation (HICP)
Baseline	High	• 2023: increase by 25bp in July and 25bp in September • 2024: no further increases	• 2023: 0.8 % • 2024: 1.4 %	• 2023: 4-7 % • 2024: 2-3 %
Pessimistic (tightening of monetary policy)	Medium	• 2023: Increase by 25bp in July, 25bp in September and at least one more increase by 25bp by the end of the year • 2024: no further increases	• 2023: 0-0.5 % • 2024: 0.5-1 %	• 2023: 7-8 % • 2024: 3-4 %
Highly adverse (tightening of monetary policy and a new energy price crisis)	Low	• 2023: Increase by 25bp in July, 25bp in September and at least two additional increases by 25bp by the end of the year • 2024: no further increases	• 2023: between 0.5 % and -0.5 % • 2024: between -1 % and -2 %	• 2023: 8-12 % • 2024: 5-10 %

Source: authors' own elaborations and assumptions, based on European Commission Summer 2023 macroeconomic short-term outlooks released in September 2023, experts' opinions, and triangulation with economic outlooks released by the OECD and the European Central Bank covering the same period..

3.3.1. Scenario 1: Baseline

Yearly headline inflation (HICP) projections for 2023 and 2024 point to a decline in inflation in Europe compared with 2022, while annual core inflation (i.e. excluding food and energy prices) is proving persistent.[42] **European Commission outlooks released in Summer 2023**

[42] HICP is the headline inflation figure, and includes food and energy prices. The ECB formulates its objective of price stability according to headline inflation, mainly due to its relevance in measuring citizens' purchasing power.

indicated that yearly headline inflation will be in the range of 4-7 % in 2023, followed by 2-3 % in 2024. This is therefore the level of inflation assumed in the baseline scenario.

Energy prices will remain an important component of inflation through to the end of 2023 and in the first quarter of 2024, but their deceleration is expected to contribute to a decrease in inflation in 2024.[43] At the same time, rises in the prices of non-energy industrial goods and services increased inflation rates over the course of 2023, replacing energy as the primary driver of inflation across the EU-27.[44] Specifically, pent-up demand[45] is the main driver of the current persistence of inflation, even if consumption levels are decreasing quickly. The persistence of inflation during the first half of 2023 led to the ECB's decision to further increase the three key interest rates[46] by 25 basis points (25bp) in July and September 2023,[47] in line with the Bank's goal of ensuring the timely return of inflation to the medium-long term target rate of 2 %.[48] The ECB held off raising interest rates in October 2023 for the first time in 15 months due to a gradual decline in inflation; however, as noted above, the outlook remains highly uncertain. **Therefore, inflation is expected to decline for the near future, but is still expected to remain above the ECB target.**

The inflationary trend in the baseline scenario is coherent with a positive but modest expansion of the EU economy in 2023 and 2024. GDP growth in the EU has been revised downwards in the 2023 autumn projections as compared with the outlook released in spring. It is expected to grow by 0.8 % in 2023 (down from a previous forecast of 1 %), followed by 1.4 % in 2024 (compared with 1.7 % in the spring outlook).[49] High (and still-increasing) consumer prices for most goods and services are negatively impacting consumption despite a decline in energy prices, the continuing expansion of employment, and rising wages. On top of this, a tightening of monetary policy is causing a rapid slowdown in the provision of bank credit. Despite the downgrading of estimates, GDP growth is still expected to be positive, supported by pent-up demand since the pandemic (see above) and the sustained level of public investments forecast in 2023 and 2024, thanks to the continued deployment of the Recovery and Resilience Facility (RRF).[50]

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[43] Moreover, gas storage levels are comfortable, and the risk of shortages occurring next winter is considered negligible. See European Commission. (2023). Spring 2023 Economic Forecast: An improved outlook amid persistent challenges. Available at: https://ec.europa.eu/commission/presscorner/detail/en/ip_23_2723.

[44] As of February 2023, monthly inflation excluding energy and food increased to 7.4 % with respect to January 2023, See Eurostat (2023). Euroindicators, released on 17 March 2023. Available at: https://ec.europa.eu/eurostat/web/products-euro-indicators/w/2-17032023-ap.

[45] This pent-up demand is the release of excess savings during the pandemic, which has sustained demand since 2021. This is also coherent with increased profit margins (Section 4.7).

[46] In the Eurosystem, the three key ECB interest rates are: (1) the rate for the main refinancing operations (MRO), which determines the interest rate applied in regular lending operations conducted by the ECB to provide liquidity to the banking system. This is the interest rate that banks pay when they borrow money from the ECB for one week. When they do so, they must provide collateral to guarantee that the money will be paid back; (2) the rate for the marginal lending facility, which determines the interest rate charged on overnight credit provided to banks by the EBC. This is similar to the MRO, but applies to overnight loans, and costs banks more than if they borrow for one week (the money must be reimbursed the day after the negotiation and the provision of the loan); (3) the deposit rate, which is the interest rate banks receive (or pay in the case of negative interest rates) for depositing money overnight with the ECB. The MRO is the main reference rate of the three interest rates the ECB sets every six weeks as part of its work to keep prices stable in the euro area. The deposit rate and the rate on the marginal lending facility normally form the "corridor" within which money market overnight rates fluctuate.

[47] The increase in July 2023 followed three increases by 50 basis points on 16 March 2023, 25 basis points on 4 May 2023, and an additional rise of 25 basis points on 15 June 2023. See: https://www.ecb.europa.eu/press/pr/date/2023/html/ecb.mp230727~da80cfcf24.en.html#:~:text=Key%20ECB%20interest%20rates,The%20Governing%20Council&text=Accordingly%2C%20the%20interest%20rate%20on,effect%20from%202%20August%202023.

[48] ECB (2023). *Combined monetary policy decisions and statement, 16 March 2023*. Available at: https://www.ecb.europa.eu/press/govcdec/mopo/html/index.en.html

[49] European Commission (September 2023). European Economic Forecast – Summer 2023. Institutional Paper 255| September 2023. Available at: https://economy-finance.ec.europa.eu/economic-forecast-and-surveys/economic-forecasts/summer-2023-economic-forecast-easing-growth-momentum-amid-declining-inflation-and-robust-labour_en.

[50] European Commission (2023). *Spring 2023 Economic Forecast: An improved outlook amid persistent challenges.* Available at: https://ec.europa.eu/commission/presscorner/detail/en/ip_23_2723.

3.3.2. Scenario 2: Pessimistic (tightening of monetary policy)

This scenario assumes that **interest rates under the baseline scenario will not be sufficiently restrictive to bring inflation down** to the ECB's 2 % target, and thus refers to tighter monetary policy decisions being made (with at least one more increase by 25bp by the end of the year). Indeed, it is still possible that consumers held off making purchases during the pandemic, building up a backlog of demand that is being unleashed now and will continue for the next few months, allowing producers to pass costs on to customers. From the opposite direction, employees' attempts to recoup some of the purchasing power they have lost due to high inflation over the last year may be adding wage pressures to the expected inflation rate.[51]

Simulations see **HICP inflation** ranging between 7 % and 8 % in 2023, and between 3 % and 4 % in 2024, before falling gradually throughout the course of 2025.

Tighter monetary policy will produce a mix of circumstances that are expected to reduce prospects for economic growth. These include higher funding costs for firms and less fiscal space for governments, especially those with higher levels of debt.[52] Higher inflation is also weighing down on the disposable income and debt servicing capacity of households, especially those with lower incomes, leading to expected negative effects on consumption. In this scenario, the fourth quarter of 2023 may be characterised by reductions in private consumption and in investment within the Eurozone by 1 % and 3 %, respectively, leading to weaker growth prospects than the baseline scenario, with **GDP growth of between 0 % and 1 % in 2023/2024**.[53]

3.3.3. Scenario 3: Highly adverse

The highly adverse scenario makes assumptions about the consequences for the EU economy of a possible new wave of inflation of the same order of magnitude as that experienced during 2022. This could be caused by the combination of an energy crisis-induced supply shock and demand-driven hikes in the price of food products and services.[54] This scenario does not take into account any measures that might be introduced to mitigate the effects of more adverse developments.

A permanent disruption in European energy imports from Russia would primarily result in a sharp increase in energy prices, accompanied by heightened uncertainty and significant weakness in global trade. For instance, the Commission's 2023 Summer Forecast indicates that the contribution from energy prices was set to be negative in 2023, but should turn positive in 2024 due to signs of possible OPEC+[55] cuts in supply pointing to slightly higher prices in

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[51] *Ibid*.

[52] As monetary policy acts to address inflation, governments will face further challenges, especially in countries that already have higher levels of public debt, such as Greece, Italy, Portugal, Spain, France and Belgium. Since 2020, EU governments have used fiscal deficits to counter the impacts of COVID-19, rising energy prices and inflation. These interventions were made in the context of exceptional availability of funds at low interest rates of between 0 % and 1 % and following a period of decreasing trajectory of the government debt-to-GDP ratio. The ECB's new expectations foresee that prolonged deficits, along with rising funding costs, will limit the use of fiscal interventions to sustain the economy in the face of future negative shocks, with the consequence of putting the debt dynamics of some countries on less favourable trajectories. See: Eurointelligence Professional Daily Morning Newsbriefing. (2023). Eurostat inflation data, February 2023. Available at: https://ec.europa.eu/eurostat/documents/2995521/16138299/2-02032023-AP-EN.pdf/91fa331d-8f61-adff-5e42-d92a64b6ee81 Eurostat (2022). General government debt, 2020, 2021. Available at: https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Government_finance_statistics#Government_debt.

[53] Simulations based on the Financial Stability Review (FSR) released at the end of 2022 by the ECB, when a pessimistic scenario was expected, in contrast to upwards revisions in spring 2023.

[54] ECB (2023). Financial Stability Review May 2023. Available at: https://www.ecb.europa.eu/pub/financial-stability/fsr/html/ecb.fsr202305~65f8cb74d .en.html#toc7.

[55] In 2016, largely in response to dramatically falling oil prices driven by significant increases in US shale oil output, OPEC signed an agreement with 10 other oil-producing countries to create what is now known as OPEC+. These 10 other countries include Russia, Mexico, Kazakhstan and Oman.

spring than had been assumed.[56] On top of this, persistent inflationary pressure could derive from high prices for services and unprocessed foods.[57] As an example, monthly inflation on services increased to 4.8 % between January and February 2023, driven mainly by the gradual pass-through of past increases in energy costs, as well as rising wages, and pent-up demand following the restarting of the economy after the COVID-19 pandemic.

In this highly adverse scenario, **inflation is forecast to rise to between 8 % and 12 % during the final quarter of 2023/beginning of 2024, before declining to between 5 % and 10 % by the end of 2024** and dropping further afterwards, when the direct and indirect impacts of higher energy prices would be offset by the contrary effect of worsening cyclical conditions (see below), which would weigh more persistently on price developments.

These developments probably result in slower economic activity and even tighter financing conditions, with at least two additional **increases of 25bp in interest rates by the end of the year**. While supporting banks' profitability, higher interest rates are expected to reduce the asset quality[58] and contribute to tighter financial conditions for firms by increasing funding costs and dampening down consumption demand. Under this scenario, **GDP would fall** up to -0.5 % by the end of 2023/start of 2024, followed by a drop of between -1 % and -2 % by the end of 2024, and would grow moderately in the subsequent year.

3.3.4. Inflation projections by ecosystem

Figure 7 and Figure 8 show ecosystem-specific projections **for 2023 and 2024 in the baseline scenario**. Declining inflation is expected across all ecosystems, although at different speeds. Energy-intensive industries, agri-food and to a lesser extent, construction are expected to experience more persistent inflation compared with the electronics and textile ecosystems.[59] Indeed, while a reduction in price growth is expected, energy market dynamics in 2023 will be just as challenging for Europe as they were in 2022, and input costs will remain high at least throughout 2023. The effect of consistently high input costs, along with a demand-driven component of inflation for services and unprocessed food, will translate into a persistence of inflationary effects in the near future in the energy-intensive industries, agri-food and construction ecosystems, in which inflation is expected to run at between 5 % and 15 % over the coming quarters compared with the same period in 2022.

According to simulation analysis, inflation levels will also continue to evolve differently between the ecosystems selected for in-depth analysis in both **the pessimistic** and the **highly adverse scenarios**,:[60]

- Inflation in **energy-intensive industries** will depend on energy price variations between countries, based on their future fuel mix and the level of energy efficiency in

[56] In contrast, upside risks to gas and electricity prices appear contained thanks to a rapid expansion of liquefied natural gas infrastructure and the diversification of supply. A similar evolution to gas is expected for electricity prices, with energy-intensive industries and households having adjusted their energy consumption patterns.
[57] Eurointelligence Professional Daily Morning Newsbriefing (2023). Eurostat inflation data, February 2023. Available at: https://ec.europa.eu/eurostat/documents/2995521/16138299/2-02032023-AP-EN.pdf/91fa331d-8f61-adff-5e42-d92a64b6ee81.
[58] Loans granted to businesses and households are assets for banks. A rise in interest rates may therefore be profitable for banks, leading to an increase in their net income from interest. However, if the economy deteriorates and interest rates increase still further, a deterioration in asset quality due to an increase in non-performing loans could materialise, with negative impacts on bank profitability. The interest that banks earn on these assets is a key component of their income and profit, and the risk of loans not being repaid is their main risk. The higher this credit risk, the lower the quality of the loan, also known as its "asset quality".
[59] Interestingly, this effect appears not to correlate with the importance of SMEs to each of these ecosystems, in terms of added value. While SMEs provide 44 % of the value added in agri-food, and only 37 % in energy-intensive industries, the value added by SMEs in construction is 70 %. Likewise, SMEs in electronics only add around 40 % of all value, whereas those in textiles add 64 %.
[60] Authors' elaboration, based on macroeconomic short-term outlooks released between March and May 2023, together with experts' opinions and case studies. The assumed inflation rate is based on the assumption that this scenario already materialises in 2023.

their economies.[61] Inflation will reach its highest level in the highly adverse scenario (25-40 %).

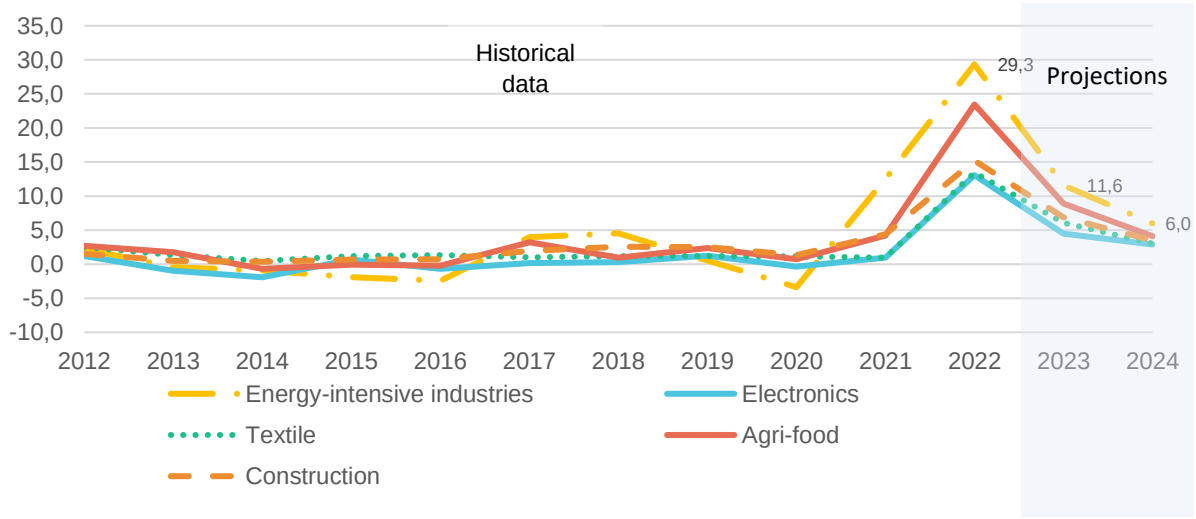
- **Agri-food**: under the highly adverse scenario, the domino effect of the invasion of Ukraine by Russia will continue to produce both direct and indirect effects on the ecosystem. Russia is the world's largest supplier of natural gas, and is responsible for 33 % of the world's fertiliser production.[62] As a result, the trade sanctions imposed on Russia will continue to tighten the supply of fertilisers globally. In parallel, other key fertiliser-producing countries, such as Germany, will be forced to further reduce production due to the high energy costs assumed in these scenarios, with inflation expected to be in the same order of magnitude as in energy-intensive industries.
- **In the construction sector,** inflation will increase the cost of various construction materials. Recent literature indicates that the cost of construction materials accounts for between 35 % and 60 % of the overall cost of construction.[63] This translates into a level of inflation ranging between 15 % and 20 % under the pessimistic and highly adverse scenarios.
- At the peak of inflationary pressure recorded in 2022, geopolitical conflicts and COVID-19 lockdowns created significant inflationary pressure in the **electronics ecosystem**, making microelectronics manufacturing 20-30 % more expensive. As a result, chip makers and their foundry service providers passed their increased operating costs downstream in the order of 10-20 %. The same magnitude of inflation is thus expected in the pessimistic and highly adverse scenarios.
- **The textile ecosystem** is very heterogeneous. Upstream, the value chain is strongly affected by increases in energy prices and limited access to raw materials or export markets (Russia is one of the main trading partners of EU textile companies). Cotton and polyester fabrics experienced price increases of 15-20 % between 2021 and 2022, while auxiliary chemicals and printing inks rose by between 10 % and 12 %. In the context of growing demand in 2021 and 2022, producers were able to pass these higher costs on to the next stages of the value chain, with the ultimate effect of higher consumer prices for the final products. During economic downturns, as predicted in these scenarios, companies may no longer be able to pass such costs on to the final clients. Thus, the inflation rate is assumed to be as it was in 2021-2022, with most effects being felt by manufacturers, who have no possibility to transmit them onward to consumers.

[61] International Energy Agency (2022). *Energy Efficiency 2022 Report*. Available at: https://www.iea.org/reports/energy-efficiency-2022/executive-summary

[62] Colussi, J., Schnitkey, G., & Zulauf, C. (2022). War in Ukraine and its Effect on Fertilizer Exports to Brazil and the U.S. *Farmdoc Daily* (12)34, Department of Agricultural and Consumer Economics, University of Illinois at Urbana-Champaign, March 17, 2022. Available at https://farmdocdaily.illinois.edu/2022/03/war-in-ukraine-and-its-effect-on-fertilizer-exports-to-brazil-and-the-us.html.

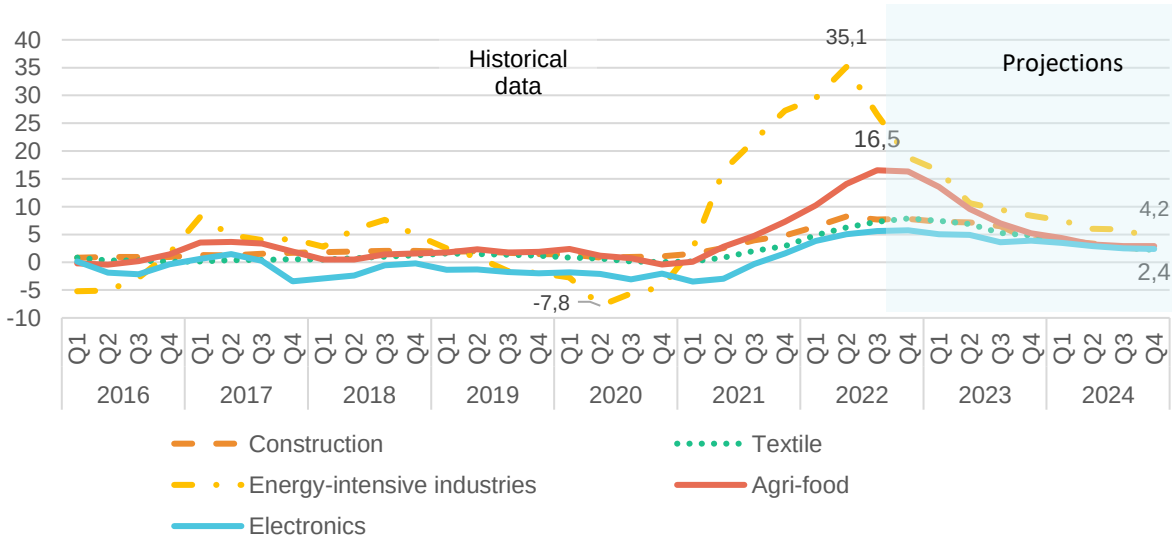
[63] Musarat, M.A., Alaloul, W.S., & Liew, M.S. (2021). Impact of inflation rate on construction projects budget: A review. *Ain Shams Engineering Journal*, *12*(1), 407-414. See also: https://constructionexec.com/article/materials-pricing-inflation-and-uncertainty-how-contractors-can-better-manage-the-bottom-line

Figure 7. Average changes in year-on-year inflation in five selected industrial ecosystems (%) in the baseline scenario, EU-27, 2012-2024



Source: PPMI and CSIL elaborations.

Figure 8. Changes in inflation compared with the same quarter in the previous year in five selected ecosystems (%) in the baseline scenario, EU-27, Q4/2016-Q4/2024



Source: elaborated by PPMI and CSIL.

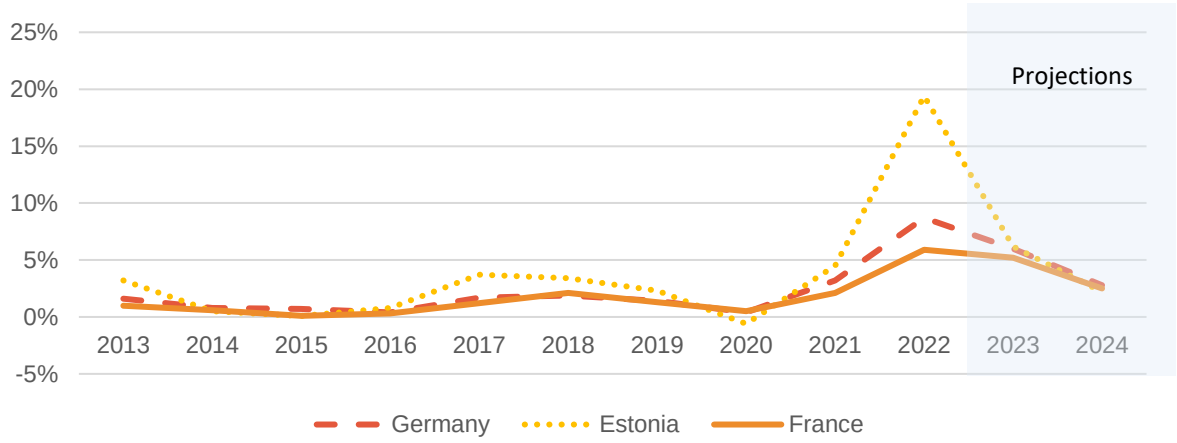
3.3.5. Inflation projections by country

The team also produced inflation projections for each EU Member State in the baseline scenario based on data released by the respective national central banks in each country. This evidence basis has been further triangulated with the HICP economic forecasts provided by the European Commission at the national level.[64] For the sake of clarity, Figure 9 visualises

[64] For Estonia, see: https://economy-finance.ec.europa.eu/economic-surveillance-eu-economies/estonia/economic-forecast-estonia_en#:~:text=GDP%20is%20estimated%20to%20have,through%20to%20other%20inflation%20components.

inflationary trends in three exemplary cases of high (Estonia), medium (Germany) and low (France) inflation. Overall, in the baseline scenario, national inflation rates are expected to converge towards the same value of the general HICP at EU level, albeit with differences from country to country. The decline towards this level is expected to be quicker in those countries that experienced higher levels of inflation, such as in the Baltic states. The surge in inflation seen in those countries in 2022 was caused by the higher relative shares of energy, transport and food products in the consumer baskets of those countries, compared with other EU countries. By contrast, in countries where inflation was lower, it will return more gradually to the standard target of close to 2 %. For instance, France has the lowest level of inflation in the Eurozone, also thanks to *ad hoc* measures introduced by the government to mitigate energy bills, such as energy vouchers and the tariff shield. On top of this, France is less dependent on fossil fuels to produce its electricity, with more than 60% of electricity production in the country coming from nuclear power. This makes France more resilient to external shocks to the supply of energy.

Figure 9. Average changes in year-on-year inflation in selected EU countries (%) in the baseline scenario, 2013-2024



Source: PPMI and CSIL elaborations.

4. The impact of high inflation on SMEs

Having reviewed the latest inflation trends and likely projections for the future, this chapter addresses the impact of sustained high inflation on SMEs. Specifically, it explores how inflation affects firms' exposure to the risk of late payment, the likelihood of bankruptcy, investment risks (including both digital and green investments), profitability, access to skilled labour, and participation in public procurement. Each section begins by describing the mechanisms that underpin the associations between inflationary changes and each impact, as well as the data and the indicators employed to estimate them. It then goes on to present relevant trends, both at an aggregated level and by ecosystem and firm size, if such data are available. These are followed by the findings from the regression models, interviews and the literature review. Wherever possible, simulations of how inflation is expected to affect firms in the near future have been carried out for each impact.

For France, see: https://economy-finance.ec.europa.eu/economic-surveillance-eu-economies/france/economic-forecast-france_en#:~:text=For%20the%20whole%20of%202023,annual%20terms%2C%20by%200.6%25.&text=The%20French%20economy%20is%20projected,and%20core%20inflation%20progressively%20declines.
For Germany see: https://economy-finance.ec.europa.eu/economic-surveillance-eu-economies/germany/economic-forecast-germany_en#:~:text=Altogether%2C%20real%20GDP%20is%20expected,shored%20up%20the%20growth%20outlook.

4.1. Late payments

The European economy has long been afflicted by late payments. The late receipt of payments constitutes a significant roadblock that can disrupt the whole supply chain. Inability to secure payments in a timely manner can create liquidity problems, rendering companies unable to meet financial obligations such as payments to workers and suppliers, or loan repayments. Moreover, late payments limit firms' financial flexibility, as they have less capital available for investment and innovations, or to expand their business. This can have subsequent negative effects on public procurement and cross-border trade. Lastly, late payments affect the ability of firms to hire new and more qualified workers, as well as their competitiveness in the market.[65] In the worst cases, late payments may lead to insolvency or to the bankruptcy of the company, as highlighted by a European Commission study on late payments.[66]

Such problems are most likely to affect SMEs, since they lack the means to cope with the consequences of late payments, such as sizeable buffers of working capital or access to lines of refinancing during economic upheavals. Given the importance of SMEs to the European economy, the EU has taken several steps to combat late payments, such as Directive 2011/7/EU (the Late Payment Directive, LPD). The LPD defines late payments as those that are not made within the contractual or statutory period for payment, which was set at 60 days for transactions between undertakings,[67] and at 30 days when public authorities are involved.[68] The LPD also established provisions such as an entitlement to interest in the case of late payments, and a minimum level of compensation for recovery costs.[69]

On 12 September 2023, the European Commission adopted a proposal for a new regulation. Once adopted by the European Parliament and the Council, this will repeal the current LPD.[70] The new proposal introduces a maximum payment term of 30 days for both B2B transactions and those in which the debtor is a public authority. Further novelties include compulsory interest payments, a flat compensation fee of 50 EUR for each invoice that is paid late, enforcement measures, and alternative dispute resolution mechanisms. [71] With fewer than 40 % of payments in the EU currently being made within the contractual deadline, the new proposal aims to close this gap between payment terms and reality.[72]

Problems resulting from late payments may be exacerbated by the current inflationary environment. **The main channel for the effect of inflation on late payment comes via the monetary policy response of increasing interest rates**. As central banks raise interest rates

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[65] European Commission (2021). Fit for Future Platform Opinion – Directive on combating late payment in commercial transactions. Available at: https://commission.europa.eu/system/files/2022-01/final_opinion_2021_sbgr2_06_late_payments.pdf. Intrum. (2022). *European Payment Report 2022*. Available at: https://www.intrum.com/publications/european-payment-report/european-payment-report-2022/.

[66] European Commission, Directorate-General for Internal Market, Industry, Entrepreneurship and SMEs, Lofstrom, F., Rivoire, L., & Gallo, C. (2015). Ex-post evaluation of Late Payment Directive, Publications Office. Available at: https://data.europa.eu/doi/10.2873/016503, p. 7.

[67] This term can, however, be extended as long as the new term is not 'grossly unfair to the creditor', and it is expressly agreed in the contract.

The payment term for public authorities can be extended to 60 days for public authorities that provide healthcare and for public undertakings. The LPD does not apply to payments made to or by consumers.

[69] For a evaluation of the effectiveness of the Late Payment Directive, see: European Commission, Directorate-General for Internal Market, Industry, Entrepreneurship and SMEs, Lofstrom, F., Rivoire, L., & Gallo, C. (2015). Ex-post evaluation of Late Payment Directive, Publications Office. Available at: https://data.europa.eu/doi/10.2873/016503.

[70] European Commission (2023). Regulation of the European Parliament and of the Council on combating late payment in commercial transactions. COM(2023) 533/final 2. Available at: https://ec.europa.eu/info/law/better-regulation/have-your-say/initiatives/13665-Late-payments-update-of-EU-rules_en.

[71] European Parliament (2019). Combating late payment in commercial transactions, European Parliament resolution of 17 January 2019 on the implementation of Directive 2011/7/EU on combating late payment in commercial transactions (2018/2056(INI), available at: https://www.europarl.europa.eu/doceo/document/TA-8-2019-0042_EN.pdf.

[72] European Commission (2022). A "Relief Package" to give our SMEs a lifeline in troubled waters: Blog of Commissioner Thierry Breton. Available at: https://ec.europa.eu/commission/presscorner/detail/en/STATEMENT_22_5653. See also: European Commission, Directorate-General for Internal Market, Industry, Entrepreneurship and SMEs, Lofstrom, F., Rivoire, L., & Gallo, C. (2015). Ex-post evaluation of Late Payment Directive, Publications Office. https://data.europa.eu/doi/10.2873/016503.

to reduce the amount of liquidity in the economy, financing costs can affect firms depending on their standing *vis-à-vis* their creditors or debtors. Those firms that pay later can retain their working capital by relying on trade credit, whereas those firms that are waiting to be paid may need to resort to external financing – a situation that is worsened by inflation. In such an unpredictable economic environment, one would expect late payments to become more prevalent, especially for SMEs, since they are poor in terms of liquidity.[73] This is because rising input prices increase production costs, which some businesses may not be able to pass on to consumers due to the risk of losing those clients (see Section 4.7). Furthermore, various businesses are in fixed-price contracts with their clients, meaning that they are contractually limited against increasing prices for their clients (Section 4.5). As such, they may no longer have sufficient funds to cover their short-term financial obligations towards third parties, leading to payment delays.

This section analyses the effect of sustained high inflation on late payment practices – both in terms of the receipt of payments and in terms of companies' ability to make timely payments to suppliers. Wherever possible, analyses are conducted both for all ecosystems combined at the aggregate level, and broken down separately by ecosystem selected for in-depth analysis (agri-food, electronics, energy-intensive, construction, textiles).

Key points

- The average number of days taken to collect payments declined from around 77 days in 2013 to 61 days in 2019, although it has increased again to 64 days following the pandemic. This period is also greater for SMEs (65 days on average in 2021) than large firms (58 days in 2021).
- Average collection periods are longest in the construction ecosystem (around 100 days in 2021), and smallest for the tourism ecosystem (around 50 days in 2021). Firms in construction and in the industrial ecosystem were also most likely to experience late payments in 2022.
- In 2023, the time lag for payments increased most for B2B transactions and those involving the public sector, but not for B2C transactions.
- Increases in inflation, such as those experienced in 2022, increase the collection period by 1.5 days on average. This effect is larger for SMEs (1.7 days) than large firms (0.4 days), and is most severe in the construction ecosystem (around 3.5 days). Average collection periods are expected to increase further (by 0.9 and 1.6 days, respectively, based on 2022 data) due to increases in interest rate and a slower rate of GDP growth .
- The baseline scenario sees the collection period returning to pre-pandemic levels. The more pessimistic scenario follows a similar trajectory, while in the highly adverse scenario, the number of days taken to collect payment will remain higher by at least one more day by 2024. In the construction ecosystem, this could amount to a difference of around four extra days between the baseline and the highly adverse scenario in 2024.

4.1.1. Data and indicators for late payments

Four indicators are used to measure late payments:

[73] Intrum (2022). European Payment Report 2022. Available at: https://www.intrum.com/publications/european-payment-report/european-payment-report-2022/.

1. the **collection period** from the Orbis Europe database;[74]
2. **encountering problems due to late receipt of payments** from the Survey on Access to Finance of Enterprises, conducted jointly by the European Commission and the European Central Bank (SAFE);
3. **having problems in paying suppliers** as a consequence of the late receipt of payments, also from SAFE; [75]
4. the **gap between the payment terms offered and the actual time to payment**, taken from the Intrum European Payment Reports in 2022 and 2023.[76]

The first three indicators were employed in the regression modelling exercise, while the fourth indicator is only explored to identify recent trends, given that the microdata underpinning the Intrum report are not publicly accessible. Each indicator has its own strengths and weaknesses, which detailed in Table 2. For instance, none of the indicators measures late payments directly, i.e. in terms of the number of firms that receive payments from other businesses later than 60 days, using the definition set out in the LPD. However, this threshold itself might appear quite high for struggling firms that rely on prompt payments, while being considered low by others. The collection period, therefore, measures payment promptness in a neutral way. Taken together, the different measures provide a holistic overview of both actual payment practices and how they are perceived by SMEs.

Table 2. Pros and cons of different indicators regarding late payment practices

Indicator	Description	Pros	Cons
Collection period (Orbis)	Average number of days taken to collect payments, by year	▪ Data available for all EU Member States for 2013-2021 ▪ Comparable across countries, years and ecosystems ▪ Actual payment practices rather than perceptions reported in a survey	▪ Measures collection promptness rather than late payments ▪ Lack of observations for 2022 ▪ Excludes micro enterprises[77]
Problems due to late receipt of payments (SAFE)	Response 'Yes' to the question 'Has your company experienced problems due to late payments from any private or public entities in the past six months?	▪ Comparable across countries, years and sectors ▪ Data available for 2022 (survey conducted in Q3)	▪ Subjective measure ▪ Only available from 2019 onwards ▪ Not informative about actual payment practices (i.e. by how many days a payment is late)
Problems in paying suppliers as a consequence of late receipt	Response 'It affected payments to suppliers' to the question 'What were the consequences of	▪ Comparable across countries, years and sectors ▪ Data available for 2022 (survey conducted in Q3)	▪ Subjective measure ▪ Only available from 2019 onwards ▪ Not informative about payment practices

[74] Orbis data available at: https://www.bvdinfo.com/en-gb/our-products/data/international/orbis.
[75] SAFE data available upon request at: https://single-market-economy.ec.europa.eu/access-finance/data-and-surveys-safe_en.
[76] Intrum (2022). European Payment Report 2022. Available at: https://www.intrum.com/publications/european-payment-report/european-payment-report-2022/; Intrum (2023). European Payment Report 2023. Available at: https://www.intrum.com/publications/european-payment-report/european-payment-report-2023/.
[77] Around 93 % of firms are micro-firms (those with fewer than 10 employees), which would have exploded the number of observations. https://ec.europa.eu/eurostat/databrowser/view/SBS_SC_SCA_R2__custom_2928090/bookmark/table?lang=en&bookmarkId=4bdbd2d1-3236-4d2f-be66-c77585a6619e. As a result, in the Orbis sample, 10.7 % are large firms, 31 % are medium-sized firms, and 58.3 % are small firms, categorised according to the EU's guidelines: https://single-market-economy.ec.europa.eu/smes/sme-definition_en.

Indicator	Description	Pros	Cons
of payments (SAFE)	those late payments?'[78]		▪ Only applies to those firms which answered 'Yes' to the question about having problems in receiving late payments
Gap between terms offered and actual time to payment (Intrum EPR)	Difference, in days, between the average payment terms offered and the average payment time	▪ Comparable across countries and years ▪ Informative of the prevalence of late payments	▪ Microdata not available ▪ Macrodata only available for the most recent two years ▪ No specific sectoral analysis ▪ Detailed methodology not readily available ▪ Based on responses to a survey instead of actual payment practices

Source: PPMI elaboration.

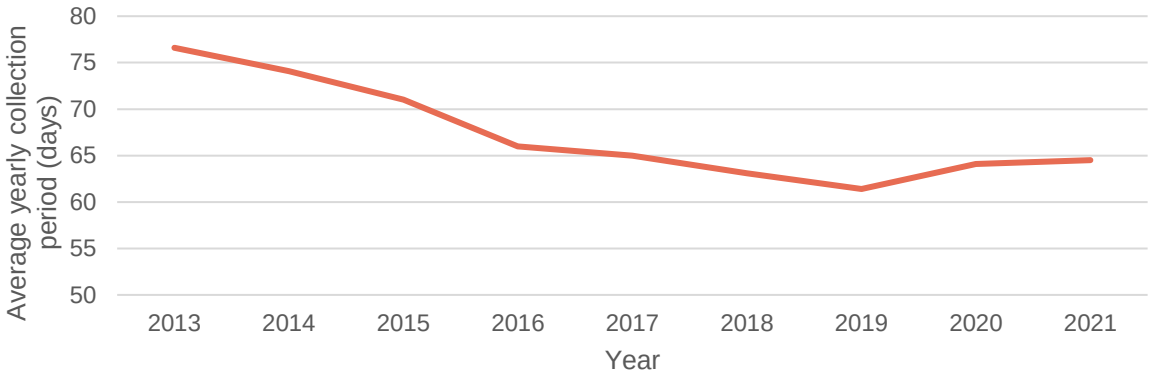
4.1.2. Trends in late payments

This section explores late payment trends over time, firstly for all of the ecosystems combined, and then for those selected for in-depth analysis.[79]

According to data from both SAFE and Orbis, the prevalence of late payment practices has decreased over the years. The average collection period, as taken from Orbis data, has decreased from almost 80 days in 2013 to around 65 days in 2021, with an exceptional temporary increase during 2020 due to the COVID-19 pandemic (see Figure 10).[80] In some Member States, the COVID-19 crisis tripled the average collection period in March 2020, compared with the same month in 2019.[81] The main takeaway from these figures is that, while the average collection period remains above the thresholds laid down in the LPD, the trend is encouragingly downward, despite a slight increase in 2021. While not depicted below, the SAFE results confirm this trend: the share of firms saying that they face issues due to the late receipt of payments decreased from 46 % in 2019 to 42 % in 2022. Nevertheless, it remains to be seen how time to payment will evolve in 2023, given that some of the effects of the current economic uncertainty may be delayed.

[78] The four consequences that SAFE asks respondents about are whether late payment: (1) affected payments to suppliers; (2) affected investments or new recruitment; (3) delayed repayments of loans or [the firm] had to use additional financing; and (4) affected production or operations.
[79] As a reminder to the reader, the term 'ecosystem' is used when referring to ecosystems in Orbis data, while 'sectors' refer to the sectors available in SAFE data, namely – construction, industry, services, and trade.
[80] Please note that values were excluded where the collection period was either 0 days, or was higher than 900 days, since these are more likely to be input errors.
[81] European Commission (2021). *Fit for Future Platform Opinion – Directive on combating late payment in commercial transactions*. Available at: https://commission.europa.eu/system/files/2022-01/final_opinion_2021_sbgr2_06_late_payments.pdf, p. 3.

Figure 10. Annual average collection periods in days in the EU-27, 2013-2021 (Orbis)



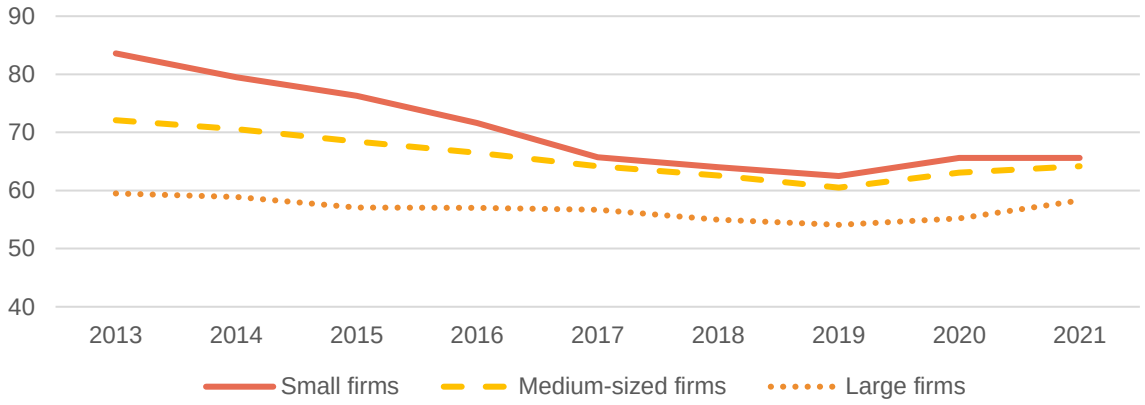
Source: elaborated by PPMI, based on data from Orbis.
Note: unlike the Intrum report discussed below, Orbis data do not allow trends to be distinguished with regard to types of transactions. Malta and Luxembourg are excluded from the analysis due to the low number of firms included.

The downward trend is mostly driven by SMEs, whose time to receiving payment fell from an average of almost 78 days in 2013 to 65 days in 2021, whereas for large firms the trend has remained relatively steady over time, despite a pronounced increase in 2021 (Figure 11).

Other sources in the literature shed further light on the situation in 2022. According to the 2022 Intrum European Payment Report,[82] almost six in 10 of the 11,000 firms surveyed across 29 European countries said that rising prices were making it hard for them to pay suppliers on time.[83] According to businesses surveyed by Intrum in 2023, inflation is still the main factor why customers do not pay on time (59 %), followed by rising interest rates (57 %), and the financial difficulties experienced by debtors (57 %). More than two-thirds of businesses anticipate that the high levels of inflation will last for at least another year, with the proportion being higher in the Baltic states (87 %, compared with a European average of 68 %), which experienced the highest increases in inflation during 2021-2022.[84]

[82] Intrum (2022). European Payment Report 2022. Available at: https://www.intrum.com/publications/european-payment-report/european-payment-report-2022/.
[83] All figures taken from Intrum's European Payment Report 2022.
[84] Intrum (2023). European Payment Report 2023. Available at: https://www.intrum.com/publications/european-payment-report/european-payment-report-2023/.

Figure 11. Annual average collection periods in days in the EU-27 by firm size, 2013-2021 (Orbis)



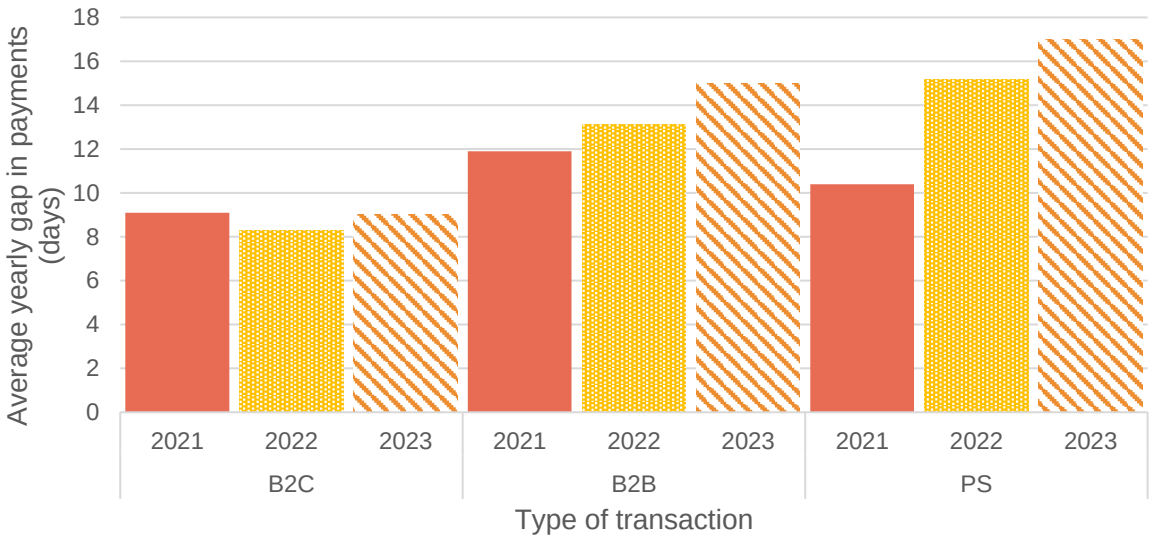
Source: elaborated by PPMI from Orbis data.
Note: unlike the Intrum report discussed below, Orbis data do not allow trends to be distinguished with regard to types of transactions. Malta and Luxembourg are excluded from the analysis due to the low number of firms included.

Various sources highlight that payment delays increased in 2022, although evidence is mixed as to how much. According to Intrum, the gap between the payment terms offered and the actual time to payment increased on average by five days between 2021 and 2022 for payments coming from the public sector, but only slightly for other business-to-business transactions (around one day), while it decreased for business-to-consumer transactions. In 2023 (relative to 2022), Intrum reported increased gaps for all transaction types – a one-day increase for business-to-consumer, a two-day increase for business-to-business, and a one-day increase for payments by public authorities (see Figure 12).[85]

Similarly, according to some country-specific reports, payment delays in B2B transactions among German companies increased on average by roughly one day in 2022 (from 9.97 days during the second half of 2021 to 10.95 during the second half of 2022 – the highest value in seven years) due to significant cost increases following the Russian invasion of Ukraine, as well as stronger inflationary pressures.[86] Payment deadlines in Hungary also increased by four days for B2C transactions and three days for B2B transactions, with the proportion of invoices paid late increasing by five percentage points (from 15 % to 20 %) since 2019.[87]

[85] Intrum (2023). European Payment Report 2023. Available at: https://www.intrum.com/publications/european-payment-report/european-payment-report-2023/.
[86] See: https://www.creditreform.de/aktuelles-wissen/pressemeldungen-fachbeitraege/news-details/show/creditreform-zahlungsindikator-deutschland-winter-2022-2023.
[87] See: https://www.napi.hu/magyar-gazdasag/eos-kintlevoseg-felmeres-fizetesi-moral.760979.html.

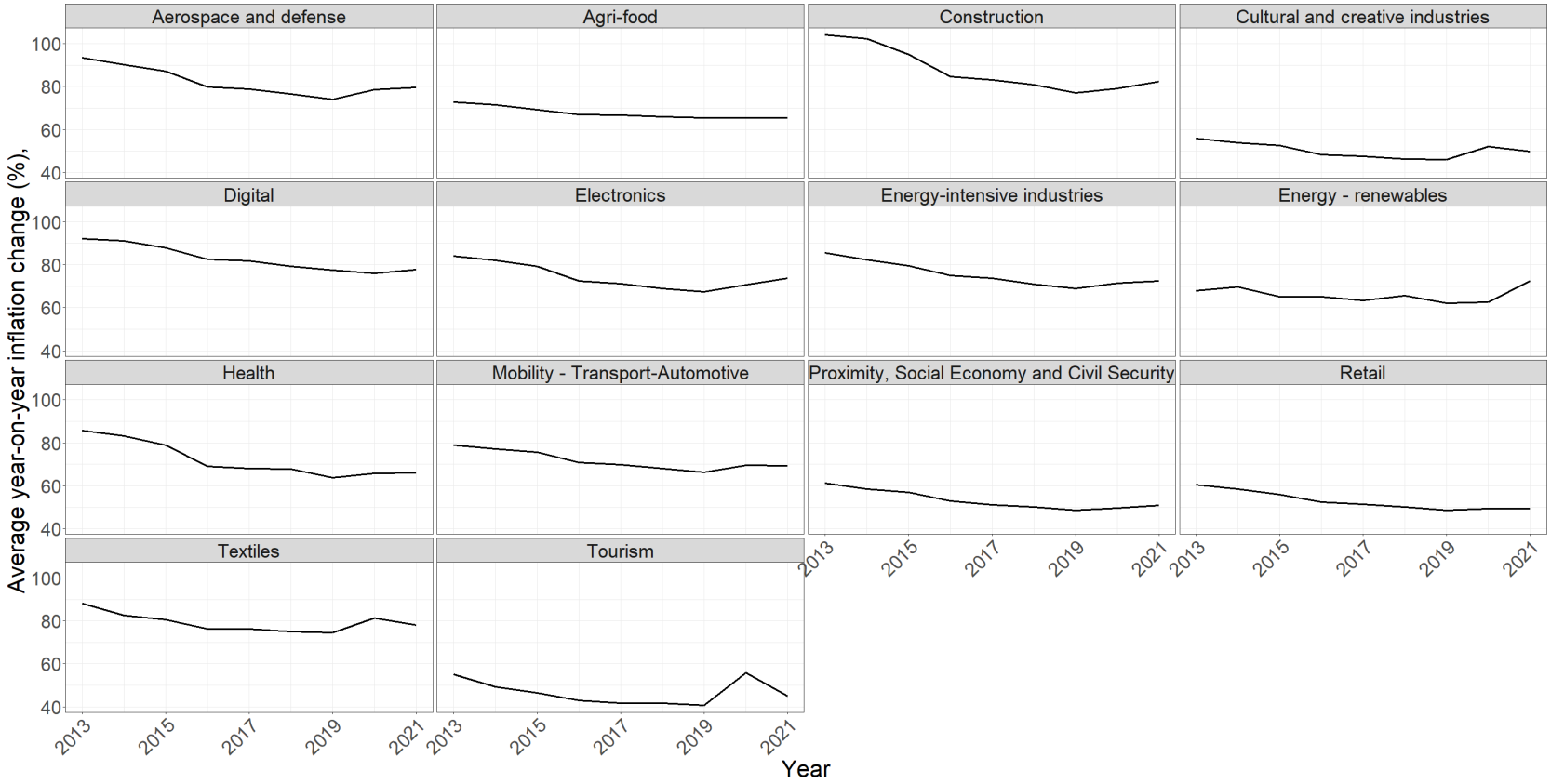
Figure 12. Gap between the terms offered and actual time to payment in 29 European countries, 2021-2023 (Intrum)



Source: elaborated by PPMI, based on the Intrum European Payment Report 2022.
Note: B2B = business-to-business, B2C = business-to-consumer; PS = business-to-public services. 2023 figures are approximated. The 29 countries covered comprise 25 Member States from the EU-27 (Malta and Luxembourg are excluded), in addition to Bosnia & Herzegovina, Norway, Switzerland and the United Kingdom.

In addition to these overall trends, notable variations exist by ecosystem, as shown by the Orbis data. With regard to the time taken to collect payment, while the tourism ecosystem averaged just over 50 days between 2013 and 2021 (across all types of transactions), the construction ecosystem stood at 100 days – twice as long – for the same period (Figure 13). This also suggests that not all ecosystems experience a late payment problem to the same extent, with retail, tourism, and the proximity, social economy and civil security ecosystems exhibiting average times to payment below the thresholds established by the LPD. Interestingly, the energy-renewables ecosystem had already showed a marked increase in 2021, which also corresponds to parallel increases in inflation.

Figure 13. Trends in collection periods in the EU-27, by ecosystem, 2013-2021 (Orbis)



Source: elaborated by PPMI, based on Orbis data.
Note: unlike the Intrum report, Orbis data do not allow trends to be distinguished with regard to types of transactions. Malta and Luxembourg are excluded from the analysis due to the low number of firms included

With regard to the five ecosystems selected for in-depth analysis, variations exist in at least two dimensions:

- in terms of the total number of days to payment, none of the ecosystems average a collection period below the 60-day threshold set by the LPD. Meanwhile, construction has the longest time to collection – a full month longer than agri-food;
- in terms of change over time, there is a downward trend across all ecosystems, although the rate of change is inconsistent: construction is characterised by peaks and troughs despite an overall decreasing trend; agri-food is characterised by minimal change over time; energy-intensive industries and electronics are characterised by overall decreases, with a small upswing in 2020; and textiles is marked by a stronger upswing in 2020.

Analysis of SAFE data identifies three key trends in late payment practices across sectors, shown in Figure 14 and Figure 15:

- there is very little variation over time in terms of both companies that experience problems due to late receipt of payments from customers, and companies that make late payments to suppliers as the consequence of late payment receipt across sectors;
- with the exception of the services ecosystem, firms experienced more problems related to late payments in 2022 than in 2021, though the difference was often small and the total proportion of firms experiencing such problems is generally lower than in 2019 (low-inflation period);
- inter-sectoral variation, though small, is consistent over time. In particular, firms in the construction and industry sectors tend to experience more problems in relation to both the late receipt of payments, and making late payments to suppliers. Evidence from the case studies shows that this is influenced by the prevalence of B2B transactions within these ecosystems. Business clients tend to pay in instalments, or per stage. Meanwhile, B2C payments (in services, tourism, retail, etc.) tend to be paid immediately.

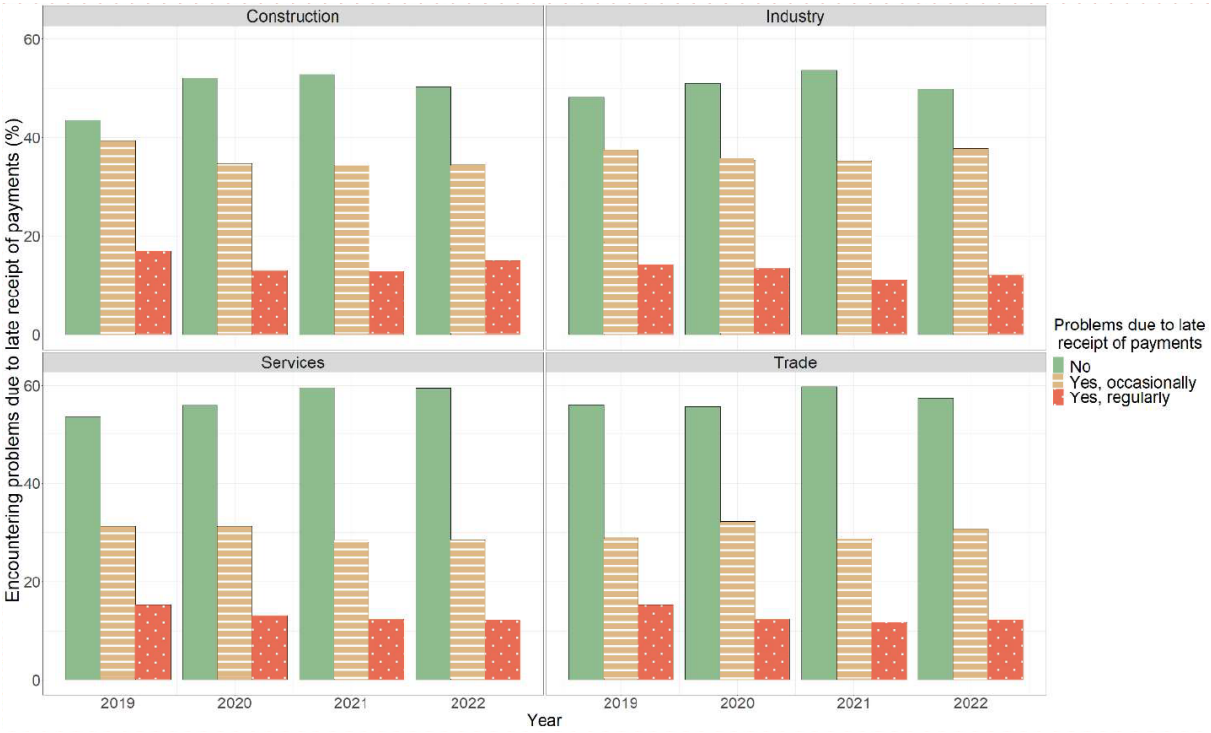
Nevertheless, it should be noted that the perceptions reported in the SAFE survey are a subjective measure. The fact that respondents perceive that their firm is experiencing problems with late payments does not mean that this reflects the actual payment terms, nor does it offer information as to the severity of the problem.

Lastly, collection periods also vary by country. In the Netherlands, Italy and Spain, the times taken to receive payment are much higher than in Belgium, Lithuania, Latvia or Finland (Figure 16). Moreover, aside from Croatia, Greece, Italy and Portugal (Cyprus represents an exception, possibly affected by its small size), no other country presents a markedly downward trend.

Overall, the above trends suggest that, first, the prevalence and severity of late payments have decreased over the last decade, although an uptick in the length of time taken to collect payment is expected to have occurred in 2022; second, late payment patterns might depend on the business culture and regulatory environment inherent to each ecosystem;[88] and third, payment times in any given year are likely to be affected by those in the previous year. All of these insights are taken into consideration when modelling the impact of inflation on late payments in the section that follows.

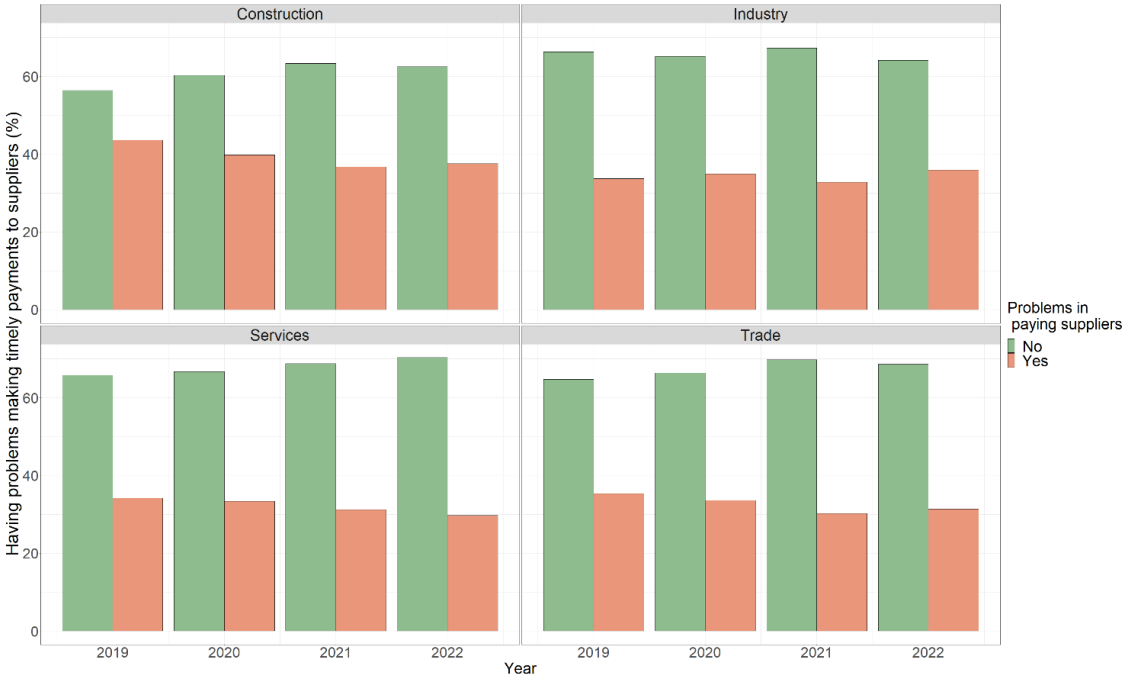
[88] This was also supported by regression analyses in the *ex-post* evaluation of the LPD, 2015.

Figure 14. Problems due to the late receipt of payments by sector, EU-27, 2019-2022 (SAFE)



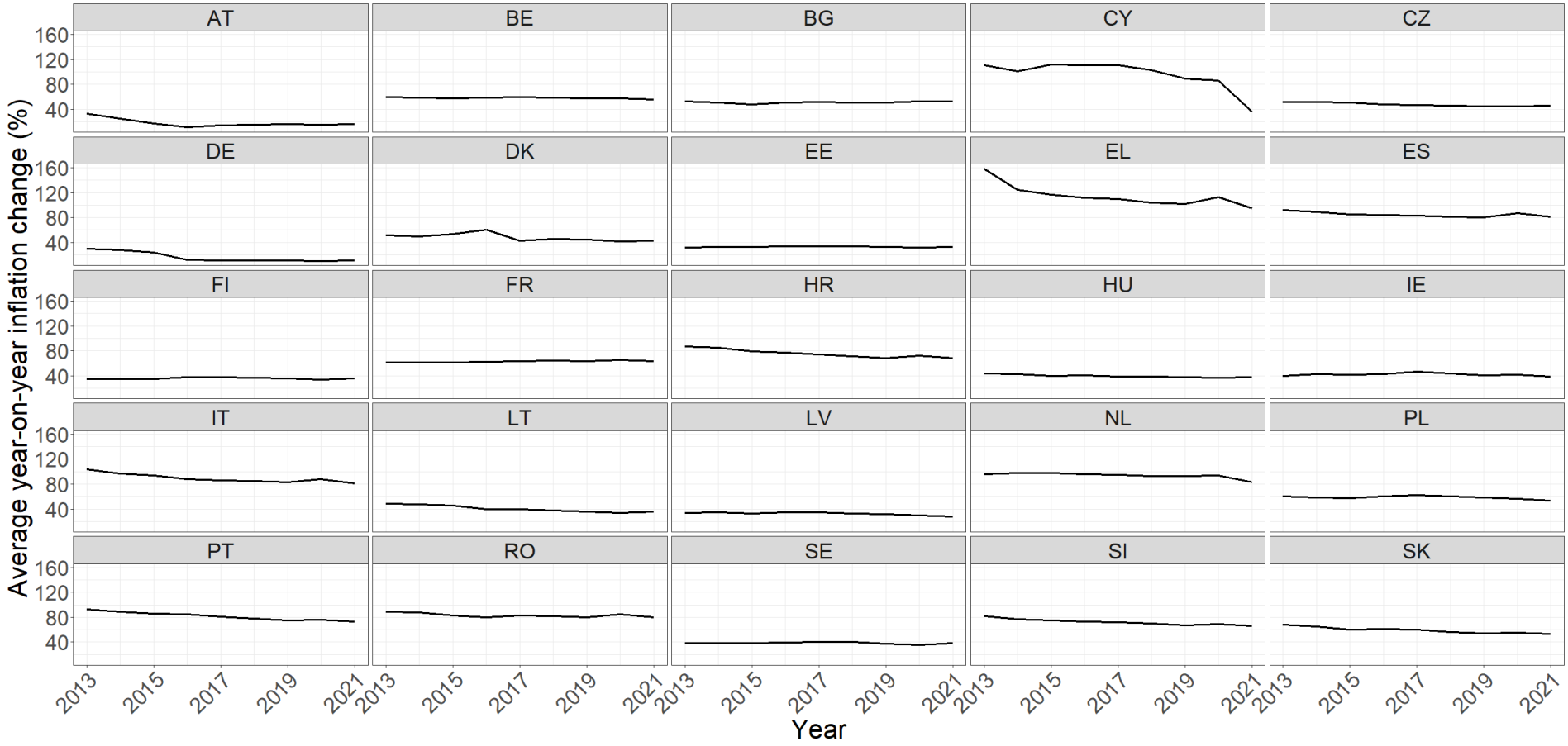
Source: elaborated by PPMI, based on SAFE data.
Note: unlike the Intrum report, SAFE data do not allow trends to be distinguished with regard to types of transactions.

Figure 15. Problems in making timely payments to suppliers across sectors in the EU-27, 2019-2022 (SAFE)



Source: PPMI elaboration on SAFE data.
Note: unlike the Intrum report, SAFE data do not allow trends to be distinguished with regard to types of transactions.

Figure 16. Trends in collection periods the EU-27 by country, 2013-2021 (Orbis)



Source: elaborated by PPMI, based on Orbis data.
Note: unlike the Intrum report, Orbis data do not allow trends to be distinguished with regard to types of transactions. Malta and Luxembourg are excluded from the analysis due to the low number of firms included.

4.1.3. The effect of inflation on late payments

The regression models implemented for this study highlight three key findings, each of which is discussed in further depth in the next sections:[89]

1. **increases in inflation in 2022 are associated with increases in collection periods by an average of 1.5 days, as well as increases in the probability of firms reporting problems in paying suppliers by 1.5 percentage points;[90] however, decreases in real GDP growth and increases in interest rates appear to have a stronger effect on late payments than inflation increases.**
2. **the effect of inflation on late payment practices depends on the sector, with the strongest effects seen in construction and industry, while the weakest were seen in services and trade;**
3. **higher inflation increases collection periods for SMEs more than those of large firms.**

Table 12, Table 13 and Table 14 in Annex 2 show detailed empirical results for the effects of changes in inflation on late payment practices, with SAFE and Orbis data treated separately. The tables summarise the results from the 22 regression models used to inform the analysis that follows.

Overall effect of inflation on late payments

The overall effect of inflation on late payments is somewhat modest: an increase of 1 percentage point in the year-on-year change in inflation prolongs the average collection period by around 0.2 % (see Table 12 in Annex 2, Model 10). **Due to the inflation observed in 2022**, **the collection period is thus expected to increase by roughly 1.5 days on average across countries and ecosystems.** This is in line with the actual increases observed in payment delays in the selected countries (see Section 4.1.2).

While this might seem a small change at first glance, it is important to remember that it took nine years for the average collection period to decrease by 10 days, and in a number of ecosystems the decrease achieved was even smaller. Hence, part of the gains from the last decade may have been lost due to inflation.

Likewise, SAFE-based models suggest that the **increase in inflation** experienced between 2021 and 2022 is **associated with a small increased probability of SMEs experiencing problems due to late payments,** from 46.1 % to 46.7 % (Model 2), **and in encountering problems in paying suppliers in a timely manner**, from 34 % to 35.5 % (Model 6), although only in the latter case is the effect statistically significant.[91]

Although the effects of inflation might appear small, this should not come as a surprise, for various reasons. In an interview, one representative of a business association noted that the propensity to make payments late in a high-inflationary environment depends a lot on the

[89] Due to the spread of the inflation variable, the effects of an alternative operationalisation were tested, whereby inflation changes were subdivided into multiple categories (negative or no inflation for year-on-year changes lower than or equal to zero; low inflation for values up to 5 %; moderate inflation for values up to 10 %; high inflation for values up to 20 %; very high inflation for values over 20 %). The findings show that, for SAFE, only in the case of very high inflation changes is there a statistically significant effect on experiencing problems in late payment practices compared with the reference category of low inflation changes, which is most common over the time period analysed. This suggests that the effect of inflation on late payment practices may be driven mostly by energy prices, which have risen sharply since 2021. For Orbis, the effect on the collection period is significant only when the lagged response variable is not included in the model. In this case, as inflation changes surge, the collection period decreases for SMEs, but increases for large firms, in line with past findings suggesting that smaller firms may want to bill more promptly, since their survival depends on timely cashflows. See: Paul, S.Y., & Boden, R. (2011). Size matters: the late payment problem. *Journal of Small Business and Enterprise Development*, *18*(4), 732-747.

[90] For Orbis, the results also hold when testing for a limited collection period of one year (360 days).

[91] Although the effect is only significant at the 10 % level.

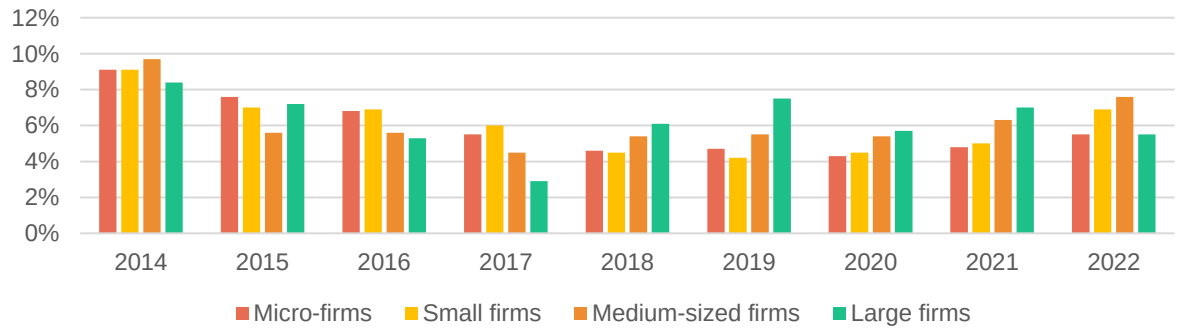
company and its management – while some companies ask for flexibility from banks regarding loan repayments, which would mitigate the effect, others proceed as usual. In other cases, firms tend to operate on trade credit by negotiating long payment terms. Moreover, a representative of another business association noted that, in the trade sector, many SMEs do not report problems with late payments because operating on trade credit is just in the nature of how these businesses are organised, since it helps with their cashflow.

The overall small effect can also be explained by the fact that other variables – such as interest rate hikes and decreased economic growth – are also strong predictors of late payment practices. In particular, while the 2022 hikes in interest rates led to an additional increase of 0.9 days in average collection periods, the decrease in GDP growth between 2021 and 2022 (from 5.4 % to 3.5 %)[92] was associated with an increase in average collection period of around 1.6 days in 2022 (1.7 days for SMEs, and 0.9 day for large firms).

Increased interest rates can also affect firms' expectations concerning their access to finance, which is found to be strongly linked with experiencing problems in making payments to suppliers. This result echoes past findings on how a deterioration in bank lending might encourage firms to compensate by using trade credit (i.e. deferring payments) as a source of working capital.[93] It also reflects a recent growing preoccupation with rising interest rates, which makes firms more cautious about their borrowing, as confirmed by several interviewees, as well as by existing studies.[94] When interest rates rise, smaller firms find it more difficult to borrow, which increases demand for trade credit, which in turn leads to increases in late payments.[95] This is less of a problem for large firms because they are less likely to rely on borrowing (and more likely to receive financing from investors). This was also confirmed by an interview with a representative of a business association, according to whom the current period of high inflation, compounded by rising interest rates, makes it more difficult for SMEs to pay back financial commitments and other loans.

Such qualitative evidence is further bolstered by data collected by SAFE, which shows a marked increase in the share of SMEs not applying to bank loans for fear of possible rejection, from 5.4 % in 2021 to 6.6 % in 2022 (with small firms being impacted the most, see Figure 17).

Figure 17. Share of firms in the EU-27 who did not apply for bank loans for fear of possible rejection by firm size, 2014-2022 (SAFE)



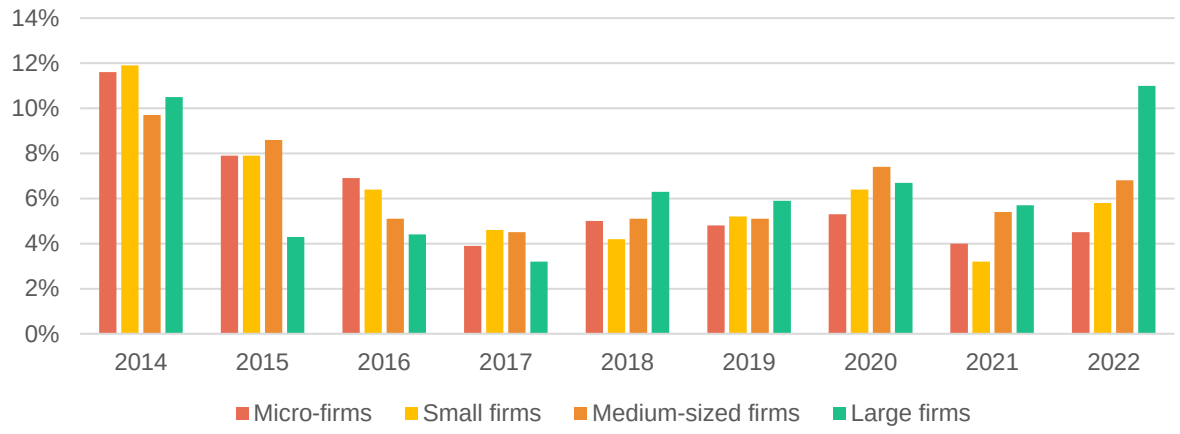
Source: elaborated by PPMI, based on SAFE data.

Likewise, when firms do decide to apply and attempt to negotiate the terms of their loan, their requests were rejected more often in 2022 than in 2021, with the share of SMEs that were

[92] Figures from Eurostat official statistics, see: https://ec.europa.eu/eurostat/databrowser/view/TEC00115/default/table.
[93] Paul, S., & Boden, R. (2014). Trade credit: A literature review. *British Business Bank*, *12*, 1-39; see also Howorth, C., & Reber, B. (2003). Habitual late payment of trade credit: an empirical examination of UK small firms. *Managerial and Decision Economics*, *24*(6-7), 471-482.
[94] Intrum (2022). European Payment Report 2022. Available at: https://www.intrum.com/publications/european-payment-report/european-payment-report-2022/, p. 6.
[95] Paul, S., & Boden, R. (2014). Trade credit: A literature review. *British Business Bank*, *12*, 1-39.

rejected increasing from 4.2 % to 5.7 % (Figure 18). Interestingly, a significant share of large firms' applications was rejected in 2022, although the low number of large firms makes this estimate less certain.

Figure 18. Share of firms in the EU-27 who did apply to a bank loan, negotiated the terms, but were rejected, 2014-2022 (SAFE)



Source: elaborated by PPMI, based on SAFE data.

Overall, this suggests that **while inflation in itself has only a small impact on late payments, actions associated with high inflation – most importantly, increases in interest rates – as well as the consequent expectations of firms concerning such measures, can indirectly increase the prevalence of late payments if they slow down economic growth or lead to a recession**.

Hence, inflation appears to have a direct effect on late payments, and also leads to payment delays indirectly – by negatively affecting economic growth, and by worsening the financial situations of firms, as well as their access to finance.

Effects by ecosystem

The effect of inflation on late payment practices depends on the industrial ecosystem in question. The findings from the SAFE regressions (Models 3 and 7, see Table 12 in Annex 2) show that **rises in inflation have a smaller effect on the service sector compared with their effect on SMEs in industry**. This is probably because much inflation until mid-2022 was due to increases in energy prices and shortages in the supply of materials and equipment, which firms in the service sector use in smaller quantities than their counterparts in industry. The marginal effect of inflation, however, is only significant for those firms that belong to the industry and trade sectors (Model 3). Meanwhile, results are inconclusive with regard to the probability of having problems in paying suppliers in a timely manner (Model 7). These mixed findings could also be due to the differing prevalence of late payments among B2B and B2C transactions (see Figure *12*).

Ecosystem-specific analyses of the Orbis data (see Table 14 in Annex 2) likewise suggest that belonging to certain ecosystems can heavily influence the effect of changes in inflation on the collection period. In particular, firms in the construction ecosystem would see their collection periods increase by around 3.5 days given the 2022 inflation rate (Model 15). The construction industry has been identified as the sector most adversely affected by late payments. In 2020, 42 % of construction companies stated that late payment had a high impact on the threat to

the survival of their business – the same level reported by energy and mining companies, and between 1 and 11 percentage points more than all other sectors.[96]

According to one sectoral expert interviewed for the present study, rises in interest rates are another factor affecting late payment in the construction ecosystem. Interest rate rises have already led to an increase in the cost of financing and caused delays in payments. When the price of construction work has to be renegotiated, it delays work and, ultimately, payments. This pattern has a disproportionate effect on SMEs. It is worth noting that the issue of late payments is often passed on to subcontractors, who are primarily composed of small and medium-sized companies. According to the European Builders Confederation (EBC), several independent studies have revealed that delayed payments significantly harm SMEs in construction and may lead to bankruptcy or default due to the debilitating effect of late payments on liquidity (see Section 4.2). [97]

While no such effects were found using Orbis data for the other ecosystems studied in depth (possibly because 2022 Orbis data were not yet available at the time of the analysis), qualitative evidence points to late payments becoming a more pronounced issue in other ecosystems as well. In agri-food, for instance, an interviewee from a trade association mentioned that many of its members have faced challenges in paying energy providers on time, with the purchase of livestock feed and medicine being a higher priority. As such, many have delayed paying their energy bills. In the electronics ecosystem, one interviewee mentioned that SMEs face ongoing challenges in receiving payment from suppliers. This is compounded by the fact that production now takes a lot longer in the first place, given that lead times for obtaining chips and other components have lengthened. Lastly, in the textiles ecosystem, interviews revealed that payment delays might be more impactful for those companies already facing longer collection periods, namely those operating in the B2B sector, as well as those sourcing raw materials and components from non-EU suppliers.

However, **interviewees recognised that late payments in these ecosystems are a long-standing issue, suggesting that inflation, while exacerbating late payment practices, may not be the primary driver**.

Effect by firm size

Increases in the rate of inflation affect the collection periods of SMEs and large firms differently, with **the effect on SMEs being four times greater than that for large firms, translating to an expected increase in collection period in 2022 of 1.7 days for SMEs, compared with 0.4 days for large firms**. Indeed, one representative of a business association stressed that SMEs are more vulnerable to changes in inflation because many SMEs deferred payments during the COVID-19 pandemic and took out loans in order to stay afloat. Large firms also have greater power to withhold payments from SMEs, and this affects SMEs' capabilities to comply with payment terms. Likewise, interest rate hikes intended to combat inflation may deter SMEs from seeking external financing, which could in turn further exacerbate their late payment issues. Indeed, the effect of increases in interest rates is only statistically significant among SMEs, where it translates to an increase in the collection period in 2022 of around 0.33 days.

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[96] Intrum (2020). Real estate and construction firms are hit the hardest by late payment. Available at : https://www.intrum.com/press/news-stories/real-estateand-construction-firms-are-hit-the-hardest-by-late-payments/.

[97] EBC (2023). EBC position on the revision of Directive 2011/7/EU on combating late payment in commercial transactions. Available at: https://www.ebc-construction.eu/wp-content/uploads/20230317-EBC-Position-Paper-Revision-of-Late-Payment-Directive.pdf.

4.1.4. Simulating the effect of inflation on future late payments

This section presents the simulated future effect of inflation on collection periods using the Orbis-based models presented above for the three scenarios discussed in Section 3.2.[98] Analysis of historical data shows that inflation impacted the collection period between 2021 and 2022, extending it by 1.5 days on average, from 64 days in 2021 to around 65.5 days in 2022 (Figure 19).

In the **baseline scenario**, this impact is expected to be short-term, and is likely to diminish as inflation falls within the next two years. By 2024, the negative impact generated by inflation is expected to be absorbed and the number of days take to receive payments will return to the historical, pre-pandemic trend (around 64 days), all other things remaining unchanged.

Conversely, in the two more pessimistic scenarios, the late payments experienced by European SMEs are expected to increase and not return to 2021 levels by 2024. This is due to higher inflation levels, the expected slowdown in economic activity, and higher levels of borrowing (Figure 19). More specifically:

In the **pessimistic scenario,** delays in payments will further exacerbate firms' liquidity needs compared with the baseline scenario, and may cause firms – particularly smaller ones – to seek extensions to their overdraft facilities and to increase their borrowing, resulting in higher financial costs. Higher interest rates (in combination with inflation) could have an adverse effect on the survival of firms, as their liquidity could be negatively affected. While exiting the market due to financial distress is a possible outcome in the pessimistic scenario, the likelihood of this remains low. Figure 19 shows that the simulated extension of the collection period in this scenario is very close to the baseline scenario (1.5 days): therefore, **even if higher interest rates are in place, their impact on late payments will not be particularly significant, and will remain manageable for SMEs overall.**

The combination of circumstances in the **highly adverse scenario** are expected to have widespread and lasting effects on the economy, including effects in terms of an increase in the number of days taken to receive payment. Simulation shows that the number of collection days will increase by **at least one more day compared with the baseline scenario for each year**, and that this adverse impact will extend beyond the forecasted time horizon. Liquidity constraints associated with prolonged late payments will force firms to compensate for their lack of liquidity using loans, but now at higher financial costs. **The likelihood of default increases, especially for indebted SMEs** (see Section 4.2).[99] Literature shows that delays in payments have a detrimental effect on SMEs, increasing exit rates; the latter will be even higher if combined with a negative financial and economic cycle.[100] A collateral effect under this scenario is as follows: financially solid SMEs with sufficient liquidity, which can afford to face longer payment delays, are more likely to participate in both public and B2B procurement, and to secure the delivery of the procurement orders. As a result, more vulnerable SMEs will see a reduction in orders in comparison to normal conditions, hence further increasing the likelihood of bankruptcy.[101]

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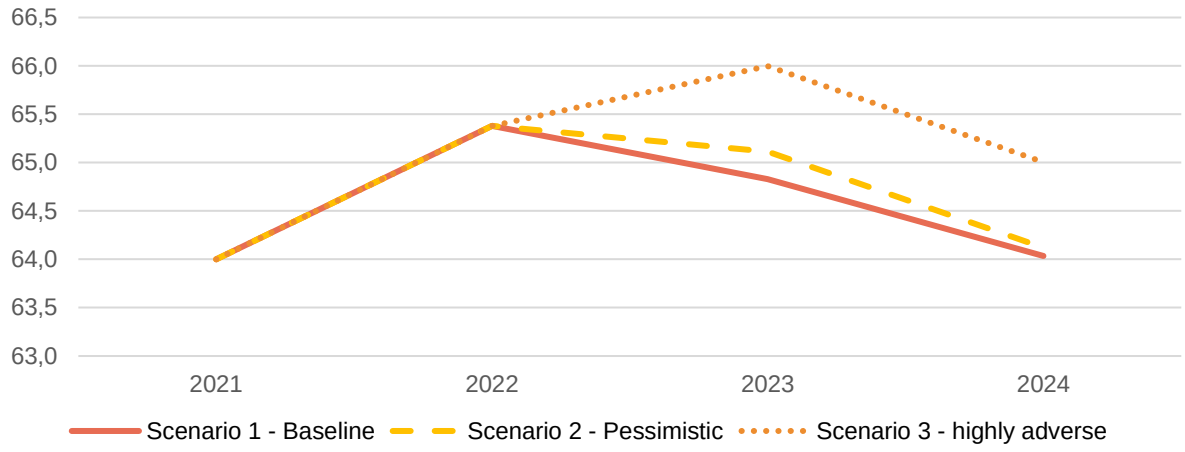
[98] Note that the results of SAFE models can also be simulated, but that the collection period is a more reliable measure given that it is not based on survey respondents' perceptions.

[99] Rusu, V.D., & Roman, A. (2022). The relationship between financing decision of SMES and their performance. In: *Business Development and Economic Governance in South-Eastern Europe*. Cham: Springer, pp. 353-367.
Kaya, O. (2022). Late payments to SMEs: a factor that affects their access to finance. European Financial Management Association 2022 Annual Meeting, Rome, Italy, 29 June-2 July 2022.
Hall, G. (1992). Reasons for insolvency amongst small firms ? A review and fresh evidence. *Small Business Economics*, *4*(3), 237-250

[100] European Commission (2014). The Economic Impact of Late Payments. Economic Papers 531, September 2014.

[101] *Ibid.*

Figure 19. Simulated variations in the effects of inflation on the collection period in days in the EU-27, all ecosystems, 2021-2024

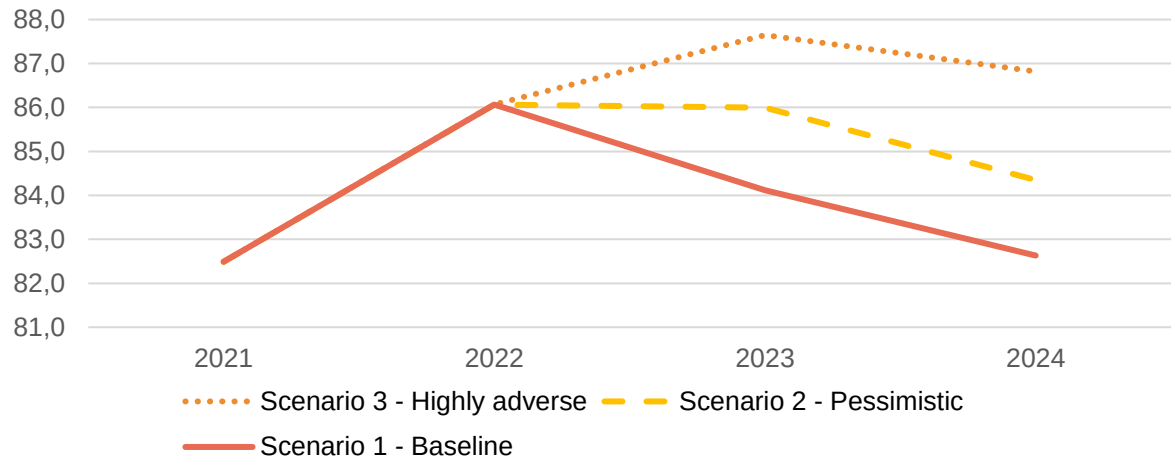


Source: elaborated by CSIL, based on PPMI estimates.
Note: 2022-2024 values are projections. Malta and Luxembourg are excluded from the analysis due to the low number of firms included.

When considering variations by ecosystem, the impact of inflation is higher in construction, which experiences a lengthening of the collection period by up to one working week (5 or 6 days) in the worst-case scenario, from 82 days in 2022 to 87 in 2024 (Figure 20). Limitations in the Orbis data do not allow the quantitative simulation of the impact of future inflation on late payments in the other ecosystems selected; however, the existing literature indicates that payment delays in agri-food and energy-intensive industries are not immune from inflationary pressures. The 2023 outlook of the Atradius Payment Practices Barometer for Western Europe reveals that key concerns in the agri-food sector include cashflow issues and administrative delays faced by B2B customers, with 40 % of the businesses surveyed saying that they are experiencing further delays on an already average wait of two months longer than the contracted terms. This represents a threat to suppliers' cashflows, with almost half of the businesses surveyed offering discounts for early payment in an attempt to mitigate this risk.[102] The report shows a similar trend among energy-intensive industries such as the processing of steel and metals, and in the electronics/ICT manufacturing.

[102] Report available at: https://atradius.it/pubblicazioni/payment-practices-barometer-b2b-payment-practices-trends-western-europe-2022.html Last access on 13/06/2023.

Figure 20. Simulated variations of the effects of inflation on the collection period in days in construction in the EU-27, 2021-2024



Source: elaborated by CSIL, based on PPMI estimates.
Note: 2022-2024 values are projections. Malta and Luxembourg are excluded from the analysis due to the low number of firms included.

4.1.5. Conclusions regarding late payment practices

Overall, **inflation is found to increase the time it takes for firms to collect payments, with the levels of inflation observed in 2022 equating to an increase in firms' average collection periods of roughly 1.5 additional days**. Furthermore, the simulations under different economic outlooks show that other side effects play a key role at predicting late payments, including central banks' reactions to curb inflation by raising interest rates, the evolution of GDP, the liquidity of firms, as well as their financing options.

Hence, it would not be too far-fetched to assume that **some of the gains made over the past 10 years in terms of reducing the average collection period could be lost due to current inflation, if both direct and indirect effects are considered**. Within the simulated time horizon, the overall impact of inflation on late payments will be absorbed only in the baseline scenario; in contrast, in the two more pessimistic scenarios, the number of days that SMEs need to wait before receiving payments will increase in comparison to pre-energy crisis periods.

Inflationary effects also differ depending on the sector to which the firm belongs. Using Orbis data up to 2021, increases in year-on-year inflation are associated with a parallel increase in the collection period only in the construction ecosystem. Analysis of SAFE data including 2022 shows that the impact of inflation is significantly smaller on the service sector than on industry, pointing to the fact that rises in energy prices have a disproportionate effect on those ecosystems that either consume or produce more energy. Service sector firms are also more likely to engage in B2C transactions compared with industry, where B2B transactions prevail, with the former experiencing fewer delays in payment compared with the latter.

These analyses are in agreement with interviewees, who stressed that **smaller enterprises tend to suffer more from late payments during uncertain times compared with larger firms** due to power imbalances. Overall, large firms have shorter collection periods, and the indirect effects of inflation, such as a slower rate of GDP growth and higher interest rates, tend to prolong SMEs' collection periods more than those of large firms.

4.2. Bankruptcies

The expected increase in the collection period due to inflation could have a ripple effect on SMEs, because late payments are responsible for one out of four bankruptcies in the EU.[103] Inflation can also increase the risk of insolvency more directly: inflation increases production costs, which may in turn lead to liquidity problems. These problems may be compounded by rising interest rates, which are expected to make it more difficult for SMEs to pay back debts, as well as making it harder for struggling SMEs to access capital that would otherwise provide the boost necessary to withstand economic uncertainty. This section therefore analyses in greater detail the prevalence of bankruptcies in the current high-inflation environment, how these are impacted by inflation, and how they are likely to evolve over the next two years.

Key points

- Bankruptcies have been kept unusually low during the pandemic thanks to government action, but as these support policies began to taper out, Q2 2023 saw the largest level of bankruptcy declarations since 2015, and a 18.6 % increase compared with the pre-pandemic period (Q2 2019). The sectors most affected are transportation and storage; accommodation and food services; and education, health and social activities.
- Inflation appears to have made very little contribution to bankruptcy rates. The levels of inflation seen in 2022 are associated with a decrease of less than 0.3 percentage points in a firm's solvency ratio (i.e. its ability to repay long-term obligations, as proxy for the financial health of a firm), with the effect being slightly greater among large firms than SMEs, since SMEs were most likely to receive government support during the pandemic.
- Other factors are more relevant in explaining bankruptcy trends, including regulatory changes to bankruptcy proceedings (e.g. in Spain), higher interest rates, more limited access to finance, and the greater prevalence of late payments.
- In the baseline scenario, bankruptcy declarations are forecast to increase up to a level of 5 % across all sectors. However, the pessimistic and the highly adverse scenarios could see a threefold increase in the number of firms declaring a default in construction (from two to six out of every 1,000 firms), and a doubling of defaults in accommodation, from 7.5 to 17 firms out of every 1,000.

4.2.1. Data and indicators for bankruptcies

Various data sources exist to measure bankruptcies and insolvencies in the EU, each with its advantages and disadvantages. Eurostat's Structural Business Statistics[104] is perhaps the most reliable source of such data, yet bankruptcy information is only available at the country level due to reasons of confidentiality. As a result, this source of data is used when discussing bankruptcy trends, but not in regression models. The OECD shares similar statistics for OECD countries,[105] whereas the World Bank provides information on the density rates of deregistered limited liability companies and closed businesses globally.[106] However, both the OECD and the World Bank data are similarly only available at country level and, crucially, only cover 2020 and earlier years, thus excluding the period of high inflation on which this study focuses. As a result, both data sources are excluded from the present analysis. Lastly, the Orbis dataset

[103] European Commission (n.d.). EU Payment Observatory. Available at: https://single-market-economy.ec.europa.eu/smes/sme-strategy/late-payment-directive/eu-payment-observatory_en.
[104] For details, see: https://ec.europa.eu/eurostat/web/structural-business-statistics
[105] Available at: https://stats.oecd.org/Index.aspx?DataSetCode=SSIS_BSC_ISIC4.
[106] Available at: https://www.worldbank.org/en/programs/entrepreneurship/methodology#:~:text=Closed%20business%20density%20rate%3A%20The,%2D64)%20per%20calendar%20year.

contains information on firms' solvency ratio which, albeit not a direct measure of bankruptcies, provides information about a firm's long-term ability to pay investors and/or shareholders, and therefore helps in evaluating a firm's financial health. Specifically, the solvency ratio is calculated as the ratio of shareholder funds to total assets:[107]

$$\text{Solvency ratio} = \frac{\text{Shareholder funds}}{\text{Total assets}} \cdot 100\%$$

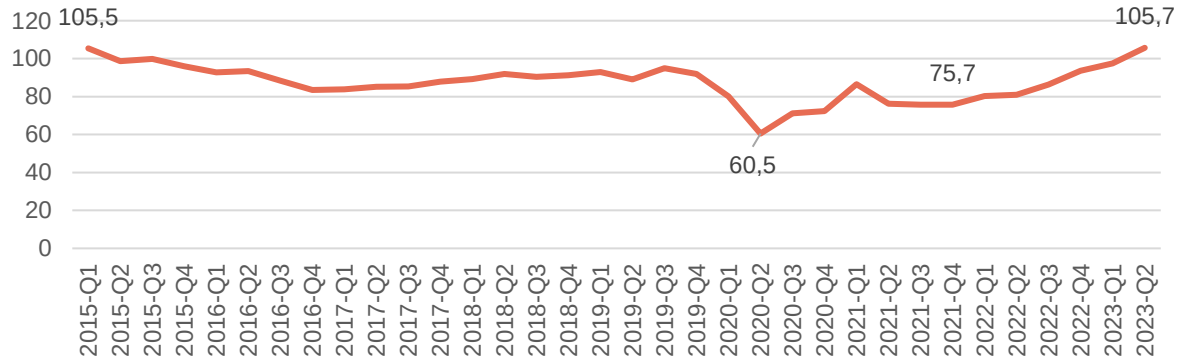
The advantage of using Orbis data is that these are measured at the company level, allowing one to control for various company characteristics that might influence the firm's solvency ratio, such as profitability, turnover, firm size and age, among others. The disadvantages of using Orbis data – as discussed in the late payments section (see Section 4.1) – are that no data are available for 2022, and that micro-firms are excluded from the analysis.

To provide further information on trends in 2022, this section also presents insights from Technote data (see A.1.1.2 for an elaboration of this).

4.2.2. Trends in bankruptcies

A **steady increase in bankruptcy rates has occurred since 2022 and into the first quarter of 2023** (Figure 21). The difference between the first quarter of 2023 and the numbers recorded for the second quarter of 2020 – the lowest point in bankruptcy rates observed – is especially significant and represents an increase of 52 %. The true number of companies that ceased operations at the beginning of 2023 may be even higher: representatives of business associations who were interviewed argue that a large proportion of SMEs exit the market before they go bankrupt. The latest increase in the first quarter of 2023 marks a return to pre-pandemic levels of bankruptcy, given that the bankruptcy rate was kept artificially low in 2020 and 2021.[108]

Figure 21. Declarations of bankruptcies in the EU-27, Q1 2015 – Q2 2023, seasonally and calendar-adjusted (Index 2015=100)



Source: elaborated by PPMI from Eurostat table sts_rb_q.

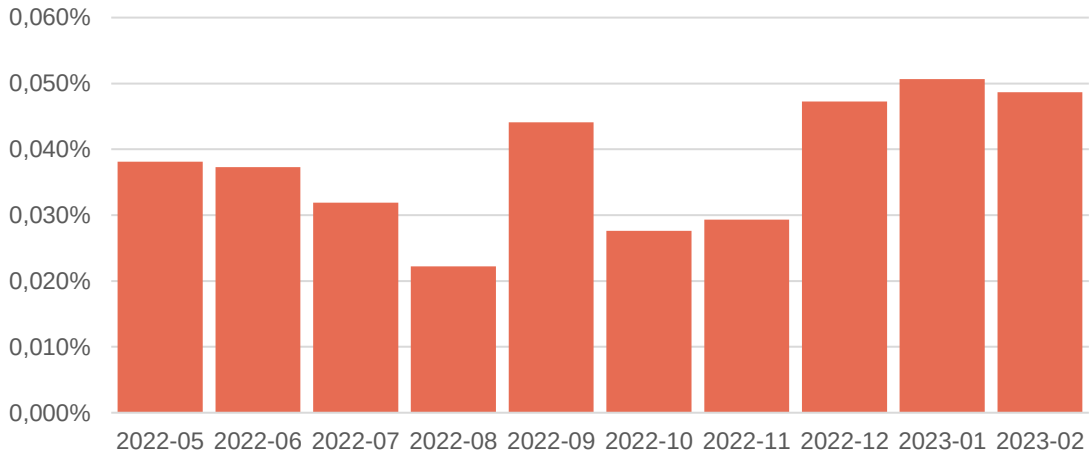
The research team further tracked the website operations of around 350,000 firms between May 2022 and February 2023 using Technote data. This method allows to check which previously active websites went offline during this period, as a proxy measurement for bankruptcy. Out of the 350,000 firms tracked, around 0.38 % went offline. The above trends confirm an **increase in bankruptcies since the last quarter of 2022**. Indeed, Figure 22

[107] Although the Orbis sample used for the regression analyses only includes active firms, with the solvency ratio ranging from -100 % to 100 %, a lower limit of -20 % was set, since companies below this threshold are likely to have already defaulted.

[108] Please note that in 2020 there also was an interruption to administrative services for handling bankruptcy declarations. See: European Commission. (2023). *Economic outlook for EA and EU -- Recent developments in bankruptcy declarations in the EU*. Available at : https://ec.europa.eu/economy_finance/forecasts/2023/spring/Box_I_2_2-Recent%20developments%20in%20bankruptcy%20declarations%20in%20the%20EU.pdf.

shows that the share of websites that went offline almost doubled from 0.028 % in October 2022 to a maximum of 0.051 % in January 2023. Although website domains are usually purchased for one calendar year, meaning that some of this increase may be due to domain expiry, the share of websites going offline remained steady even in February 2023. This suggests that the trend may not, in fact, be due to domain expiry, and may instead correlate with the aggregate data on bankruptcies shown in Figure 21. Further corroboration comes from the statistics published by Eurostat for Q2 2023, which suggest an increase of 8.4 % in bankruptcy declarations in the EU-27 compared with Q1 2023, to the highest level seen since 2015.[109]

Figure 22. Share of firms whose website went offline between May 2022 and February 2023, as a share of total firms tracked (Technote and Orbis)



Source: elaborated by PPMI, based on Technote and Orbis data.

Companies that are now going bankrupt were in distress even before the the high inflation period, but government aid and various stimulus programmes kept companies afloat in 2020 and 2021,[110] thus maintaining bankruptcy rates at record lows during the pandemic. Such measures included, among others, loan repayment moratoria, waivers of social charges, and low interest rates, which allowed the operation of enterprises that would otherwise have collapsed because their profits could not cover their interest costs.[111] In some cases, the obligation to declare bankruptcy was suspended with the start of the COVID-19 pandemic in Europe in March 2020 until June 2022, to avoid an avalanche of business failures.[112] Consequently, businesses are now failing as these provisions expire and firms have to repay loans at higher interest rates, while at the same time facing increased costs of financing, energy, labour, production and materials.[113]

When breaking down the numbers of bankruptcies by NACE economic activities, all sectors recorded increases between Q4 2021 and Q2 2023. Nevertheless, transportation and storage

[109] Eurostat (2023). *Q2 2023: Business bankruptcies at highest level since 2015*. Available at: https://ec.europa.eu/eurostat/web/products-eurostat-news/w/ddn-20230817-1.

[110] Arnold, M. (2023). EU bankruptcy filings jump to 8-year high as pandemic aid ends. *Financial Times;* Moller-Nielsen, T. (2023). Breaking point: Bankruptcies in EU reach historic highs, *Brussels Times.* https://www.brusselstimes.com/374152/breaking-point-bankruptcies-in-eu-reach-historic-highs; Bourgery-Gonse, T. (2023). Insolvency figures soar by 50 % in France. Retrieved from: https://www.euractiv.com/section/economy-jobs/news/insolvency-figures-soar-by-50-in-france/; Wadhwani & Shanfeld (2022). Inflation Rates: Impact on Bankruptcy Filings. Available at: https://www.wslaw.com/blog/2022/december/inflation-rates-impacts-on-bankruptcy-filings/; see also: https://www.businesseurope.eu/publications/rapidly-increasing-numbers-bankruptcies-are-alarming

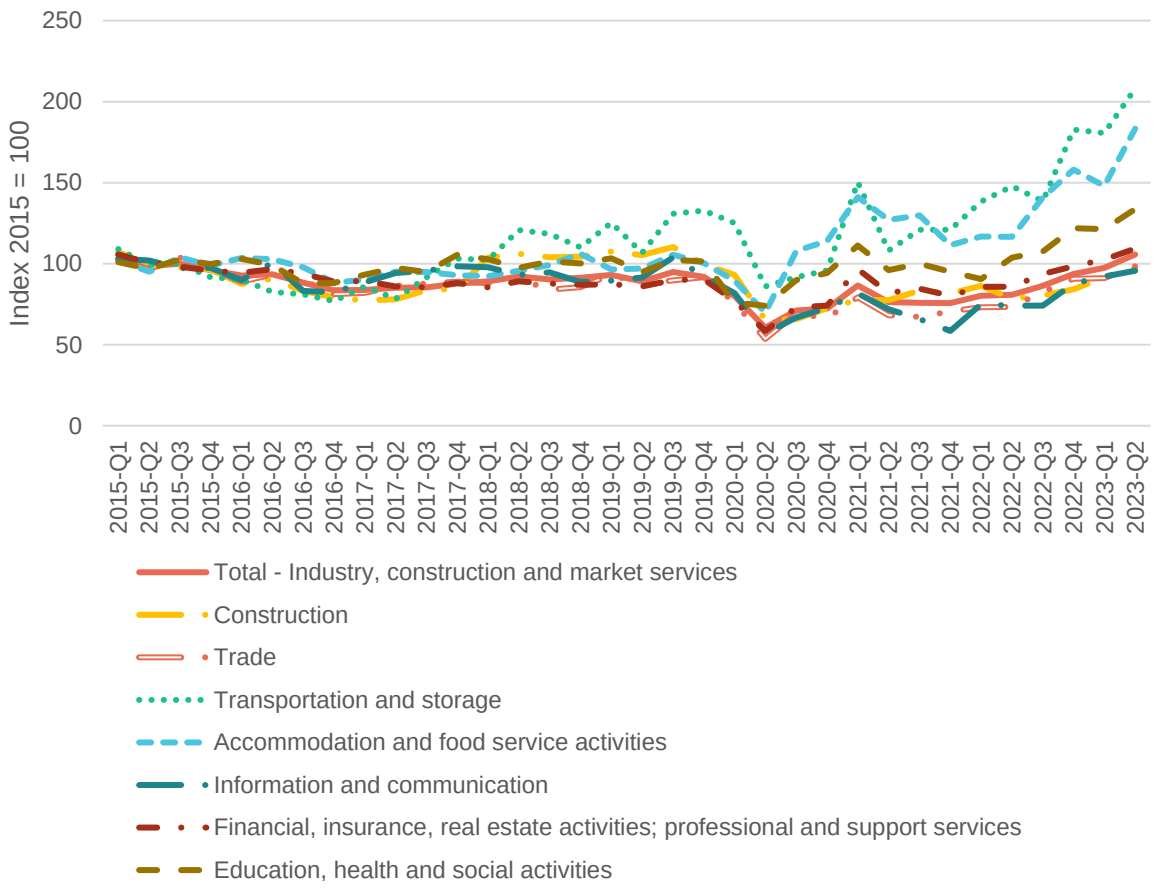
[111] Arnold, M. (2023). EU bankruptcy filings jump to 8-year high as pandemic aid ends. *Financial Times.*

[112] Elisei, C., & Aguado, J. (2023). Analysis: Spain's new restructuring law is being put to the test, fast. Reuters. Available at: https://www.reuters.com/markets/europe/spains-new-restructuring-law-is-being-put-test-fast-2023-02-15/#:~:text=The%20number%20of%20insolvent%20Spanish,previous%20quarter%2C%20Spanish%20data%20showed.

[113] See: https://www.businesseurope.eu/publications/rapidly-increasing-numbers-bankruptcies-are-alarming.

(72 %), accommodation and food services (64.5 %), as well as information and communication (63.4 %) were among those sectors with the highest increases during this period (see Figure 23 below). All of these industries were affected by the pandemic: transportation and storage companies due to travel suspensions; companies providing accommodation and food services due to both travel suspensions as well as social distancing measures; meanwhile, some companies in information and telecommunications may have been established to meet the short-term rise in the demand for remote services, which has now subsided.

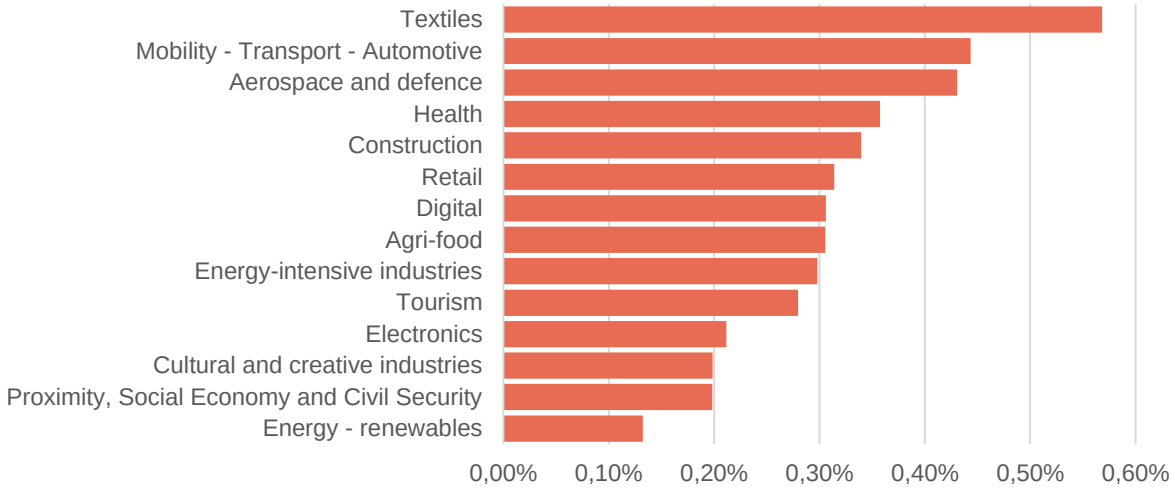
Figure 23. Declarations of bankruptcies in the EU by NACE activity, Q1 2015 – Q3 2023, seasonally adjusted (Index 2015=100)



Source: elaborated by PPMI from Eurostat table sts_rb_q.

Similarly, Technote data matched with Orbis data show that the share of websites going offline between May 2022 and February 2023 was greater in transportation-related ecosystems such as mobility and aerospace, which recorded the second- and third-highest shares of websites going offline. Health was the fourth most common (Figure 24). Additionally, Technote data shows that firms in the textiles ecosystem – a sector not included in the Eurostat data presented above – were the most likely to shut down their websites, probably due to reduced demand for medical textiles (e.g. masks).

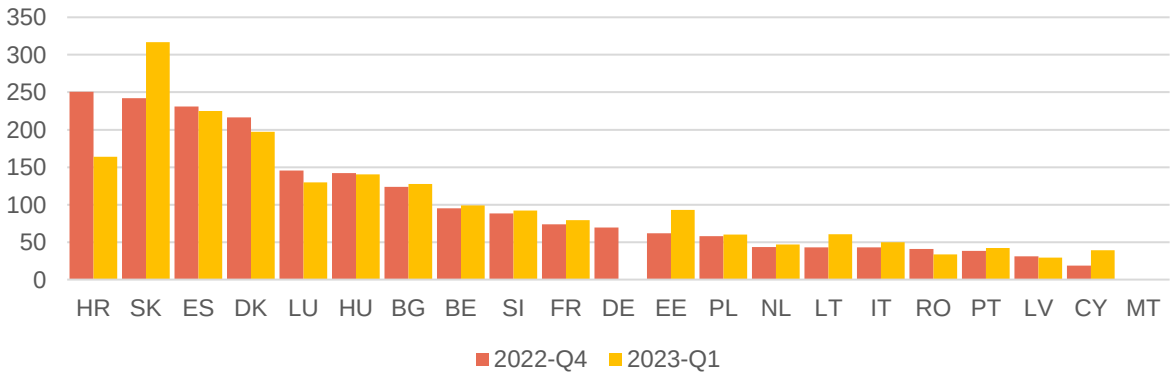
Figure 24. Share of websites going offline between May 2022 and February 2023, by ecosystem (Technote and Orbis)



Source: elaborated by PPMI, based on Technote and Orbis data.

When it comes to the declaration of bankruptcies by country, Croatia, Slovakia, Spain and Denmark present the highest numbers recorded in the fourth quarter of 2022 (see Figure 25). The case of Denmark provides perhaps the clearest example of a delay in bankruptcies due to government support discussed above and inflation-exacerbated problems caused by the pandemic. In Denmark, 45 % of companies that had been given pandemic-relief VAT loans went bankrupt within the first nine months of 2022.[114] During the COVID-19 pandemic, taxes and VAT payments in Denmark were postponed, and staff and rental costs were covered up to a max of 80 %; however, the payback terms for this arrangement were quite severe, with a monthly interest rate of 0.7 % (non-deductible) and a payback term of a maximum of 24 months. Interest rates were raised at the same time the payback term started, creating a double challenge for firms.[115]

Figure 25. Declarations of bankruptcies in the EU by country in Q4 2022 and Q1 2023, seasonally adjusted (Index 2015=100)



Source: elaborated by PPMI, based on Eurostat data table sts_rb_q.
Note: data for Austria, the Czech Republic, Finland, Greece, Ireland and Sweden were unavailable.

In addition to high inflation, high energy costs and post-COVID effects, countries such as Spain and Slovakia also suffered from burdensome and ineffective insolvency legislation, which until

[114] Christian, W. (2022). Denmark sees most bankruptcies in a decade. Available at: https://cphpost.dk/2022-10-07/news/denmark-sees-most-bankruptcies-in-a-decade/.
[115] Information provided by a Danish bankruptcy expert.

2022 did not include appropriate preventive mechanisms, leading to insolvency proceedings being initiated late, proceedings taking an excessively long time, and often ending in liquidation.[116] For context, in 2019, Directive (EU) 2019/1023 on restructuring and insolvency (the Restructuring Directive) established uniform rules for preventive restructuring frameworks, to be implemented by 2021. These preventive restructurings enabled debtors to continue their businesses on the basis of an agreed restructuring plan. The Restructuring Directive provided a diverse toolkit for preventive restructurings, including the suspension of creditor enforcement actions, the obligation to file for insolvency, an override of *ipso facto* clauses that permit contract termination or modification on insolvency, as well as cramdown (i.e. court-imposed restructuring) and certain protections for new and interim financing.[117] However, despite passing new laws in 2022 following Directive (EU) 2019/1023, some countries did not have a great deal of time to test out their new restructuring systems before being hit with the rise in bankruptcies. In Spain, the insolvency framework entered into force in September 2022, shortening the repayment plan and making bankruptcy proceedings more debtor-friendly. Since Spain has the third highest number of corporations in the EU, developments in this country have an important weight in the EU aggregate.[118]

Furthermore, as discussed above, certain industries such as transportation and accommodation services, are affected more than others. The latter is particularly important in both Spain and Croatia, given their reliance on tourism.[119] Logistics, meanwhile, plays an important role in Slovakia, which is suffering due to the loss of the Russian and Ukrainian markets, the disruption of the supply chains, the increased cost of raw materials, as well as a continuing shortage of truck drivers, exacerbated by the large number of Ukrainian drivers who have returned home to fight in the Russian war of aggression against Ukraine, thus further weakening the already under-staffed East-West corridors through Slovakia.[120]

In terms of financial health, data on firms' solvency ratios offer an understanding of the ability of companies to meet their long-term obligations. Although 2022 data on the solvency ratio was not yet available from Orbis at the time the analyses were carried out, recent trends provide valuable insights into differences by size of firm. While the average solvency ratio in 2021 stood at 42 %, the figures for small and medium-sized firms (43 % and 42 %, respectively) were slightly higher than those for large firms (40 %) (Figure 26). These figures cover almost 400,000 firms available in the Orbis database, so differences in the average for each size of firm are statistically significant.

This trend in solvency ratios is also noteworthy for another reason: while the solvency ratio for large firms dropped between 2020 and 2021 by an average of half a percentage point, suggesting worsening financial health, it actually increased for both small and medium-sized firms – by 0.55 and 0.07 percentage points, respectively. On the one hand, this might support

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[116] Elisei, C., & Aguado, J. (2023). Analysis: Spain's new restructuring law is being put to the test, fast. Reuters. Available at: https://www.reuters.com/markets/europe/spains-new-restructuring-law-is-being-put-test-fast-2023-02-15/#:~:text=The%20number%20of%20insolvent%20Spanish,previous%20quarter%2C%20Spanish%20data%20showed; Monereo Meyer Abogados (2022). Spain Has Finally Passed Its New Insolvency Law. Available at: https://www.lexology.com/library/detail.aspx?g=a958ac9f-0af5-45ed-8784-ce2908668561; Pfeffer, R., & Bojnansky, S. (2022). Slovakia: Latest Changes To Insolvency Legislation. Available at: https://www.mondaq.com/insolvencybankruptcy/1214302/latest-changes-to-insolvency-legislation.

[117] The European Parliament and the Council of the European Union (2019). Directive (EU) 2019/1023 of the European Parliament and of the Council of 20 June 2019 on preventive restructuring frameworks, on discharge of debt and disqualifications, and on measures to increase the efficiency of procedures concerning restructuring, insolvency and discharge of debt, and amending Directive (EU) 2017/1132 (Directive on restructuring and insolvency).

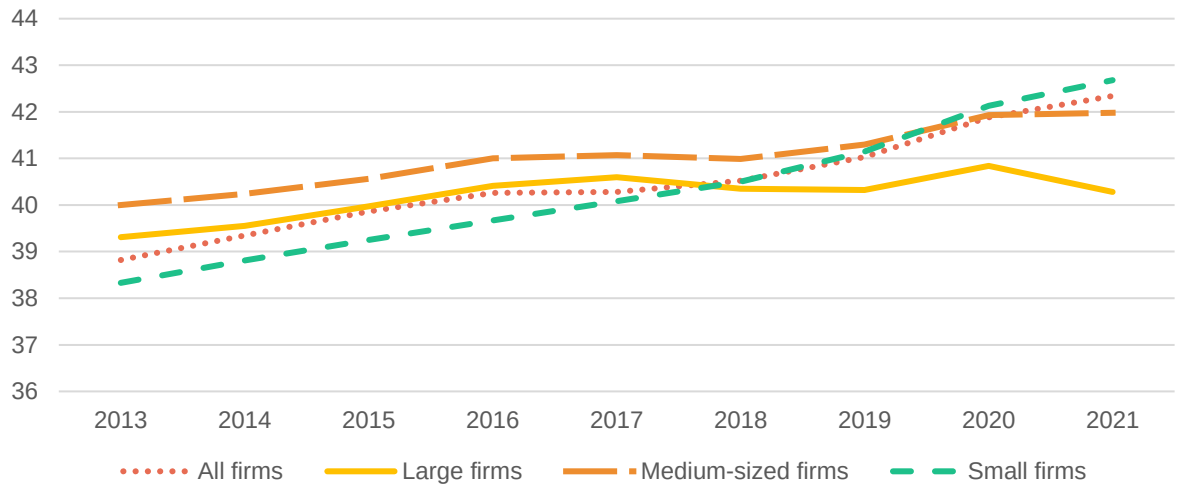
[118] European Commission (2023). Economic outlook for EA and EU -- Recent developments in bankruptcy declarations in the EU. Available at : https://ec.europa.eu/economy_finance/forecasts/2023/spring/Box_I_2_2-Recent%20developments%20in%20bankruptcy%20declarations%20in%20the%20EU.pdf. For Spain, the bankruptcy declaration index went from 172.3 in Q2 of 2022 to 216.2 in Q3 of 2022, an increase of 25 %.

[119] Along with Greece, Spain and Croatia are the top countries in the EU regarding the value added to their economies from accommodation and food service activities.

[120] Information provided by Early Warning Europe.

the notion put forward by the World Economic Forum[121] that SMEs were more resilient during the pandemic than large businesses. On the other hand, it should be noted that smaller companies were among the largest beneficiaries of government support during the pandemic.[122] Hence, as argued above, the strain felt by SMEs during the pandemic may have been masked by state aid measures.[123] These trends are also supported by Technote data, which show that the websites of large firms were the most likely to go offline.[124]

Figure 26. Solvency ratio (%) in the EU-27, 2013-2021, by firm size (Orbis)



Source: elaborated by PPMI, based on Orbis data.

4.2.3. The effect of inflation on bankruptcies

Overall, higher levels of inflation in 2022 were associated with an overall decrease in solvency ratio, but only by around 0.3 percentage points, with the effect on large firms being stronger (0.5 percentage points) than that on SMEs (0.22 percentage points). Nevertheless, as explained above, the current rise in bankruptcies is not just an isolated effect of inflation, but is related to the COVID-19 pandemic and its management.

The regression analysis shows that increases in inflation are associated with decreases in the solvency ratio, suggesting that firms are less able to meet their long-term obligations, and are therefore more likely to go bankrupt (see Table 15 in Annex 2). Specifically, an increase in inflation of one-percentage point reduces the solvency ratio by 0.3 percentage points (Model 2 in Table 15). While the average solvency ratio observed in 2021 was 42.34 %, the research team expects this figure to be around 42.04 % given the changes in inflation in 2022, all else being equal.

[121] World Economic Forum (2023). Europe's small businesses proved resilient to COVID-19 pandemic disruption. Here's what that means for SMEs. Available at: https://www.weforum.org/agenda/2023/01/europe-smes-business-resilience-covid-19/.
[122] European Commission (2021). SME Envoys - Finance subgroup Conclusions of the 2021 Survey and Roundtable on national solvency measures for SMEs during and after the Covid-19 crisis. Available at: https://single-market-economy.ec.europa.eu/system/files/2021-11/SME%20Envoys%20Finance%20-%20Final%20conclusions%20on%20national%20solvency%20measures%20for%20SMEs%20October%202021.pdf.
[123] This point is also supported in a Commission brief on state aid, according to which the Temporary Framework for state aid to counter the COVID-19 crisis was amended to cater to the needs of small businesses, by allowing Member States to convert small amounts of repayable instruments into direct grants. See: European Commission, Directorate-General for Competition, Mathieu Collin, A., Cannas, G., & Casteele, K. (2022). Competition state aid brief. Issue 1/2022 – February 2022.
[124] Followed by small and medium-sized firms. When matched against the Orbis data used in this report, around 11 % of firms in the tracked sample were large, 33 % were medium-sized, and 56 % were small. Of these, 0.35 % of small firms had their websites go offline, while the corresponding shares were 0.29 % for medium-sized firms and 0.41 % for large firms. It should be noted, however, that the sample is not representative of all businesses.

The effect is somewhat stronger when it comes to large firms. Namely, the average marginal effect of inflation is to reduce the solvency ratio by 0.05 percentage points for large firms (Model 4 in Table 15), meaning that for the levels observed in 2022, one would expect the solvency ratio to decrease from 40.28 % to 39.77 %. The equivalent effect for SMEs is to reduce the average solvency ratio by 0.02 percentage points, meaning that the expected solvency ratio would decrease from 42.46 % to 42.23 % between 2021 and 2022 (Model 5 in Table 15).

These changes are small, but it is important to remember that they only reflect the direct effect of inflation. Indirectly, inflation also contributes to bankruptcies by, for example, limiting firms' access to finance. To illustrate this, in Lithuania, around 38 % of loan applications by SMEs were rejected or not entirely fulfilled in 2022.[125]

The regression findings are corroborated by past research. A study covering the pandemic period suggests that increases in inflation are indirectly associated with higher insolvency risks, as a result of deteriorating access to finance.[126] A macro-economic model using data from 1980 to 1991 in the US (a period covering two recessions) also found that inflation is among the best predictors of business failures.[127]

Nevertheless, both of the studies cited above point to interest rates being a more important factor influencing bankruptcies. As inflation rises, central banks respond by raising interest rates, which translate to businesses having to pay higher rates on their loans, hence reducing their cashflow and increasing the likelihood of bankruptcy. Unsurprisingly, enterprises that have taken out loans that are not price-indexed and have variable interest rates are usually the ones most affected by high inflation.[128] Some of the literature finds interest rates to be the only significant systematic variable among such variables as employment, unemployment and sales in predicting business failure, given their effect on operating costs.[129]

Effect by ecosystem

Increased interest rates may be an important factor in why businesses in **agri-food** may fail, since this sector often faces higher interest rates than other economic sectors.[130] Likewise, an overwhelming majority of firms in construction are SMEs – and especially micro-firms. Such companies often have limited bargaining power to obtain favourable financing deals, due to their lower working capital and higher perceived business risk. Similarly, studies in **energy-intensive industries** have found that while SMEs were able to gain wider access to financing during the COVID-19 pandemic as EU financial instruments were mobilised and extensive national-level measures deployed under the Temporary Crisis Framework for state aid, there has since been an important decline in the uptake of debt-based instruments in 2022 – a sign that firms are unwilling or unable to take on increased debt through borrowing.[131] Lastly, according to one interviewee, the 2023 bankruptcy of Silicon Valley Bank (SVB) in the US and runs on regional banks have led to greater caution in the European banking sector over lending to higher-risk technology-driven firms, leading to greater difficulties in accessing finance for firms in the electronics ecosystem.

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[125] Information gathered through interviews.
[126] Kaya, O. (2021). Insolvency risk of European SMEs during pandemic. Available at: http://entfin.org/wp-content/uploads/2021/06/Insolvency-Risk-of-European-SMEs-during-Pandemic.pdf.
[127] Millington, J.K. (1994). The impact of selected economic variables on new business formation and business failures. *Journal of Small Business Finance*, *3*(2), 177-179.
[128] Wadhwani, S.B. (1986). Inflation, Bankruptcy, Default Premia and the Stock Market. *The Economic Journal*, *96*(381), 120-138.
[129] Everett, J., & Watson, J. (1998). Small business failure and external risk factors. *Small Business Economics*, *11*(4), 371-390.
130 fi-compass (2020). Financial needs in the agriculture and agri-food sectors in the European Union – Summary report. Available at: https://www.fi-compass.eu/sites/default/files/publications/financial_needs_agriculture_agrifood_sectors_eu_summary.pdf.
[131] EIB (2022). The European Small Business Finance Outlook 2022. Available at: https://www.eif.org/news_centre/publications/eif_working_paper_2022_84.pdf.

SMEs in the **electronics** ecosystem are also affected by bottlenecks in production, which stem from the steep increase in demand following the COVID-19 outbreak. Producing goods now takes much longer due to much longer lead times in obtaining chips and other components. For instance, according to feedback from interviewees, the usual lead time for micro controllers pre-pandemic was 6-8 weeks, but since the pandemic began in 2020 and subsequently even post-pandemic, supply chain shortages have meant that delivery times have increased to as long as 12-18 months. Moreover, the requirement to purchase in much greater volume than necessary, or else fail to secure a supplier for chips/components, also adversely impacts SMEs' cashflow. The lack of a diversified supplier base makes it more difficult to reduce dependence on Asia, especially China, for imports – a problem that the European Chips Act is seeking to address.

In **construction**, meanwhile, firms face very different odds of bankruptcy, depending on their focus. While the manufacturers of building materials are being constrained by a combination of long collection periods due to the scarcity of raw materials (see Section 4.1) and high inflation, firms in those segments in which demand has ramped up, such as construction renovation, are far less likely to face the risk of bankruptcy.

4.2.4. Simulating the effect of inflation on future bankruptcies

This section analyses how bankruptcy rates might evolve given different scenarios for the overall economic outlook.

The baseline scenario for 2023 and 2024 foresees a trend in bankruptcy declarations in the EU that is slightly higher than the historical average prior to the pandemic, with annual variations ranging from 0 % to 5 %, taking into account all sectors. The assumptions here are that the EU economy is expected to continue showing resilience in the face of a highly challenging global socioeconomic context; that the main effects of past negative shocks have already materialised in the most exposed and vulnerable sectors; and that the increases in interest rates seen in July and September 2023 are still manageable for households and firms, especially for indebted SMEs. However, there is increasing evidence that tight financial conditions are impacting financing costs and credit volumes for firms, especially SMEs, while persistent negative shocks continue to limit the momentum for growth in the EU economy (see Section 3.3). The financial situations of SMEs **might deteriorate quickly in the pessimistic and highly adverse scenarios.** The phasing out of fiscal support, the exhausting of excess private savings accumulated during the pandemic that have so far sustained demand, delays in the disinflation process, and tighter financial conditions are expected to increase the risk of an economic recession in the EU between the second half of 2023 and the first half of 2024, the probability of which stands at more than 80 % under these scenarios.[132] In addition, these factors will make the financial situations of SMEs more critical if they lack the liquidity and collateral to access credit.

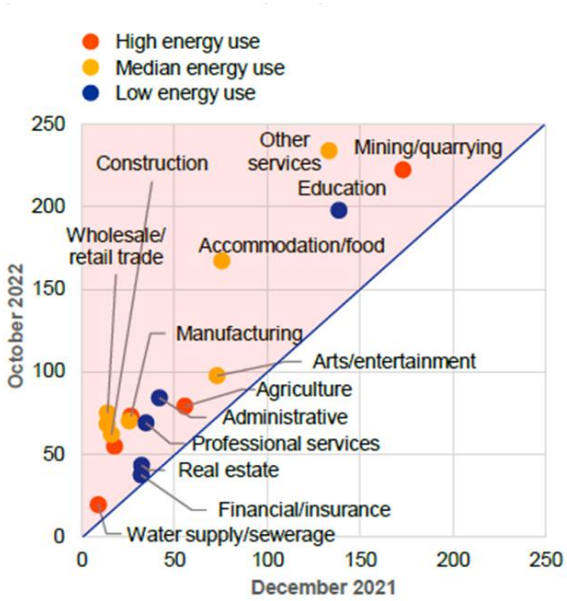
To get an idea of what could happen in the next two years should these scenarios manifest themselves, we can consider the past ECB bankruptcy projections released in 2022 – at a time when inflation pressures and energy prices were at their highest. We can assume that these projections will be especially relevant for the third – highly adverse – scenario, characterised by higher inflation and higher energy prices, as well as a negative economic outlook. Figure 27 shows the simulated probability of default for firms in the euro area by NACE code by comparing the situation in October 2022 with that in December 2021. The figure shows that all sectors lie above the bisector line, indicating an increased probability of default for all firms

[132] Estimates by the ECB indicate that the probability forecasts of a recession in the course of 2023 increased from around 45 %, according to the projections of May 2022, to 80 % according to projections released in November 2022. See ECB (2022) Financial Stability Review, November 2022 – Overview. Available at: https://www.ecb.europa.eu/pub/financial-stability/fsr/html/ecb.fsr202211~6383d08c21.en.html#toc5.

across ecosystems and geographies in the period considered.[133] Businesses in those energy-intensive sectors that are less able to pass on higher energy and commodity costs to customers, including construction and the utilities market, are more exposed to the risk of bankruptcy. **In the construction sector specifically, the number of firms declaring default could triple from two to six out of every 1,000 firms** in the next year (from the end of 2023 to the end of 2024).[134]

In addition, bankruptcy declarations are expected to rise further in those sectors that have already been hit severely by the COVID-19 crisis, and which probably emerged from the pandemic with higher levels of debt and lower liquidity buffers, such as the accommodation and transport sectors. Indeed, government liquidity support measures during the acute phases of the pandemic helped many SMEs in these sectors, including those that were already struggling to stay afloat. As support measures have decreased, the number of financially viable firms has also fallen. Figure 27 indicates that in a negative economic cycle, bankruptcy declarations **could more than double** in the next year, from **7.5 to 17 out of every 1,000 firms** in the **accommodation and related food services**, and rise **from 14 to 25 out of every 1,000 SMEs in transport**. **The agriculture sector, including agri-food**, in which fuel, fertiliser and fodder are vital to maintaining normal levels of output, has also suffered as a result of the Russian war of aggression against Ukraine, while **SMEs in manufacturing** could experience an increased risk of default due to the lack of affordable raw materials, **in line with the trend envisaged for construction**.[135]

Figure 27. Probability of bankruptcy for firms listed in the Euro area, by NACE category (basis points), Dec 2021 to Oct 2022



Source: ECB (2022). Financial Stability Review, November 2022 – Overview (Chart 5, p. 10).

In summary, SME bankruptcies in the EU have been on the rise since 2022, after a prolonged period at lower-than-average levels. This rise is due to increased borrowing costs and declining

[133] ECB (2022). Financial Stability Review, November 2022. Available at: https://www.ecb.europa.eu/pub/financial-stability/fsr/html/ecb.fsr202211~6383d08c21.en.html.

[134] This corresponds to an increase in the probability of default from 20 basis points (0.2 %) to 60 basis points (0.6 %) from December 2021 to October 2022, as reported by ECB simulations. See: ECB (2022). Financial Stability Review, November 2022.

[135] Sousa, A., Braga, A., & Cunha, J. (2022). Impact of macroeconomic indicators on bankruptcy prediction models: case of the Portuguese construction sector. *Quantitative Finance and Economics*, *6*(3), 405-432; European Commission (2022). A "Relief Package" to give our SMEs a lifeline in troubled waters, blog of Commissioner Thierry Breton; Díez, F.J. et al. (2021). Insolvency Prospects Among Small and Medium Enterprises in Advanced Economies: Assessment and Policy Options. IMF staff discussion note, April 2021, SDN/2021/002.

fiscal support, along with higher labour and input costs, as well as the phasing out of pandemic-related support.[136] Recent studies, also based on experiences from the 1970s,[137] indicate that throughout 2024, an increase in the number of bankruptcies could happen, should those scenarios materialise that involve further increases in the cost of borrowing in challenging macroeconomic and policy environment set out above.[138] International institutions such as the ECB and the IMF suggest that **temporary and targeted government support may be needed in the event of highly adverse economic conditions, to prevent the risk of a wave of bankruptcies among small and more vulnerable firms and to avoid negative spillovers (reduction in asset quality, credit deterioration) into the financial system**.[139]

4.2.5. Conclusions regarding bankruptcies

The low level of bankruptcies during the COVID-19 crisis and the comparatively high number during the current period are not primarily related to increases in inflation, but to the financial support programmes offered during the pandemic, which are now expiring. Regulatory changes in Spain have also contributed to the recent trend. More bankruptcies are expected, especially given current high interest rates, which will make it more difficult for indebted firms to pay back their loans and to access finance more generally. In the baseline scenario, bankruptcies are expected to rise between 0 % and 5 %, depending on the ecosystem concerned. The more pessimistic scenarios would see bankruptcy numbers tripling in construction and doubling (or almost doubling) in accommodation and food as well as in the transport sector, reflecting the vulnerability of these sectors after the pandemic.

4.3. Investment and digitalisation

Even though inflation appears to have only a limited influence on bankruptcies, it can limit firms' growth. In order to grow, companies need to invest in those areas they believe will provide the greatest payoffs, be it in land, equipment, training, intellectual property, digital technologies or green practices, to highlight a few examples. However, investment is risky when the economic environment becomes uncertain. The supply shocks that followed the COVID-19 lockdowns, as well as spiralling energy prices, exacerbated by the Russian war of aggression against Ukraine, and interest rate hikes made as a policy measure to counter inflation, have all deteriorated the investment environment.[140] This could affect SMEs in particular, which are less liquid-rich.[141] This section of the report analyses the effect of the high-

[136] European Commission (2023, September). European Economic Forecast – Summer 2023. Institutional Paper 255| September 2023. Available at: https://economy-finance.ec.europa.eu/economic-forecast-and-surveys/economic-forecasts/summer-2023-economic-forecast-easing-growth-momentum-amid-declining-inflation-and-robust-labour_en.
IMF (2022, October). Financial Stability in the New High-Inflation Environment, Chapter 1. Available at: https://www.imf.org/-/media/Files/Publications/GFSR/2022/October/English./ch1.ashx.

[137] Damodaran, A. (2022). A Follow up on Inflation: The Disparate Effects on Company Values! Available at: https://aswathdamodaran.blogspot.com/2022/05/a-follow-up-on-inflation-disparate.html Last access on 29/03/2022.

[138]Reuters (2022). Fed Officials nod to March rate hike as inflation drumbeat grows louder, Reuters, 13 January 2022
Weltman (2022). Inflation Rates and the Corresponding Impact on Bankruptcy Filings. Available at: https://www.weltman.com/Publication-Inflation-Rates-and-the-Corresponding-Impact-on-Bankruptcy-Filings.

[139] ECB (2022). Financial Stability Review, November 2022 – Overview. Available at: https://www.ecb.europa.eu/pub/financial-stability/fsr/html/ecb.fsr202211~6383d08c21.en.html#toc5.
IMF (2022). Financial Stability in the New High-Inflation Environment, Chapter 1. Available at: https://www.imf.org/-/media/Files/Publications/GFSR/2022/October/English/ch1.ashx.
FTI Consulting (2022). Inflation Is Raging, Rates Are Rising and Markets Are Reeling. Where Are All the Bankruptcies? Available at: https://www.fticonsulting.com/insights/articles/inflation-raging-rates-rising-markets-reeling-bankruptcies.
Wadhwani & Shanfeld (2022). Inflation Rates: Impact on Bankruptcy Filings. Available at: https://www.wslaw.com/blog/2022/december/inflation-rates-impacts-on-bankruptcy-filings/.

[140] EIB (2023). Economic investment report 2022-2023. Available at : https ://www.eib.org/attachments/lucalli/20220211_economic_investment_report_2022_2023_en.pdf.

[141] ECB (2022). *Survey on the Access to Finance of Enterprises in the euro area.* Available at: https://www.ecb.europa.eu/stats/ecb_surveys/safe/html/ecb.safe202212~6bc3312ea1.en.html#toc5.

inflation environment on investment and digitalisation, and what the implications are for the digital transition.

Digitalisation is the first pillar of the twin transition. Europe's Digital Decade outlines the innovation efforts, spurred by the shock of the pandemic, that the EU and its Member States are undertaking. In particular, the Digital Decade policy programme aims to achieve targets and objectives in four key areas: connectivity, digital skills, digital business, and digital public services.[142] To this end, the EU has established the DIGITAL Europe Programme to provide strategic funding (EUR 7.5 billion) in order to shape the digital transformation of Europe's society and economy.[143] Digitalisation is also one of the six pillars of the Recovery and Resilience Fund (RRF), to which Member States must allocate at least 20 % of the RRF's total planned expenditure of EUR 673 billion.[144]

Within this larger framework of programmes, SMEs play a pivotal role as a critical source of innovation.[145] According to the Commission, by 2030, SMEs should have the opportunity to access digital technologies or data easily and on fair terms, and should benefit from adequate support to digitalise. The goal is to ensure that 90 % or more of Europe's SMEs reach at least a basic level of digital intensity.[146] Despite this wealth of funding, multiple studies highlight that a lack of financial resources is the top barrier to digitalisation for small businesses.[147] Financial barriers to innovation become all the more problematic during times of economic uncertainty, when firms cannot accurately estimate future cashflows.

Hence, digitalisation efforts may suffer as a result of high inflation, which can have both direct and indirect effects. Directly, inflation increases the cost of introducing digital technologies. Indirectly, firms may be discouraged by higher interest rates, given that they will have to balance potential return on investment against a higher cost of borrowing.

The section that follows lays out the methodological approach used in collecting and analysing data about investments and the adoption of innovative and digital technologies. Following on from this, recent trends in investment and digitalisation are explored, using a variety of data sources. The section concludes by presenting the findings from the regression results, complemented by qualitative insights from interviews with key stakeholders as well as sector-

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[142] European Commission (2021). Europe's Digital Decade. Available at: https://digital-strategy.ec.europa.eu/en/policies/europes-digital-decade.

[143] European Commission (2021). The Digital Europe Programme. Available at: https://digital-strategy.ec.europa.eu/en/activities/digital-programme.

[144] European Commission. (2021). Recovery and Resilience Facility. Available at: https://economy-finance.ec.europa.eu/eueconomyexplained/recovery-and-resilience-facility_en.

[145] Veugelers, R. (2008). The role of SMEs in innovation in the EU: A case for policy intervention. *Review of Business and Economics*, *53*(3), 239-262; Veugelers, R., Ferrando, A., Lekpek, S., & Weiss, C.T. (2019). Young SMEs as a motor of Europe's innovation machine. *Intereconomics*, *54*(6), 369-377.

[146] Digital intensity is a way of measuring the integration of various digital technologies at enterprise level. A basic level of digital intensity requires firms to have integrated into their business at least four out of 12 selected technologies. These are: internet download speed of at least 30Mbit/s; the use of any social media; at least 50 % of employees using computers with access to the internet for business purposes; the use of any cloud service; the integration of ERP (enterprise resource planning) software; the integration of CRM (customer relationship management) software; the purchase of intermediate or sophisticated cloud computing services; the use of at least two social media; the use of any IoT ('Internet of Things') technologies; e-commerce sales accounting for at least 1 % of total revenue; web sales accounting for at least 1 % of total revenue and B2C web sales accounting for at least 10 % of total web sales; and the use of AI (artificial intelligence) technology.

[147] Eurochambres (2022). Eurochambres Twin Transition Survey, September 2022. Available at: https://www.eurochambres.eu/wp-content/uploads/2022/09/Eurochambres-Twin-Transition-Survey.pdf; Tiwari, R., & Buse, S. (2007). Barriers to innovation in SMEs: Can the internationalization of R&D mitigate their effects?. In: *Proceedings of the First European Conference on Knowledge for Growth: Role and Dynamics of Corporate R&D-CONCORD*. Available at: https://www.econstor.eu/bitstream/10419/55499/1/546470335.pdf; Telukdarie, A., Dube, T., Matjuta, P., & Philbin, S. (2023). The opportunities and challenges of digitalization for SME's. *Procedia Computer Science*, *217*, 689-698; Zhu, Y., Wittmann, X., & Peng, M.W. (2012). Institution-based barriers to innovation in SMEs in China. *Asia Pacific Journal of Management*, *29*, 1131-1142; Indrawati, H. (2020). Barriers to technological innovations of SMEs: how to solve them? *International Journal of Innovation Science*, *12*(5), 545-564; Madrid-Guijarro, A., Garcia, D., & Van Auken, H. (2009). Barriers to innovation among Spanish manufacturing SMEs. *Journal of Small Business Management*, *47*(4), 465-488; Hadjimanolis, A. (1999). Barriers to innovation for SMEs in a small less developed country (Cyprus). *Technovation*, *19*(9), 561-570.

specific evidence from the case studies, followed by a discussion of business investment under each of the scenarios laid out in Section 3.2.

Key points

- Business investment increased in 2022 compared with 2021 (from 13.4 % to 13.9 % of GDP), which is in line with the positive association between inflation and investment estimated by the regression models. Thus increase is likely to have been driven by businesses opting to invest their cash reserves before they lose value due to rising inflation. Large firms, firms involved in infrastructure, and those based in Southern Europe were the only ones more likely to plan no investment in 2022 compared with 2021.
- The share of firms adopting a digital technology jumped from 61 % in 2021 to 69 % in 2022, probably driven by government investment. Micro- and medium-sized firms registered the largest increases, although large firms were most likely to adopt digital technologies overall. Conversely, fewer firms expect to introduce innovations (in products or services, process, management) in 2022 (50 %) than in 2021 (53 %). However, this represents part of an overall declining trend since 2015, when 63 % of firms introduced innovations.
- The hike in interest rates enacted by the ECB in September 2023, increasing them to 4.50 %, is expected to reduce the probability of SMEs reporting positive investment expectations from 31 % down to 29.2 %, compared with a fall from 35.6 % to 34.4 % for large firms. Furthermore, seeing future economic uncertainty as a major obstacle to investment reduces the probability of firms reporting positive investment expectations by 17 % among SMEs and 12 % among large firms, all other factors being equal.
- The baseline scenario foresees a deceleration in the growth of the general level of investment by firms from about 4-5 % in 2022 to less than 1 % in 2023, and between 1 % and 2 % in 2024, while the growth rate of digital investment by SMEs is expected to be between 1 % and 3% in 2023-2024. In the pessimistic and highly adverse scenarios, the evolution of digital investment by SMEs is highly uncertain: it could be lower or negative (between -1 % and 1 %) due to the negative impact of interest rates on financial markets, but it could also expand (between 3 % and 5 %) as a way to better deal with a recession.

4.3.1. Data and indicators for investment, the adoption of digital technologies and innovation

The analyses in this section rely on Eurostat (including its ICT usage for enterprises survey) and DESI (the Digital Economy and Society Index) for macro-level trends, and on two sources of micro-data – the ECB SAFE (Survey on Access to Financing of Enterprises) and the European Investment Bank (EIB) Investment Survey (EIBIS) – for micro-level trends and analyses.

The EIBIS contains information on respondents' expectations regarding investment in each financial year between 2016 and 2022. Data on actual levels of investment are only available up to 2020, which is why this is excluded from the analysis. With regard to the adoption of innovative and digital solutions, the ECB SAFE contains information on the introduction of four different innovations that firms have undertaken in the 12 months prior to their interview, for each year between 2014 and 2022:

- a new or significantly improved product or service to the market;

- a new or significantly improved production process or method;
- a new organisation of management;
- a new way of selling your good or services.

While none of these explicitly address the adoption of digital technology, they can nevertheless be regarded as good proxies for whether or not firms can afford to innovate, which is an important element in the adoption and production of digital technology. These four indicators were then **combined into a single variable measuring whether at least one of these four innovations had been introduced**.

The other source of micro-level data is EIBIS. This includes annual information on the **adoption of digital technologies** between 2019 and 2022.[148] These technologies comprise 3D printing, advanced robotics, the Internet of Things, big data and analytics, augmented or virtual reality, platform technologies, and drones. While many of these technologies may be employed by all firms, some are sector-specific. For instance, drones are only employed in construction, whereas advanced robotics are only employed in manufacturing.

It should be noted that SAFE data cover four broad sectors: industry (NACE B-E); services (NACE H-S, excluding financial services K and administrative services O-P-Q); trade (NACE G); and construction (NACE F). EIBIS also covers four broad sectors, although these are categorised differently, and their scope is much narrower. In EIBIS, manufacturing covers NACE C, construction NACE F, services NACE G-I, and infrastructure NACE D-E, as well as H (transportation) and J (information and communication). As such, it is not easy to draw direct comparisons between the results from the two datasets.

Table 3. Advantages and disadvantages of ECB SAFE and EIBIS

	ECB SAFE	EIBIS
Advantages	• More years of data for analysis (2014-2022) than in EIBIS • Wider sectoral coverage • Company-level information about demographics and financials • Data can be broken down by sector and size	• Company-level information about demographics and financials • Information about both investment and digitalisation • Can distinguish which firms received financial support • Data can be broken down by sector and size (including large firms) • Observations can be matched against more fine-grained measurements of inflation
Disadvantages	• No information on financial support • Data on large firms cannot be matched to inflation data for reasons of confidentiality	• Fewer years of data (2016-2022, and only since 2019 for digital adoption) • More limited sectoral coverage • Orbis-derived variables offer incomplete coverage

Source: elaborated by PPMI.

The nature of the two datasets creates important complementarities, summarised in the table above. In particular, while SAFE has been running for longer and offers a wider sectoral coverage (and therefore a larger sample size), EIBIS includes information on whether firms operate in high-tech sectors,[149] and on whether they received financial support during the COVID-19 pandemic. Another advantage of EIBIS is that, since it is matched with Orbis data,

[148] Similarly to the SAFE data, EIBIS also includes a variable describing whether or not the firm has introduced new goods or services, or new processes. The estimated models show similar results. To avoid redundancy and exploit the complementarities of innovation (covered by SAFE) and digitalisation, the EIBIS-based analysis focuses on digital adoption rather than innovative solutions.

[149] 'High-tech' sectors are defined in accordance with the Eurostat classification, see: https://ec.europa.eu/eurostat/cache/metadata/Annexes/htec_esms_an3.pdf.

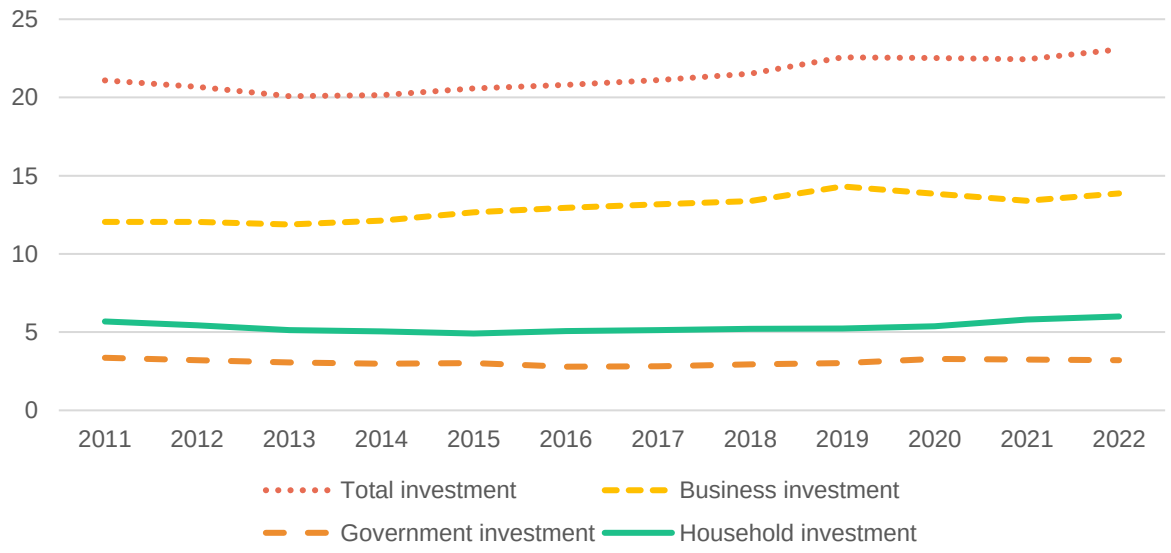
it contains information on NACE sectors at the 2-digit level. This allows the dataset to be matched with a more fine-grained measurement of inflation, such as that employed in Section 4.1 and Section 4.7 using Orbis data, and which is described in further depth in Section 3.1.

4.3.2. Trends in investment and the adoption of digital technologies and innovations

Investment trends in the EU-27 have mostly remained stable over time: between 2002 and 2022, total investments as a share of the EU-27's aggregate GDP have averaged 21.8 %, with a standard deviation of just 1 percentage point.[150] The financial crisis of 2008 was followed by a steady decline in investment up to 2014, when it picked up – only to slow again during the COVID-19 pandemic. In 2022, investment levels finally returned to pre-financial crisis levels, with an average of 23.2 % (Figure 28).

Business is the biggest contributor to total investment, on average accounting for almost 60 % of this figure. In 2022, business investment increased slightly, from 13.4 % to 13.9 % (Figure 28). Figure 28 also shows that business investment decreased during both the financial crisis and the COVID-19 pandemic, in line with the expectation that firms are more reluctant to take risks in an uncertain economic environment. The fall in the share of business investment was compensated by increases in government investment in 2020, thanks to the generous subsidies and policy measures undertaken by the governments of Member States. In 2021, it was household investment – which consists of the purchase and renovation of dwellings – that supported total investment.

Figure 28. Investment by institutional actors as a share of GDP (%) in the EU-27, 2002-2022 (Eurostat)



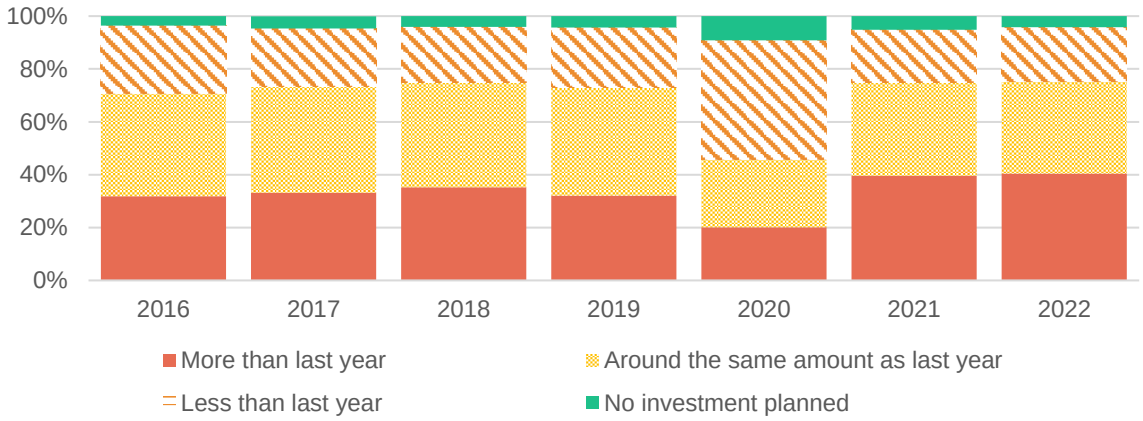
Source: elaborated by PPMI, based on Eurostat data table TEC00132.

In line with Figure 28, which shows an uptick in business investment in 2022, the **expectations of EIBIS respondents with regard to total investment spending also improved slightly** – albeit by less than 1 percentage point (the share of firms reporting no

[150] Standard deviation is a measure of data dispersion. The lower the standard deviation, the less dispersed the observations are, meaning that there is little variation overall. In this case, a standard deviation of 1 means that total investments tend to float between values just shy of 21 % and 23 %.

planned investment decreased from 5 % to 4 %, see Figure 29). This increase was bigger in the case of medium-sized and large firms, particularly those in manufacturing, as also evidenced by a recent EIB report.[151]

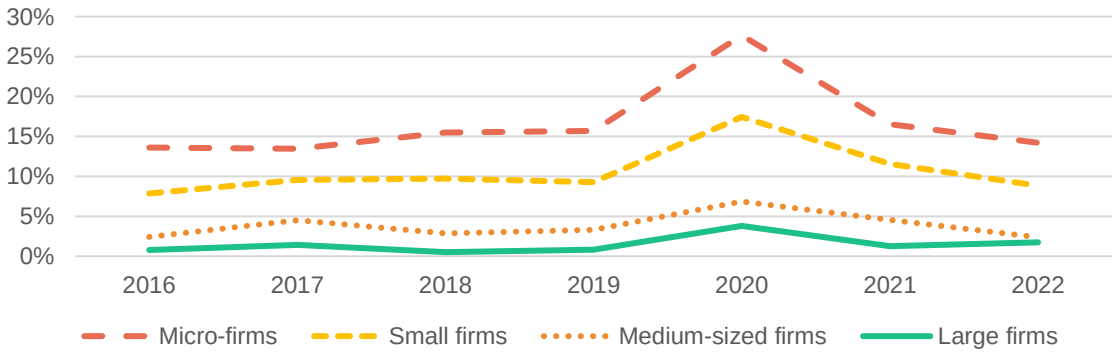
Figure 29. Expectations regarding total investment spending in the current financial year in the EU-27, 2016-2022 (EIBIS)



Source: elaborated by PPMI, based on EIBIS data.

A more detailed breakdown of companies' investment plans also highlights four trends. First, **micro-firms and firms in the construction ecosystem are, on average, the most likely to not be planning any investment** (Figure 30). Second, while micro-firms were also the most likely to be affected negatively by the pandemic in terms of investment, service sector firms (which, in the EIBIS survey, include retail and accommodation), were the ones hit hardest by the pandemic. Since 2020, the share of service sector firms declaring they have no plans to invest has been greater than the corresponding share in the construction sector (Figure 31). Third, **in 2022, large firms and firms involved in infrastructure were the only groups in which an increase in the share of firms declared that they were planning no investment**. Lastly, a breakdown by country shows that companies in **Southern European countries were most likely not to have planned any investment in 2022** (Figure 32).

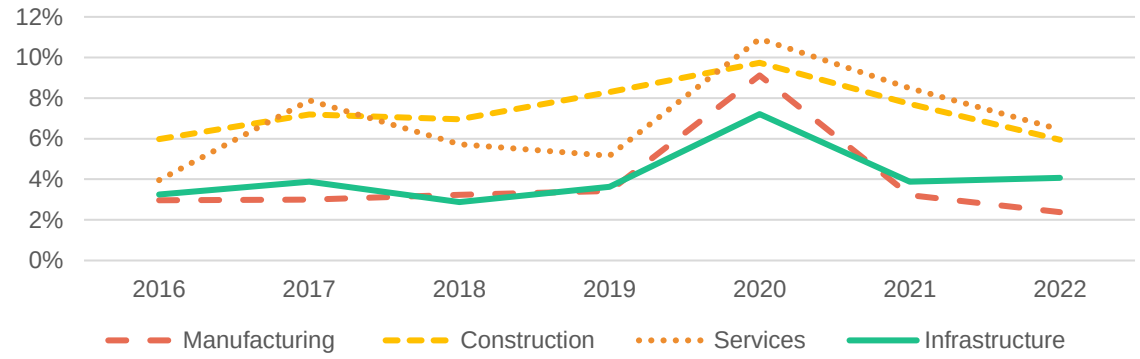
Figure 30. Expectation of no planned investment spending in the current financial year in the EU-27 by firm size, 2016-2022 (EIBIS)



Source: elaborated by PPMI, based on EIBIS data.

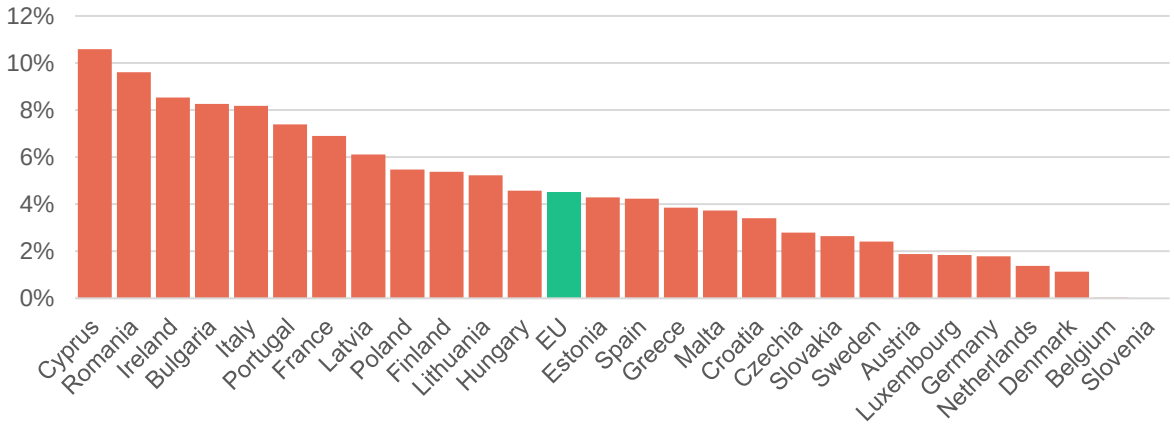
[151] EIB (2023). EIB Investment Survey 2022 – EU Overview. Available at: https://www.eib.org/en/publications/20220219-econ-eibis-2022-eu.

Figure 31. Expectation of no planned investment spending in the current financial year in the EU-27 by sector, 2016-2022 (EIBIS)



Source: elaborated by PPMI, based on EIBIS data.

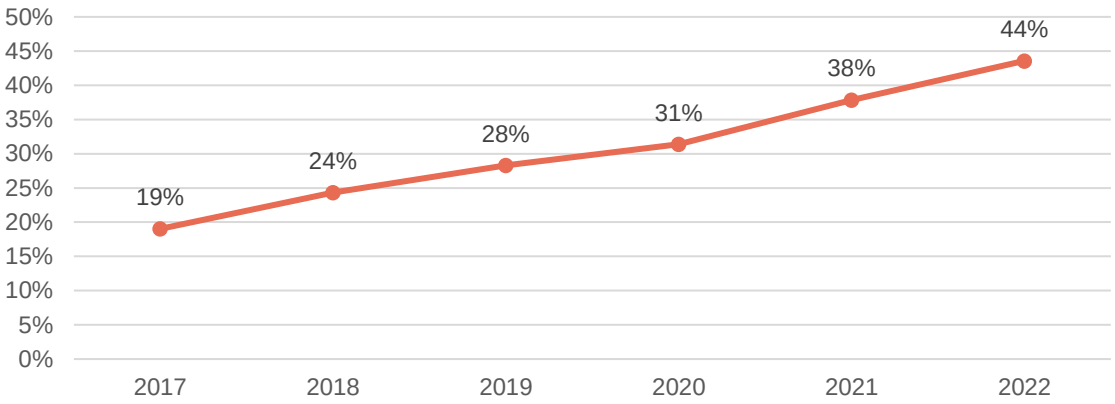
Figure 32. Expectation of no planned investment spending in the current financial year in the EU-27 by country, 2022 (EIBIS)



Source: elaborated by PPMI, based on EIBIS data.

Business digitalisation also increased in 2022. The share of SMEs with at least a basic level of digital intensity has gone from 19 % in 2017 to almost 44 % in 2022, despite a slight slowing of the trend during the pandemic (Figure 33). Since then, the uptake of digital technologies has increased more markedly, as lockdowns and the lack of physical contact pushed businesses to adopt digital solutions.

Figure 33. Share of SMEs with at least a basic level of digital intensity in the EU-27 (%), 2017-2022 (DESI)



Source: elaborated by PPMI, based on DESI data.

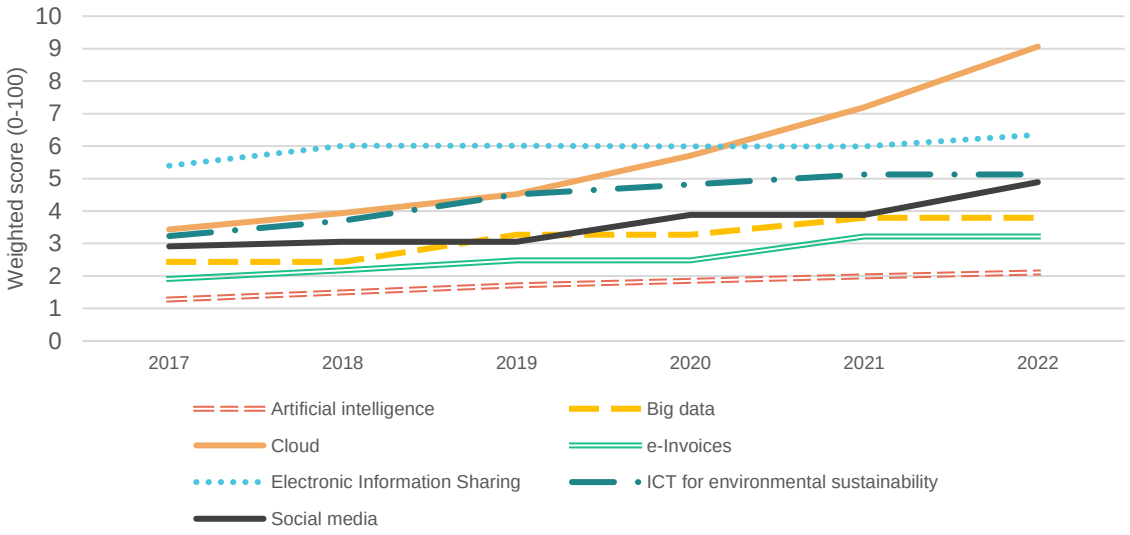
Of the specific digital technologies adopted by businesses, **the biggest uptake since 2017 has been in cloud storage** (Figure 34). As of 2021, according to the EU survey on the use of ICT and e-commerce by enterprises, around 35 % of enterprises made use of cloud computing, with the highest share of almost 70 % occurring in Sweden.[152] Cloud computing was most commonly used in the ICT sector and in publishing activities, whereas transportation and construction were the sectors with the lowest levels of uptake (less than 30 % of businesses).

Other technologies, such as social media, e-invoices and ICT for environmental sustainability have also experienced an increase in usage among businesses, whereas the adoption of AI and electronic information sharing have not increased as much over the past five years. AI, in particular, is lagging behind in comparison to other technologies, although recent major breakthroughs in AI for commercial use, such as OpenAI's ChatGPT, followed by Google's Bard and Microsoft's Copilot, may play a pivotal role in future uptake by businesses in 2023 and 2024, especially in service industries.[153]

[152] European Commission (2022). Survey of Businesses on the Data Economy 2022. Available at: https://digital-strategy.ec.europa.eu/en/library/survey-businesses-data-economy-2022.

[153] For a review of recent developments in AI, see: Hern, A. (2023). TechScape: The AI tools that will write our emails, attend our meetings – and change our lives. Available at: https://www.theguardian.com/technology/2023/mar/21/the-ai-tools-that-will-write-our-emails-attend-our-meetings-and-change-our-lives.

Figure 34. Use of digital technologies by businesses in the EU-27, 2017-2022 (DESI)



Source: elaborated by PPMI, based on DESI data.

SAFE data show that, in 2022, half of respondents had introduced at least one new innovation in the previous 12 months. This, however, represents a **marked decrease from previous years**, when the share of firms introducing at least one innovation averaged almost 59 %, peaking at 63 % in 2015 (Figure 35).

However, this aggregate variable conceals the ways in which firms may prioritise certain aspects of innovation more than others at different times. For instance, the COVID-19 pandemic forced firms to digitalise – but not necessarily to introduce new products or services. In 2020, there was a three-percentage-point increase compared with 2019 in the introduction of new ways of selling goods and services. None of the other innovation components saw such an increase, with only the introduction of new ways of organisational management seeing an increase of one percentage point, also in line with the massive changes to the labour market that occurred during the COVID-19 crisis (i.e. while some employees were no longer able to work due to pandemic restrictions, others began to working remotely, which was a novelty for the majority of firms).

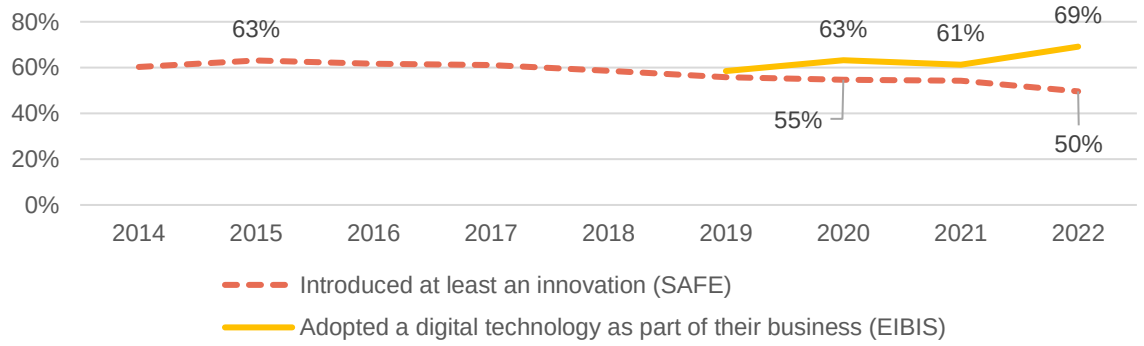
Conversely, **the share of firms that adopted digital technologies continued to rise into 2022**. Although there had already been a push to adopt digital solutions in 2020 due to the pandemic, this trend increased significantly in 2022, after a slight dip in 2021.

The share of large firms introducing innovations and adopting digital technologies is greater than the corresponding share among SMEs (Figure 36). This finding is in line with recent EIB work suggesting a widening gap between firms in terms of their degree of digitalisation.[154] More specifically, the smaller the firm, the lower the likelihood that it will innovate and adopt digital technologies, according to both EIB and SAFE data. Indeed, recent studies have found that the size of a firm plays a key role in the adoption of advanced digital technologies, with 80 % of firms with more than 250 employees using advanced digital technologies, compared with 45 % of firms with fewer than 10 employees. This disparity is strongest in the field of advanced robotics, which suggests that certain technologies

[154] Teruel, M., Amaral-Garcia, S., Bauer, P., Coad, A., Domnick, C., Harasztosi, P., & Pál, R. (2022). COVID-19 and the resilience of European firms: The influence of pre-crisis productivity, digitalisation and growth performance. *EIB Working Paper No. 2022/13*. Available at: https://www.eib.org/attachments/lucalli/20220232_economics_working_paper_2022_13_en.pdf.

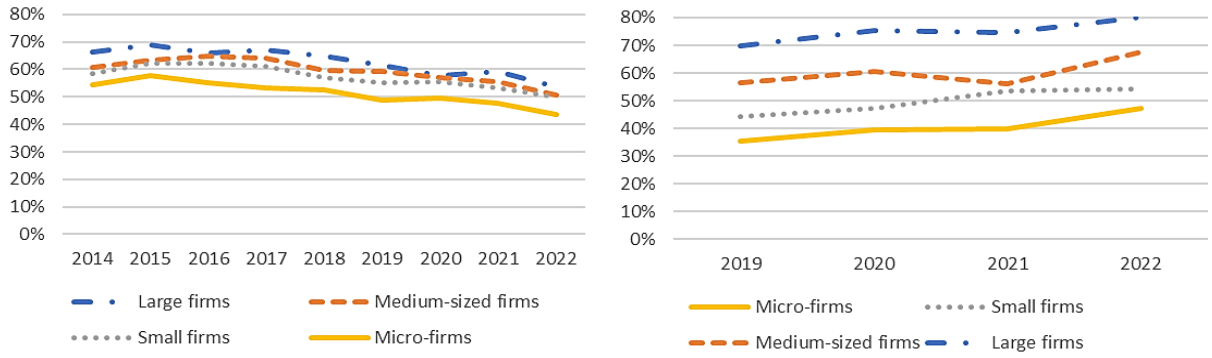
necessitate major integration costs, a factor that is likely to slow the digital transformation in Europe.[155] Interestingly, however, while the share of firms adopting digital technologies is increasing consistently, of the rate at which firms are introducing innovations is decreasing for all sizes of firm. Lastly, while companies of all sizes followed similar trends with regard to their efforts to innovate, the 2021 drop in digitalisation was greater among micro- and medium-sized firms than among large enterprises. Small companies, by contrast, did not experience a decrease in 2021.

Figure 35. Share of firms who introduced at least one innovation in the previous 12 months (%) in the EU-27, 2014-2022 (SAFE), and share of firms adopting at least one digital technology (%) in the EU-27, 2019-2022 (EIBIS)



Source: elaborated by PPMI, based on ECB SAFE and EIBIS data.

Figure 36. Left: share of firms who introduced at least one innovation in the previous 12 months (%) in the EU-27, 2014-2022 (SAFE); and right: share of firms adopting at least one digital technology (%) in the EU-27, 2019-2022 (EIBIS)



Source: elaborated by PPMI, based on ECB SAFE and EIBIS data.

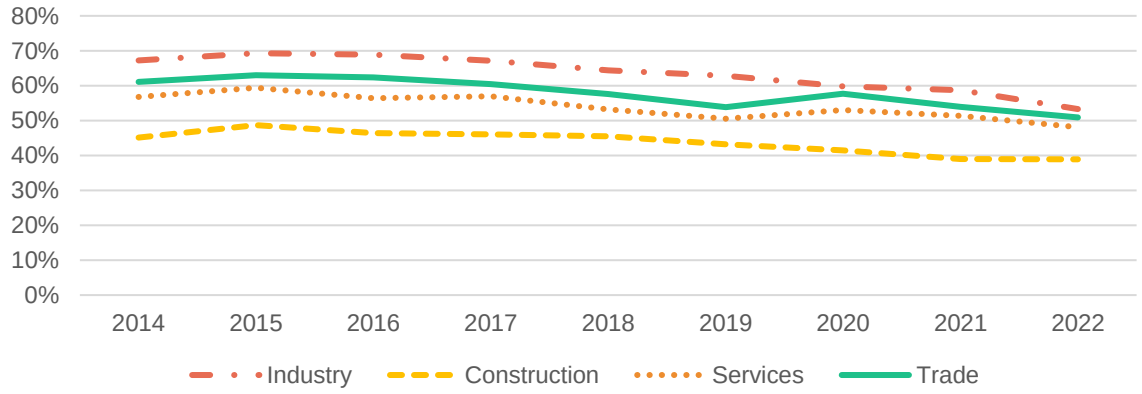
Sectoral trends also show that **firms in construction are characterised by the lowest rates of both the introduction of innovations and of digital adoption**, in line with the Eurostat survey on ICT usage among enterprises.[156] In contrast, firms in industry and manufacturing/infrastructure introduce innovations and adopt digital technologies at a faster rate. Furthermore, trends show that firms in trade (according to SAFE data) and services (according to EIBIS data) increased their innovation and digitalisation efforts the most during the pandemic (by 6 percentage points with regard to innovation and 10 percentage points with

[155] EIB (2023). Digitalisation in Europe 2022-2023: Evidence from the EIB investment survey. Available at: https://www.eib.org/attachments/lucalli/20230112_digitalisation_in_europe_2022_2023_en.pdf.

[156] European Commission (2022). Survey of Businesses on the Data Economy 2022. Available at: https://digital-strategy.ec.europa.eu/en/library/survey-businesses-data-economy-2022.

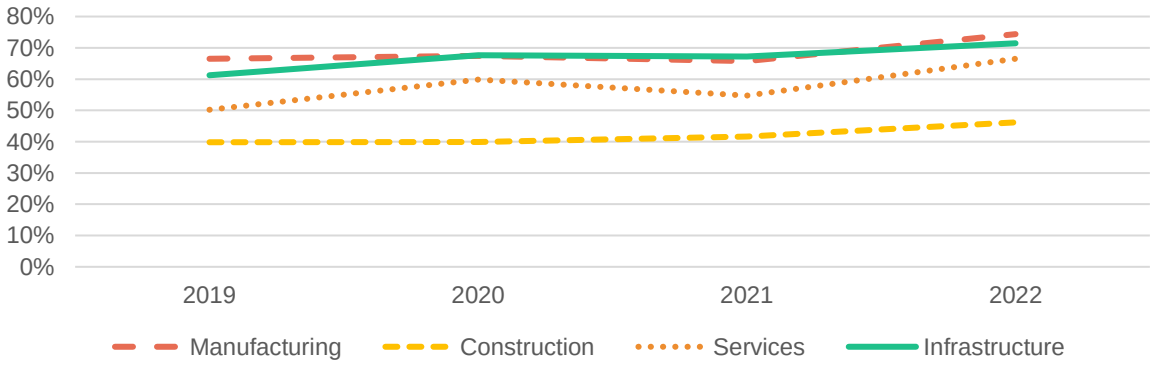
regard to digitalisation).[157] However – and in line with other trends – while fewer firms introduced innovations in 2020, the rate at which digital technologies were adopted increased by between 12 % (in manufacturing) and 32 % (in services) compared with pre-pandemic levels (Figure 37 and Figure 38).

Figure 37. Share of firms who introduced at least one innovation in the previous 12 months (%) in the EU-27 by sector, 2014-2022 (SAFE)



Source: elaborated by PPMI, based on ECB SAFE data.

Figure 38. Share of firms who adopted digital technologies (%) in the EU-27 by sector, 2019-2022 (EIBIS)



Source: PPMI elaboration based on EIBIS data.

4.3.3. The effect of inflation on investment and the adoption of innovations and digital technologies

The regression models presented in Table 16 through Table 18 in Annex 2 highlight the following key findings:

[157] As a reminder to the reader, the 'industry' sector in SAFE covers NACE B-E, while in the EIBIS classification it mostly corresponds to manufacturing (NACE C) and infrastructure (NACE D and E, which however also includes NACE H and J). For SAFE, the retail ecosystem is comprises the trade sector (NACE G), while in EIBIS the services sector covers both NACE G and I.

1. **Inflation increases investment[158] slightly, as large companies decide to invest money rather than seeing it lose value.**
2. **The effect of inflation on the adoption of digital technologies is negligible**, while **its effect on the introduction of innovations is negative and very small**. However, there are several indirect effects stemming from the high inflationary environment:
    a. **Higher interest rates are associated with a lowering of investment expectations by 1.8 percentage points, based on the interest rates set by the ECB in September 2023,** but higher rates are found to have no effect on either the adoption of digital technology or on the integration of innovative solutions.
    b. Expectations that access to external finance will worsen over the next 12 months are associated with lower investment expectations and lower digital technology adoption, by as much as 15.6 and 2.6 percentage points among SMEs, respectively.
    c. One of the strongest predictors of expected investment is firms' perceptions of **future economic uncertainty, which is associated with a decreased likelihood of firms undertaking further investment from 35.4 % to 30.4 %.**
3. **Financial support following the outbreak of the COVID-19 pandemic is found to be one of the strongest predictors of positive investment and digital uptake, particularly among SMEs.**
4. **At the ecosystem level, inflation is associated with an increase in investment in manufacturing**, but with a **decrease in the adoption of digital technologies in construction**, as well as a **decrease in the introduction of innovative solutions in industry**.

The overall effect of inflation on investment

Inflation has a small positive effect on investment expectations (Table 16), with the increase in the rate of inflation experienced in 2022 being associated with a heighted probability of positive investment of less than 1 percentage points – mostly in industry. This finding is further supported by qualitative evidence. For instance, stakeholders from the textile ecosystem noted that firms are continuing to engage in incremental investments, although more substantial investment plans are being postponed because of urgent short-term challenges. It should also be noted that **increased investment following surges in inflation is also driven by the desire of large firms (but not SMEs) to prevent their cash reserves from losing value**.[159]

Nevertheless, several studies focusing on past episodes of high inflation have found the opposite result, highlighting that inflation – especially beyond a threshold of 10 % – reduces investment.[160] This discrepancy can be explained by different intervening factors. One study

[158] The dependent variable in the EIBIS dataset concerns firms' expectations regarding total investment spending in the current financial year. Respondents were asked whether they expected more investment, around the same amount, less investment, or if they had no investment plans. For ease of analysis, this variable was recoded such that more investment = 1 and all other cases = 0. Hence, the interpretation of the estimations concerns the probability that a firm will expect more investment in the current financial year. For the purposes of readability, this will often be referred to throughout the section simply as 'more investment', 'positive investment' or 'investment expectations'.

[159] Schito, M., Klimavičiūtė, L., & Pál, R. (forthcoming). Investment decisions in a high inflationary environment. Forthcoming EIB Working Paper.

[160] Madsen, J.B. (2003). Inflation and investment. *Scottish Journal of Political Economy*, *50*(4), 375-397; Asab, N.A., & Al-Tarawneh, A. (2018). The impact of inflation on the investment: The non-linear nexus and inflation threshold in Jordan. *Modern Applied Science*, *12*(12), 113-118; Hochman, S., & Palmon, O. (1983). The Irrelevance of Capital Structure for the Impact of

using data from the United States between 1953 and 1978, for example, shows that inflation had strongly depressed non-residential investment, but mostly due to the heavier tax burden associated with inflation.[161] Another study from the 1980s argues that uncertainty concerning future prices – rather than inflation itself – reduces investment.[162] Such indirect channels were also observed in the current study, as discussed below.

Interest rates of 4.50 %, as set by the ECB in September 2023, would reduce the likelihood of firms reporting positive investment by 1.8 percentage points compared with 2022 predictions, from 31.8 % to 30 % (Model 2).[163] The effect would also be stronger among SMEs (a reduction from 31 % to 29.4 %, see Model 3) than among large firms (which would go from 35.6 % to 34.6 %, see Model 4).This negative response to higher interest rates in terms of reduced investment is well known, and has been documented at least since the 1970s.[164] Evidence of this effect was also found during the 2008 economic crisis,[165] and interviewees for the present study have noted that increasing interest rates creates uncertainty for companies, especially with regard to their investment plans.

Interest rate hikes are found to affect investment expectations of SMEs (Model 3)**, but not those of large firms** (Model 4). This is because SMEs are more likely to rely on **external finance** in comparison to large firms, which instead tend to raise funds from investors (e.g. by selling their stocks). Indeed, the regression models find that **positive investment expectations may decrease by as much as 15.3 percentage points** for all firms (15.6 percentage points for SMEs and 14.7 percentage points for large firms) when respondents expect a deterioration in access to external financing in the subsequent 12 months, rather than an improvement (Model 2 for all firms, Model 3 for SMEs and Model 4 for large firms). The most recent round of the SAFE survey showed that although actual access to finance had not yet changed much in the first half of 2022 compared with the previous semester, firms' expectations about future access to finance had deteriorated across the EU. This was primarily driven by economic uncertainty, which is also corroborated by the EIBIS data (see Figure 39).[166] Regression models suggest that this uncertainty will be sufficient to lower their planned investments. Furthermore, according to a recent EIB report, while reliance on external financing decreased more for large firms than for SMEs, the latter are more likely to report dissatisfaction with the amount of external funds obtained, suggesting that the financing terms may be insufficient to meet their investment plans.[167]

Inflation on Investment. *Journal of Finance*, *38*(3), 785-794; Fan, X., Xu, Z., Qin, Y., & Škare, M. (2023). Quantifying the short- and long-run impact of inflation-related price volatility on knowledge asset investment. *Journal of Business Research*, *165*, online first: https://www.sciencedirect.com/science/article/abs/pii/S014829632300406X.

[161] Feldstein, M.S. (1980). Inflation, tax rules, and investment: Some econometric evidence. NBER Working Paper No. 577. Available at: https://www.nber.org/system/files/working_papers/w0577/w0577.pdf.

[162] Able, S.L. (1980). Inflation uncertainty, investment spending, and fiscal policy. *Economic Review*, *65*(Feb), 3-13.

[163] It should be noted, however, that the effect of interest rates is largely driven by non-euro area countries, whose central banks – especially those in Central and Eastern European Member States – tend to set higher interest rates than the ECB.

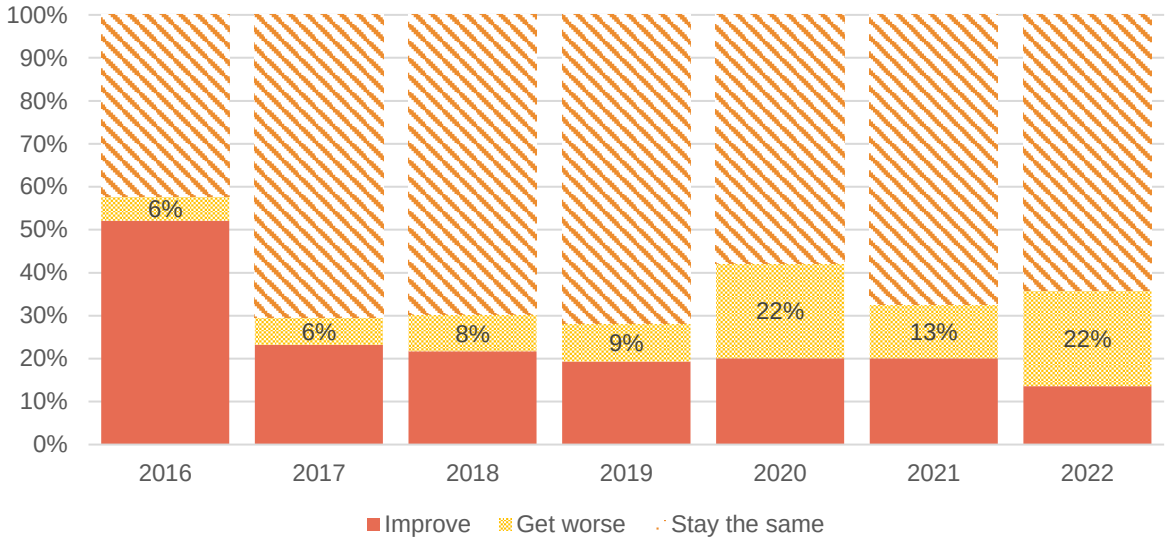
[164] Hall, R.E., Sims, C.A., Modigliani, F., & Brainard, W. (1977). Investment, interest rates, and the effects of stabilization policies. *Brookings Papers on Economic Activity*, *1977*(1), 61-121.

[165] Desroches, B., & Francis, M. (2010). World real interest rates: a global savings and investment perspective. *Applied Economics*, *42*(22), 2801-2816.

[166] ECB (2022). Survey on the Access to Finance of Enterprises in the euro area. Available at: https://www.ecb.europa.eu/stats/ecb_surveys/safe/html/ecb.safe202212~6bc3312ea1.en.html#toc5.

[167] EIB (2023). Economic Investment Report. Available at : https://www.eib.org/attachments/lucalli/20220211_economic_investment_report_2022_2023_en.pdf; see also: ECB. (2022). Survey on the Access to Finance of Enterprises in the euro area. Available at: https://www.ecb.europa.eu/stats/ecb_surveys/safe/html/ecb.safe202212~6bc3312ea1.en.html#toc5.

Figure 39. Respondents' expectations regarding developments in access to external finance in the EU-27, 2016-2022 (EIBIS)



Source: elaborated by PPMI, based on EIBIS data.

High inflation and the policy measures taken to curb it, therefore, create **uncertainty** among economic actors. In such situations, firms may be more concerned with meeting short-term challenges such as paying off debt, rather than investing to introduce innovative solutions.[168] Indeed, a recent EIB working paper shows that **a firm that perceives uncertainty as a major obstacle to investment will have an investment rate 7.5 percentage points lower than a firm that does not**[169] – a negative effect that is also corroborated by Model 2. **The effect on investment of an uncertain economic future is slightly stronger among SMEs than it is among large firms** (Models 3 and 4). In other words, regarding future economic uncertainty as a major obstacle to investment will reduce the likelihood of firms reporting positive investment expectations by 11.7 % (from 38.2 % to 34.2 %) among large firms, and by 17.6 % among SMEs (from 34.8 % to 29.6 %), all other factors being equal.

One way to mitigate against these negative indirect effects is through policy support. The 2023 EIB economic investment report finds that **firms benefitting from COVID-19-related financial support tend to increase investment to a greater extent,** by as much as 8 percentage points.[170] Likewise, the regression models show that in 2021 and 2022, firms that received policy support in the form of loans, subsidies and concessional lending reported more positive investment expectations by 2.2 percentage points compared with firms that did not receive such support. This effect was strongest among SMEs, where the difference was 3.8 percentage points.[171] This is also in line with previous research showing that among firms losing similar amounts of money, firms that were supported planned to increase investment more than firms without support.[172]

Lastly, inflation may also have an unexpected positive indirect effect on investment. Regression results show that SMEs struggling with the availability of skilled labour are more

[168] Calabrese, R., Degl'Innocenti, M., & Zhou, S. (2020). Expectations of access to debt finance for SMEs in times of uncertainty. *Journal of Small Business Management*, *60*(6), 1351-1378.
[169] EIB (2023). Economic Investment Report. Available at : https://www.eib.org/attachments/lucalli/20220211_economic_investment_report_2022_2023_en.pdf.
[170] *Ibid*.
[171] COVID-19 support is defined as subsidies, deferral of payment or new subsidised or guarantied loans.
[172] Harasztosi, P., Maurin, L., Pál, R., Revoltella, D., & Van Der Wielen, W. (2022). Firm-level policy support during the crisis: So far, so good? *International Economics*, *171*, 30-48.

likely to invest, most probably in process automation.[173] **A 2022 survey of US business executives found that around seven in 10 executives planned to increase their investment in automation tools in 2022 compared with 2021**; 78 % reported being 'very' or 'somewhat' likely to invest more in automation in order to offset the impact of labour shortages.[174] Given that access to skilled labour becomes more difficult when production and labour costs increase (see Section 4.5), inflation may, as a result, spur investment among SMEs. Note that the effect is not significant for large firms, probably because they struggle less with recruitment than SMEs. In 2022, while 60.5 % of large firms saw the availability of skilled staff as a major obstacle, this share was 63.1 % among SMEs (the difference being driven by small and medium-sized firms, as opposed to micro-firms).

The effect of inflation on investment in selected ecosystems

Looking at the differing effects of inflation on the four economic sectors in EIBIS, the regression results suggest that only in construction and manufacturing does inflation have a direct effect on investment decisions. Given the increase in inflation rate in 2022, this would translate to an increase in positive investment by around 2 percentage points in manufacturing (Table 16, Model 6). This is also in line with the findings on trends (Figure 31), which suggest that expected positive investment is higher on average in manufacturing (36 %) than in the other sectors (28 % in construction, 31 % in services, and 34 % in infrastructure). This also tallies with the results of recent EIB work, which found that expected increases in investment are more common among manufacturing firms.[175] Qualitative evidence of the positive effect of inflation on investment in manufacturing also comes from the electronics ecosystem. According to one interviewee, in the longer-term, increased costs are pushing semi-conductor foundries to invest in increasing manufacturing efficiencies and in R&D&I, as otherwise manufacturing costs would become prohibitive.

Past findings also suggest that the effect of COVID-19-related financial support is paramount at the ecosystem level as well: in the computer and electronics sector, for instance, more than 60 % of those firms that had benefited from policy support expected to increase their investments, around 20 percentage points higher than those companies that did not receive such support.[176]

The effect of inflation on the adoption of digital technologies and innovative solutions

High inflation reduces the probability that firms will innovate, but it does not appear to directly affect the adoption of digital technologies. Lower levels of inflation do not have the same effect. In particular, Model 9 in Table 17 shows that the probability of SMEs introducing innovations during the previous 12 months is around 2 percentage points lower (56.6 % vs 54.5 %) in a situation of high inflation (>10 %), compared with the more common situation of low inflation (0-5 %), whereas no significant differences are found between the effect of low to moderate inflation (5-10 %). This helps to explain why the share of firms introducing at least one innovation per year declined to 50 % in 2022 compared with 55 % in 2020 and the high of 63 % in 2015. Model 15 shows that the negative effect on the probability of introducing innovations is driven by firms in industry, where an increase of one percentage point in the rate of inflation growth reduces the probability of innovation by 0.09 percentage

[173] BusinessWire (2022). Survey reveals businesses are doubling down on automation to balance against the global labor shortage. Available at: https://www.businesswire.com/news/home/20220119005323/en/Survey-Reveals-Businesses-Are-Doubling-Down-on-Automation-to-Balance-Against-the-Global-Labor-Shortage.

[174] *Ibid*.

[175] EIB (2023). EIB Survey 2022 – EU Overview. Available at: https://www.eib.org/attachments/lucalli/20220219_econ_eibis_2022_eu_en.pdf.

[176] EIB (2023). Economic Investment Report. Available at: https://www.eib.org/attachments/lucalli/20220211_economic_investment_report_2022_2023_en.pdf.

points. This translates to a decrease of 2.8 percentage points (from 65 % to 62.2 %), given 2022 inflation levels in this sector.

Although these effects might appear modest, they have important implications in the long term. Past studies have found that, since international trade expands the size of the market that is accessible to firms, there are strong incentives to incur the fixed costs of innovation, making innovation efforts key to ensuring firms' profitability and survival.[177] Given the squeezing of profit margins and the increased rate of bankruptcies that some firms are experiencing in an environment of high inflation (see Section 4.2 and Section 4.7), it is paramount that governments set in motion policies that foster innovation. Indeed, previous research has found that the probability of developing new products or services is higher for firms that use grants or market-based finance.[178]

Inflation and interest rates are not found to significantly influence the adoption of digital technologies when their effect on all ecosystems combined is considered (Table 18). However, in the high-inflation period of 2021-2022, **the average marginal effect of inflation on firms in construction has been to reduce the probability of adopting digital technologies by 0.6 percentage points** (Model 16 in Table 18). This would translate to a decrease in the probability of adopting digital technologies from 44.8 % in 2021 to 39.4 % in 2022, given the inflation rates in this sector. This result corroborates both the findings from the case study on the construction ecosystem (which show that construction has been lacklustre in terms of digitalisation), as well as the trends displayed in Figure 37 and Figure 38, which suggest that firms in construction have always lagged behind in terms their digital and innovation efforts compared with firms in other sectors.

Instead, worsening expectations concerning access to finance have a greater effect on reducing digitalisation efforts, in a similar manner to overall investment expectations, though the predicted decrease is smaller – just 2 percentage points (from 56.7 % to 54.7 %), with a slightly stronger effect among SMEs (2.6 percentage points, from 53.2 % to 50.6 %). This is in line with past studies suggesting that problems in accessing finance are holding back SMEs' digitalisation and therefore making them less competitive.[179] Likewise, a recent EIB report found that the major barrier to digitalisation for EU municipalities remains a lack of funds.[180]

Interestingly, uncertainty about the future of the economy is less relevant to the adoption of digital technologies than it is to investment. This might suggest a certain resilience of firms' attitudes towards digitalisation, and a strong drive towards it, despite the deterioration of the economic situation. In other words, **non-economic factors, such as policy measures, are most likely to drive the adoption of digital technologies**. Among those firms that received COVID-19-related financial support, 58 % adopted digital technologies, compared with 42 % of those who did not receive support. These findings are in line with recent findings of the EIB, which show that more SMEs invested in digitalisation as a result of receiving targeted policy support.[181]

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[177] Melitz, M.J., & Redding, S.J. (2021). Trade and innovation. NBER Working Paper No. w28945. Available at: https://www.nber.org/system/files/working_papers/w28945/w28945.pdf.

[178] Bańkowska, K., Ferrando, A., & Garcia, J.A. (2020). Access to finance for small and medium-sized enterprises since the financial crisis: evidence from survey data. ECB Economic Bulletin 4/2020. Available at: https://www.ecb.europa.eu/pub/economic-bulletin/articles/2020/html/ecb.ebart202004_02~80dcc6a564.en.html.

[179] Doacă, E.M. (2022). The influence of the macroeconomic environment on the financing decision in SMEs. *Proceedings of CBU in Economics and Business*, *3*, 25-31.

[180] EIB. (2023). Economic Investment Report. Available at : https://www.eib.org/attachments/lucalli/20220211_economic_investment_report_2022_2023_en.pdf.

[181] *Ibid*.

4.3.4. Simulating the effect of inflation on investment, digitalisation and innovation

While large companies usually have the resources to implement technological changes, SMEs face difficulties in accessing finance, information and technical skills. **Therefore, the future of digitalisation investments by SMEs is only partially shaped by economic scenarios.** Structural barriers (the availability of specialised equipment and technology, resistance to cultural change, lack of skills), contextual factors (local digital infrastructure development), and public investment and priorities at national and EU levels are, and will remain, the most critical factors driving digitalisation among SMEs.[182] In this situation, economic uncertainty (see Section 4.3.3) and concerns about future increases in the interest rates during the second half of 2023 add a layer of complexity to predictions regarding digitalisation investments. It is therefore worth considering how the linkages between inflation, interest rates and growth forecasts can provide indications on the evolution of SMEs' investment and digitalisation efforts in each of the three scenarios considered in this study.

The baseline scenario foresees that the growth in the general level of investment by firms will decelerate from about 4-5 % in 2022 to less than 1 % in 2023, due to a tightening of financing conditions that is expected to weigh on SMEs' investment decisions over the year. In 2024, overall investment is expected to grow by between 1 % and 2 %, due to the gradual normalisation of economic activity, which is expected to reduce uncertainty and fuel firms' investment decisions.[183] Given that public investment is forecast to remain buoyant in both 2023 and 2024 thanks to the continued deployment of the Recovery and Resilience Facility (RRF),[184] and given that digitalisation investments rank highly in the RRF priorities,[185] and because 15-25 % of SMEs in Europe have plans to improve their business intelligence and ICT tools over the following months,[186] it can reasonably be assumed that the **growth rate of digitalisation investments by SMEs under this scenario will continue at least the same order of magnitude, if not higher. Therefore, investment growth will be in the range of 1-3 % in 2023-2024**.

According to Eurostat, gross fixed capital formation (i.e. investment) in ICT equipment in the EU represented 0.7 % of GDP in 2022, corresponding to EUR 101 billion (current prices). Given that businesses account for 60 % of this investment, and assuming that 50 % of this comes from SMEs[187], this share corresponded to around EUR 30 billion in 2022.[188] With the expected GDP growth rate in the baseline scenario and the expected evolution of digitalisation investments being in the range of 1-3%, **this would lead to investment amounts of EUR 30-31 billion per year in the period 2023-2024**.[189]

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[182] See, for instance, the EC documents 'Shaping Europe's Digital Future' and 'An SME strategy for a sustainable and digital Europe', Available at: https://single-market-economy.ec.europa.eu/smes/sme-strategy_en.

[183] European Commission (2023). Spring 2023 Economic Forecast: an improved outlook amid persistent challenges. Available at: https://economy-finance.ec.europa.eu/economic-forecast-and-surveys/economic-forecasts/spring-2023-economic-forecast-improved-outlook-amid-persistent-challenges_en#thematic-boxes---spring-2023.

[184] *Ibid*.

[185] The RRF stipulates that Member States need to allocate at least 20 % of its total planned budget of EUR 723.8 billion to the digital transition.

[186] Sharp (2023). Enabling Growth for European SMEs. Business and Technology Investment Trends in 2023. Available at: https://www.sharp.eu/business-technology-investment-trends-2023form-submission-confirmation?token=lvtHMK2d8PNKY2isyuXcZk-nu-NmTSzdJDQvD69Juao.

[187] Assumption based on added value statistics from Eurostat (Source dataset: sbs_sc_sca_r2). The data only consider micro-, small, and medium-sized enterprises. According to Eurostat data, the contribution of SMEs to added value is just above 50 %. See https://ec.europa.eu/eurostat/web/products-eurostat-news/-/edn-20220627-1.

[188] Section 4.3.2 shows that business is the biggest contributor to total investment, accounting for almost 60 %.

[189] For gross fixed capital formation in ICT equipment, see Eurostat, Gross fixed capital formation by AN_F6 asset type [NAMA_10_AN6]. Last access on 06/07/2023. The EU-27 GDP in 2022 was EUR 15.8 trillion at current prices (Eurostat data). The growth of GDP in the baseline scenario is 0.8% in 2023 and 1.4 % in 2024.

The outlook for economic growth, including investment growth, is revised downward **in the pessimistic and highly adverse scenarios**. To ensure the timely return of inflation to their medium-term targets, central banks in the EU are expected to continue to raise their interest rates, thereby contributing to a tightening of financial conditions and higher volatility in interest rates. Given this outlook, **the evolution of digital investments by SMEs is highly uncertain,** and disentangling their evolution separately in the two scenarios is difficult. On the one hand, higher interest rates negatively impact financial markets (e.g. lowering asset quality, reducing the availability of loans by banks, see Section 4.7) as well as reducing consumer spending and investments, as higher interest rates lead to higher borrowing costs and aggravate access to finance, especially for SMEs. The consequence of this is that the growth rate of investments in digitalisation is expected to be lower than in the baseline scenario, or may even be negative, ranging between -1 % and 1 % (EUR 29-31 billion per year). On the other hand, a stream of literature indicates that **investing in digital is the smart choice ahead of a recession.**[190] Digitalisation enhances growth in productivity, and entrepreneurs may therefore see potential opportunities from digital investments, as occurred during the COVID-19 crisis.[191] In such a case, an increase in digitalisation among SMEs might be observed, with investment growth being even higher than in the baseline scenario (3-5 %, corresponding to between EUR 31.5 and EUR 32 billion per year), especially if it is supported by public interventions.

From a more nuanced point of view, digitalisation appears to be a productivity gamechanger only for those firms that are already relatively more productive than their competitors. These include firms that have the skills and the absorptive capacity to reap the benefits of digital technologies; those that operate in specific sectors (e.g. in manufacturing rather than construction); and for entrepreneurs who are brave enough to go beyond simple day-to-day management during an economic downturn. SMEs often find it challenging to commit to long-term investments amid a negative economic cycle, particularly when resources are limited. In this respect, SMEs' propensity to digitalise is affected by both financial factors (access to finance and public support for investments) and non-financial factors (knowledge and ambition to digitalise).

4.3.5. Conclusions regarding investment, digitalisation and innovation

Overall, business investment increased in 2022 compared with 2021, as firms opted to invest instead of seeing their cash lose value. However, the levels of investment are expected to slow down in the baseline scenario due to higher interest rates, as well as worsening expectations regarding access to finance and economic uncertainty. However, the adoption of digital technologies is less affected by the economic uncertainty surrounding the future. The generous financial support received by firms during the pandemic and as a result of EU-level measures aimed at boosting the digital transition, such as the RRF, may also have helped firms to remain buoyant and engage in greater levels of digitalisation over the past two years.

The effect of inflation on investment and digitalisation was found to vary across sectors. In particular, increases in inflation are associated with an increase in the probability of making

[190] IMF (2023). Digitalization during the COVID-19 Crisis. Implications for Productivity and Labor Markets in Advanced Economies. Available at: https://www.imf.org/-/media/Files/Publications/SDN/2023/English/SDNEA2023003.ashx; Tech Insights (2023). Investing in Digital Transformation During an Economic Slowdown. Available at : https://synoptek.com/insights/it-blogs/it-consulting/digital-transformation-slowdown/.

[191] Anderton, R., Botelho, V., & Reimers, P. (2023). Digitalisation enhances productivity growth, but only for some firms. Available at: https://cepr.org/voxeu/columns/digitalisation-enhances-productivity-growth-only-some-firms.
Radicic, D., & Petković, S. (2023). Impact of digitalization on technological innovations in small and medium-sized enterprises (SMEs). *Technological Forecasting and Social Change*, 191, online first : https://www.sciencedirect.com/science/article/pii/S0040162523001592.

more investments in manufacturing, but a reduction in the probability of introducing innovations in industry and adopting digital technologies in construction.

Two main implications follow from these findings. The first is the **importance of targeted support to SMEs to foster digitalisation efforts**. Although this effect is likely to have been driven by the pandemic response, it remains significant even when a host of other factors (inflation, interest rates, GDP growth, obstacles to investment) are controlled for, and is corroborated by qualitative evidence from interviews and past studies on the importance of policy incentives for the digital transition. The second implication is that **low levels of investment and digital innovation can risk compromising EU firms' ability to compete internationally** in the long term,[192] as innovation is key to sustaining high productivity growth and increasing wealth.[193]

4.4. Investments in sustainability

Having explored the risks to digital investments posed by inflation, the report now turns to the second pillar of the twin transition – the green transition. The green transition has for some time been at the heart of the European Commission's agenda. With concerns about the threat posed by climate change and environmental degradation both to Europe and the world, major policy initiatives and investment programmes have been geared towards boosting the green transition. The European Green Deal (EGD), approved by the Commission in 2021, stressed the importance of moving towards sustainable transport, clean technologies, renewable energy and greater energy efficiency. In parallel, a record share constituting 30 % of the total EU budget in 2021-2027 was allocated to fighting climate change.[194]

Given that SMEs represent 99.8 % of all non-financial businesses in the EU, their involvement in adopting sustainable practices is of the utmost importance. Thus, in line with its climate goals, the Commission has also introduced an SME Strategy for a Sustainable and Digital Europe in order to mobilise and support SMEs in leading the twin transition.[195] The strategy proposes a set of actions based on three main pillars, namely: 1) capacity-building and support for the transition; 2) reducing regulatory burden and improving market access; and 3) improving access to financing.

At the same time, SMEs might be more hesitant to apply resource-efficient measures that require structural changes or significant investments, such as designing reusable products, recycling or using predominantly renewable energy.[196] This reticence may be further exacerbated in times of crises and uncertainty. Hit by the COVID-19 pandemic and often over-indebted, SMEs are currently also suffering from high energy and commodity prices, disruptions to supply chains, and shortages of skilled labour, which together have impacted their capacity for investment, as shown in Section 4.3. Thus, the current high-inflation environment may also pose a serious challenge to green investments by SMEs– the subject explored in the next section.

[192] EIB (2023). Investment report 2022/2023. Available at: https://www.eib.org/attachments/lucalli/20220211_economic_investment_report_2022_2023_en.pdf.
[193] *Ibid*.
[194] European Commission (2022). Supporting climate action through the EU budget. Available at: https://climate.ec.europa.eu/eu-action/funding-climate-action/supporting-climate-action-through-eu-budget_en.
[195] See: https://single-market-economy.ec.europa.eu/smes/sme-strategy_en.
[196] Belli, S. (2022). Small and Medium Enterprises and resource efficiency, between investment fears and the energy crisis. Ipsos. Available at: https://www.ipsos.com/en/eurobarometer-smes-resource-efficiency.

Key points

- Almost 90 % of SMEs took at least one action to become more resource-efficient in 2021. Likewise, two-thirds of firms are investing in energy efficiency, and almost three-quarters are adopting measures to minimise waste and engage in recycling. However, the data are insufficient to tell how these trends have changed from 2021 to 2022.
- Inflation has a twofold effect on green investment. On the one hand, analyses conducted on a 2021 survey show that inflation is associated with firms making lower levels of investment in becoming more resource-efficient over the following two years, increasing from 30 % to 43 % the probability of a firm making no investment in becoming more resource-efficient. On the other hand, high energy prices create incentives to invest in energy-efficient measures: perceptions over rising energy costs accounted for an increase of 5 percentage points in the probability of planning investments in energy efficiency in 2022.
- Investments in sustainability are expected to grow by 1-3 %in the baseline scenario, and by between -1 % and 1 % in the pessimistic scenario. While surprising, the highly adverse scenario might actually see the highest levels of investments in sustainability, of between 3 % and 5 %, due to SMEs being more willing to make green investments in order to reinforce their resilience and cope with the effects of a new crisis.

4.4.1. Data and indicators on sustainability investments

To measure investments in sustainability, the research team employed two sources of data. Using the Flash Eurobarometer survey 'SMEs, resource efficiency and green markets,[197] green investments were operationalised using the **yearly average investment in becoming more resource efficient, as a share of firm's turnover over the previous two years**. The second source of data was EIBIS, as employed in Section 4.3 on investment and digitalisation. Here, the focus is on a new survey question, available for 2022 only, on whether **the firm is investing or implementing measures to reduce greenhouse gas (GHG) emissions**. Such measures include: investing in new, less polluting business areas and technologies; investing in energy efficiency measures; having on-site/office renewable energy generation; minimising waste and recycling; and implementing sustainable transport options.

The analysis of trends in this report includes the four waves of the Flash Eurobarometer survey conducted in 2012 (Flash Eurobarometer 342), 2015 (Flash Eurobarometer 426), 2017 (Flash Eurobarometer 456) and 2021 (Flash Eurobarometer 498). The Flash Eurobarometer conducted in 2013 (Flash Eurobarometer 381) is not included due to the incomparability of data. While all four of the waves selected contain data on both large businesses and SMEs, Flash Eurobarometer 381 surveyed only SMEs. The trend analysis covers all businesses in the European Union except Croatia, which, together with the UK, had to be excluded from the analysis in order to ensure the comparability of data between waves. Trends from the EIBIS dataset, meanwhile, focus on investments in energy efficiency measures as a share of total investment between 2017 and 2021, and on the various measures and investments firms in the EU-27 took to reduce GHG emissions in 2022.

The Eurobarometer regression analysis is based on the most recent wave of the survey, due to the lack of data on ecosystems in previous surveys. Using 2021 data from Flash Eurobarometer 498, the research team estimated the effect of inflation on investments in sustainable practices, controlling for the ecosystem, changes in turnover, company age, firm

[197] Eurobarometer. (2021). Flash Eurobarometer 498 – SMEs, resource efficiency and green markets (wave 5). Available at: https://europa.eu/eurobarometer/surveys/detail/2287.

size, GDP growth, actions at business level to become more sustainable, and the country's overall contribution towards climate goals. Given that the dependent variable, i.e. investment in becoming more resource-efficient, is grouped by the share of turnover, ordered logistic regression models were used (see Table 19 in Annex 2). The EIBIS regression models, meanwhile, focus on how rising energy prices (as perceived by survey respondents) affected firms' investments in energy-efficiency measures in 2022. Thee include improvements to heating and cooling, as well as energy management through smart technologies.

In terms of methodological limitations, the dependent variable used in the Eurobarometer regression analysis is backward-looking, using data from 2021 on investments made during the previous two years. This means that the models may not fully capture the effects of high inflation, which may only become apparent at a later time. This effect is better captured by the EIBIS models, which cover only 2022, when the energy price shock caused by the Russian war of aggression in Ukraine was strongest. Further desk research and interviews with stakeholders have helped to minimise this limitation by considering both the direct and indirect impacts of inflation on energy efficiency investments in the current environment of high inflation.

4.4.2. Trends in sustainability investments

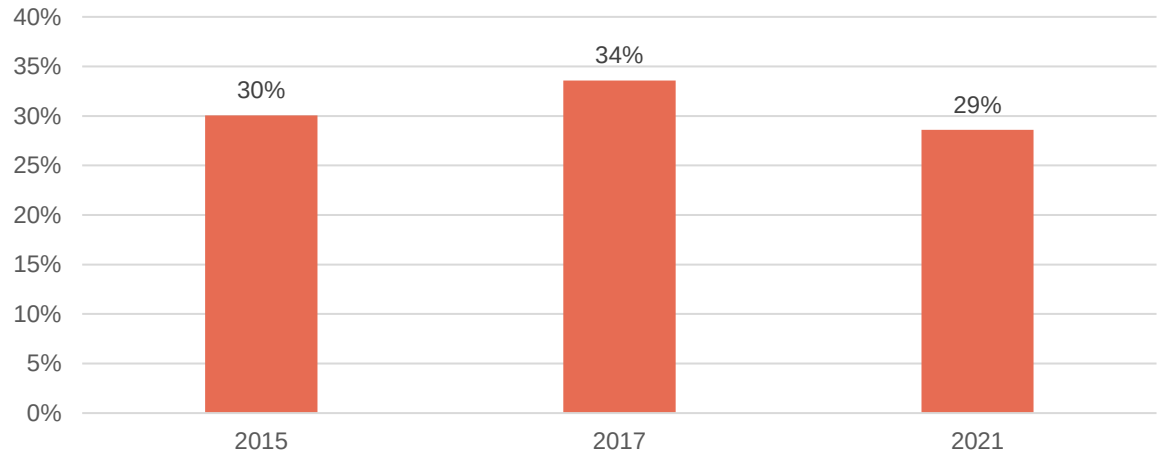
Overall, more than half of SMEs have implemented initiatives related to sustainability and greenness, according to various metrics. In Flash Eurobarometer 498 survey, 89 % of SMEs took at least one action to become more resource-efficient in 2021.[198] Likewise, data from the 2022 EIBIS show that two-thirds of the firms surveyed invested in energy efficiency, and almost three-quarters adopted measures to minimise waste and engage in recycling.[199]

The share of firms not investing in becoming more resource-efficient has remained relatively stable since 2015, fluctuating around 30 % (see Figure 40). Compared with 2015 and 2017, the share of non-investing businesses has shrunk in 2021, but only slightly – to 29 %.

Most firms tend to spend less than 5 % of their turnover on becoming more resource-efficient (see Figure 41). This level has largely persisted over time. In 2021, the share of businesses investing up to 5 % of their turnover decreased slightly, while the share of businesses investing more increased slightly. Even so, companies were still investing more on average in becoming more resource-efficient in 2012 than they were in 2021, although the difference is minimal. A similar trend is found in the share of total investment primarily used for measures to improve energy efficiency over time, taken from the EIBIS survey. As Figure 42 shows, this share fluctuates between just below 8 % and almost 11 %, and increased by 1.4 percentage points between 2020 and 2021.

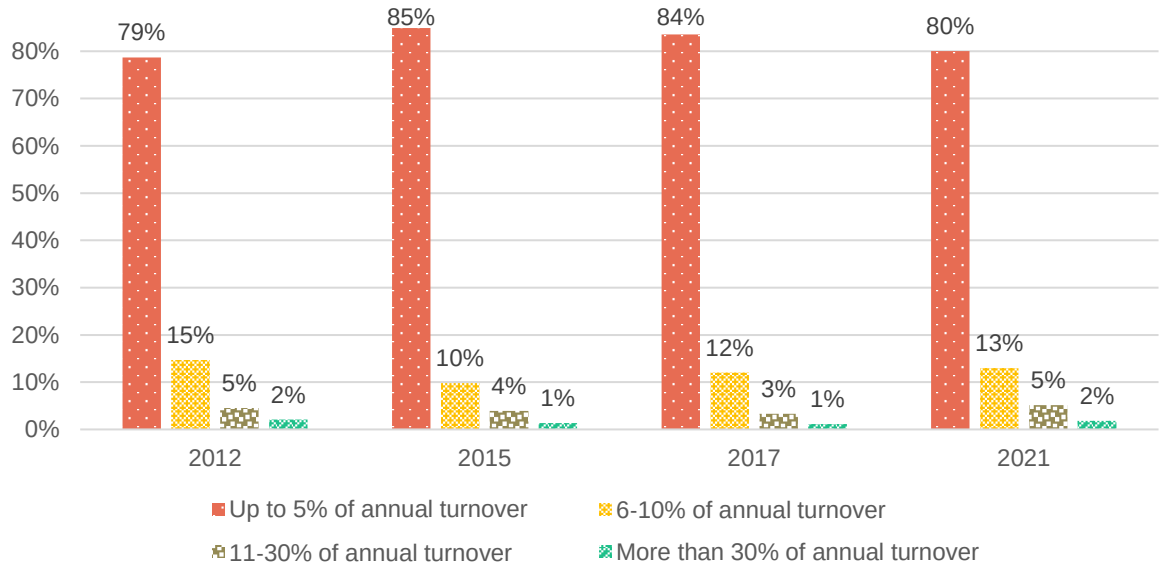
[198] Eurobarometer (2021). Flash Eurobarometer 498 – SMEs, resource efficiency and green markets (wave 5). Available at: https://europa.eu/eurobarometer/surveys/detail/2287.
[199] EIB (2023). EIB Investment Survey 2022. Available at: https://www.eib.org/en/publications/online/investment-survey-european-union.

Figure 40. Share of businesses that did not invest in measures to become more resource efficient during the previous two years (%), 2015, 2017 and 2021 (Eurobarometer)



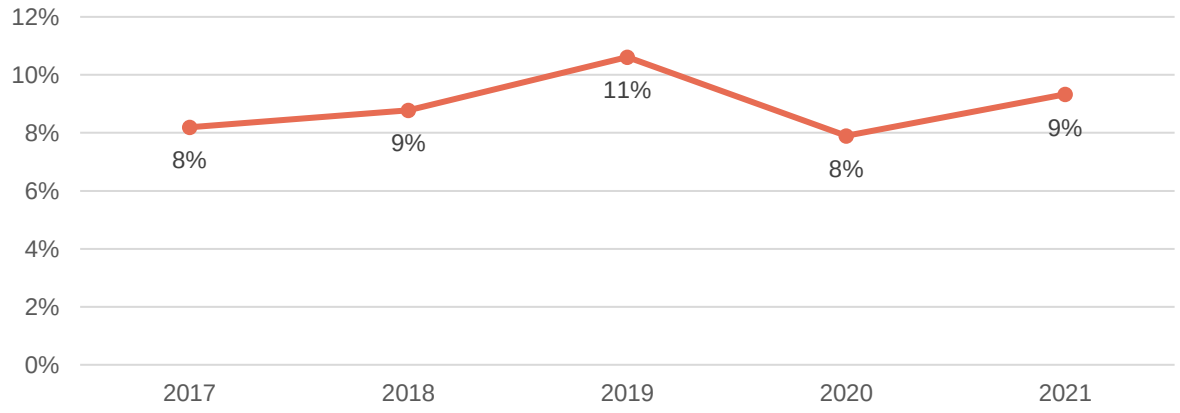
Source: elaborated by PPMI using data from Flash Eurobarometers 426, 456 and 498. Question: 'Over the past two years, how much have you invested on average per year to be more resource efficient?'
Note: data from the 2012 Flash Eurobarometer could not be included in the figure due to a lack of comparable survey questions. Croatian and British businesses are excluded from the analysis to ensure the comparability of data across time.

Figure 41. Average annual investment in becoming more resource-efficient as a share of yearly turnover over the previous two years (%), 2012, 2015, 2017 and 2021 (Eurobarometer)



Source: elaborated by PPMI using data from Flash Eurobarometers 342, 426, 456 and 498. Question: 'Over the past two years, how much have you invested on average per year to be more resource efficient?'
Note: Croatian and British businesses are excluded from the analysis to ensure the comparability of data across time.

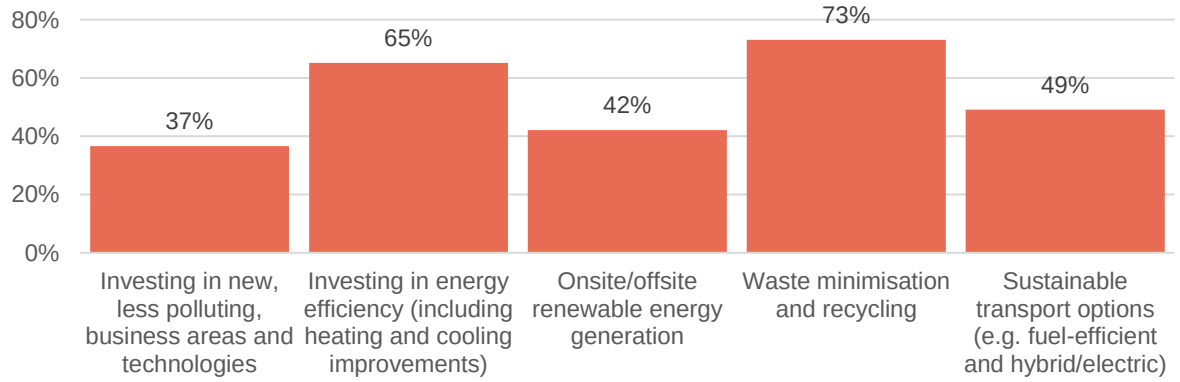
Figure 42. Share of total investment primarily used for measures by businesses to improve their energy efficiency in the EU-27, 2017-2021 (EIBIS)



Source: elaborated by PPMI, based on EIBIS data.

In 2022, investment in energy efficiency measures was the second most common type of action taken by companies to reduce their GHG emissions, implemented by 65 % of firms, trailing behind waste minimisation and recycling (73 %), but ahead of investments in new, less polluting business areas and technologies (37 %); renewable energy generation (42 %); and the use of sustainable transport options (49 %), as Figure 43 illustrates.

Figure 43. Shares of firms in the EU-27 investing in or implementing measures to reduce GHG emissions, 2022 (EIBIS)



Source: elaborated by PPMI, based on EIBIS data.

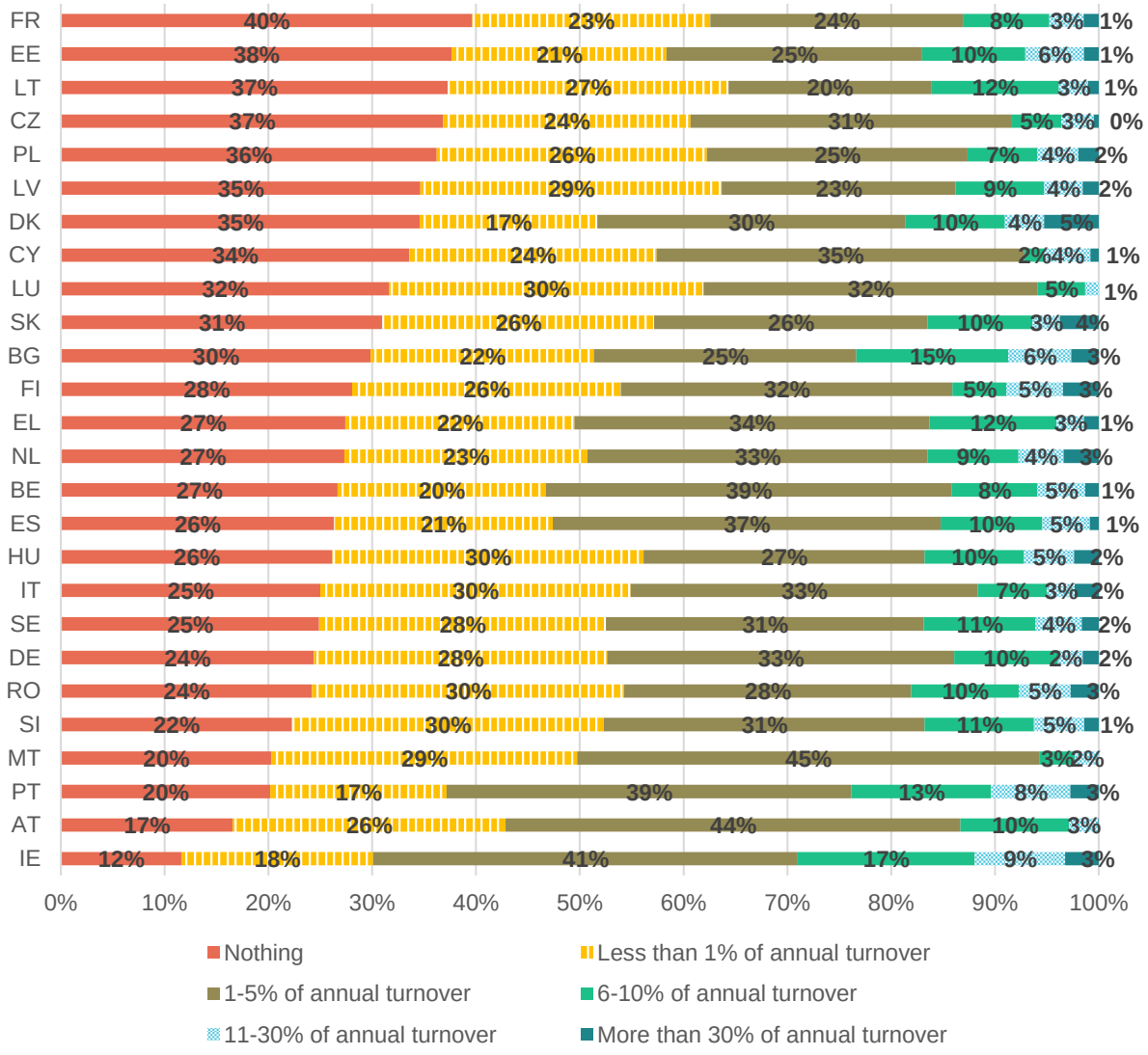
Data from the Eurobarometer and EIBIS surveys also allow the comparison of breakdowns of investments in energy efficiency by country, firm size and ecosystem.

Businesses in Central and Eastern Member States, as well as in France, are those least likely to invest in becoming more resource-efficient, and show the lowest average levels of investment (Figure 44 and Figure 45). With the exception of France, these are also the EU countries that are currently most affected by high inflation.[200] France, however, has a strategic advantage compared with the other Member States mentioned, in that firms and households can rely on a more diversified energy mix, which has also contributed to keeping down energy prices down in the country.[201]

[200] Eurostat (2023). Annual inflation down to 6.9% in the euro area – March 2023. Available at: https://ec.europa.eu/eurostat/documents/2995521/16324910/2-19042023-AP-EN.pdf/ff3d6b28-9c8f-41cd-714f-d1fd38af0b15#:~:text=The%20highest%20annual%20rates%20were,%25)%20and%20Czechia%20(16.5%25).

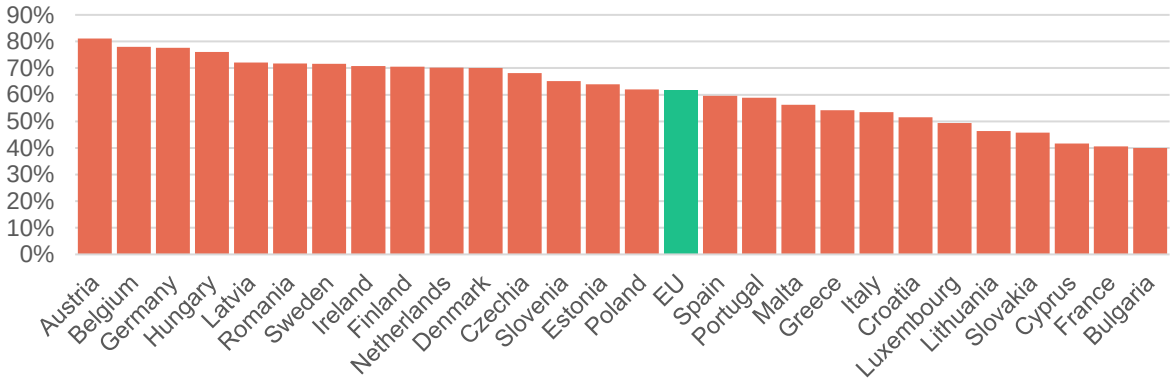
[201] PwC (2022). How to approach rising energy costs. Available at: https://www.strategyand.pwc.com/de/en/industries/energy-utilities/how-to-approach-rising-energy-costs.html.

Figure 44. Average annual investment in becoming more resource-efficient as a share of yearly turnover over the previous two years, by country, 2021 (Eurobarometer)



Source: elaborated by PPMI using data from Flash Eurobarometer 498.
Note: Croatian and British businesses are excluded from the analysis due to the unavailability of information on the survey weights.

Figure 45. Average investment in energy efficiency as a share of total investments aimed at reducing GHG emissions in the EU-27 by country, 2022 (EIBIS)



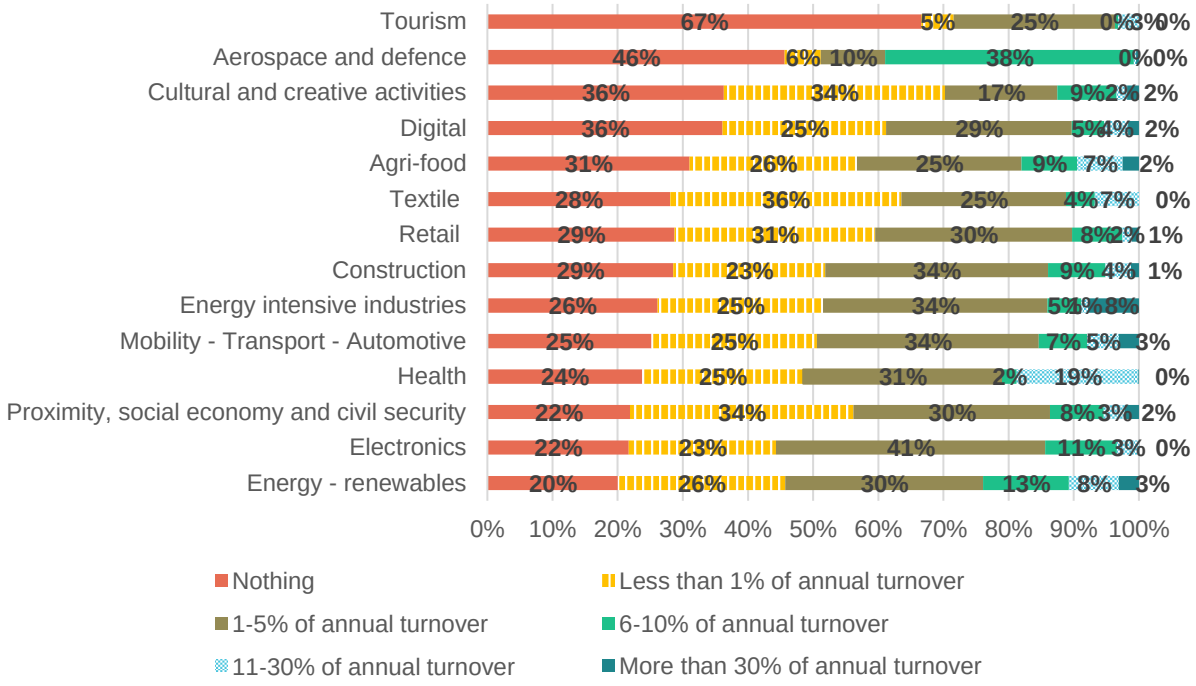
Source: elaborated by PPMI, based on EIBIS data.

Tourism is the ecosystem with the highest share of businesses not investing in measures in becoming more resource-efficient, with 67 % of all respondents reporting that they had made no investments over the previous two years. This is followed by the aerospace and defence ecosystem, in which 46 % of operating businesses had not invested in becoming more resource efficient. These two ecosystems were among those most affected by the COVID-19 crisis. In addition, green investments in the tourism sector generally relate to hotel renovations aimed at making them more energy-efficient. Given that the classification of a firm into a particular ecosystem in the Eurobarometer data is based on respondents' self-perceptions, respondents working on hotel renovations were probably more likely to self-classify themselves as working in construction rather than in tourism.

Nevertheless, the aerospace and defence ecosystem is an outlier, in the sense that it has the highest share (38 %) of investments that account for 6-10 % of annual turnover – more than any other ecosystem. This probably, represents the efforts of the aviation industry to implement green practices, given the capital-intensive nature of the ecosystem.

Meanwhile, health and energy-intensive industries are the ecosystems in which the largest shares of companies making the highest investments in becoming resource-efficient: in the health ecosystem, 19 % of respondents said they invested between 11 % and 30 % of their annual turnover, while 8 % of businesses in the energy-intensive ecosystem had made large investments totalling more than 30 % of annual turnover during the previous two years. The figures for these two ecosystems are up to three times higher than those for other ecosystems.

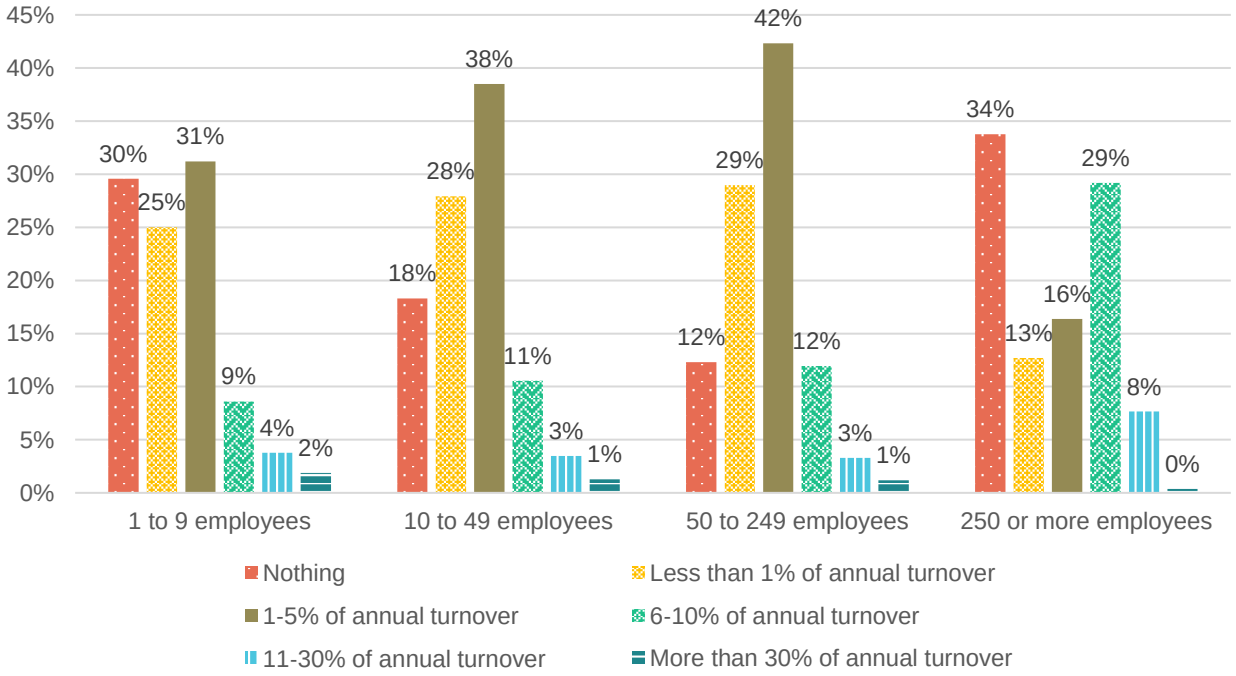
Figure 46. Average annual investment in becoming more resource-efficient as a share of yearly turnover over the previous two years, by ecosystem, 2021 (Eurobarometer)



Source: elaborated by PPMI, using data from Flash Eurobarometer 498.
Note: Croatian and British businesses are excluded from the analysis due to unavailability of information on the survey weights.

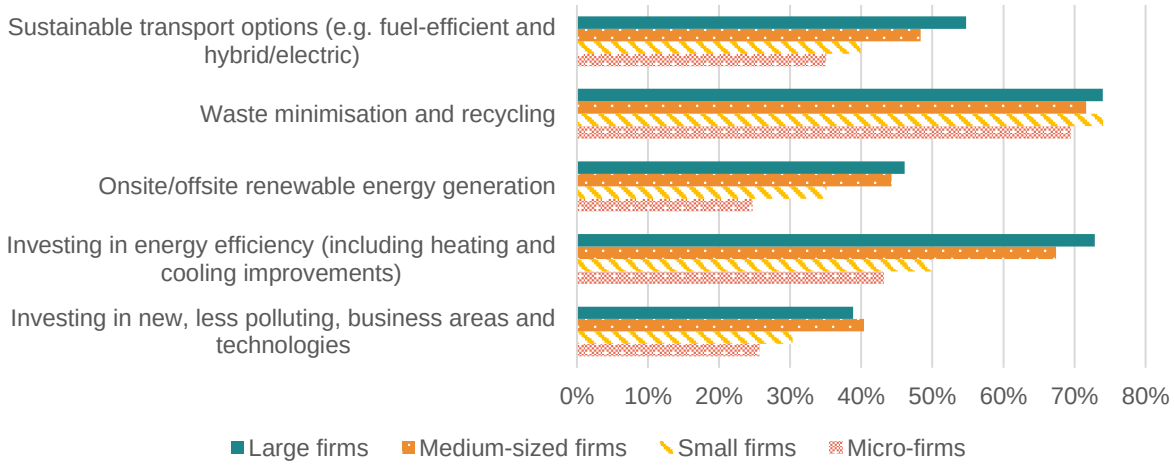
The smallest and the largest companies surveyed are the most likely not to invest at all: 30 % of companies with 1-9 employees and 34 % of those with more than 250 employees do not invest in becoming more resource-efficient (see Figure 47). For micro-firms, this may be explained by a lack of available funds to invest; large firms, by contrast, may instead prioritise their expansion. However, large firms that do invest in becoming more resource-efficient on average tend to invest greater shares of their turnover compared with smaller companies. In general, the larger the number of employees a firm has, the bigger its share of investments, which is consistent with EIBIS data. Not only are micro-firms least likely to invest, but they are also least likely to implement any of the five GHG-reducing measures mentioned in the EIBIS questionnaire (Figure 48).

Figure 47. Average annual investments in becoming more resource-efficient as a share of yearly turnover, over the two previous two years (%), by company size (Eurobarometer)



Source: elaborated by PPMI, using data from Flash Eurobarometer 498.
Note: Croatian businesses are excluded from the analysis due to unavailability of information on the survey weights.

Figure 48. Share of firms investing in or implementing measures to reduce GHG emissions in the EU-27 by firm size, 2022 (EIBIS)



Source: elaborated by PPMI, based on EIBIS data.

4.4.3. The effect of inflation on sustainability investments

Overall, the effect of inflation on investments in sustainability is both positive and negative (see Table 19 and Table 20 in Annex 2)**. The Eurobarometer regression models show that inflation is associated with a lower level of investment by firms in becoming more resource-efficient over the following two years. The EIBIS regression models, however, show that perceptions of higher energy costs are associated with an increased probability of investing in energy efficiency measures. Interviews and literature analysis further demonstrate that the impact of inflation on the adoption of**

sustainable practices is mixed: higher energy bills motivate companies to become more resource-efficient, but at the same time, inflation poses risks to companies' access to finance, their turnover, and the overall growth of GDP. The negative effects of inflation can be effectively mitigated using public funding for green investments. These effects do not differ significantly by firm size or ecosystem.

The negative impact of inflation on green investments

Regression models using Eurobarometer data show that increases in the annual growth rate of inflation are associated with companies investing lower shares of their turnover in becoming more resource-efficient. These results are based on the inflation observed in 2019, and investments made to become more resource-efficient over the previous two years, as reported in 2021. **When adjusted for the higher levels of inflation in 2022, the probability of firms investing nothing in becoming more resource-efficient would be expected to grow from 30 % to almost 43 %** – a notable increase. The share of firms investing less than 1 % of their annual turnover in resource-efficiency would also grow by 7 percentage points, whereas the share of firms investing more would decrease (see Table 4 below). On average, then, firms would invest less in becoming more resource-efficient.

Table 4. Investments and predicted probabilities of investments in becoming more resource efficient

Share of annual turnover invested	Investments made over the previous two years, reported in 2021	Predicted probabilities of investments in the two coming years, given 2022 inflation	Change
Nothing	29.9 %	42.6 %	12.7 p.p.
Less than 1 % of annual turnover	23.5 %	30.5 %	7.0 p.p.
1-5 % of annual turnover	32.6 %	20.8 %	-11.8 p.p.
6-10 % of annual turnover	9.1 %	4.1 %	-5.0 p.p.
11-30 % of annual turnover	3.6 %	1.4 %	-2.2 p.p.
More than 30 % of annual turnover	1.3 %	0.6 %	-0.7 p.p.

Source: elaborated by PPMI, using data from Flash Eurobarometer 498, Eurostat and national sources.
Note: p.p. stands for percentage point.

Such a negative effect is often due to by-products of inflation, including increased interest rates and overall economic and policy uncertainty.[202] On top of these, banking defaults and the heightened risk of a banking crisis leads to a tightening of lending and restricted access to finance. According to one representative of a business association, SMEs find it particularly difficult to make investments that are outside their usual business. With the current high level of indebtedness following the COVID-19 crisis, SMEs face an even higher burden at a time of rising interest rates[203] and energy price inflation.[204] Thus, their ability to undertake investments towards the green transition decreases.

[202] OECD Cogito. (2022). From one crisis to another: The price for SMEs. OECD Cogito Blog; Dussaux, D. (2020). The joint effects of energy prices and carbon taxes on environmental and economic performance: Evidence from the French manufacturing sector. *OECD Environment Working Papers, No. 154*; Hernández-Cánovas, G., & Koëter-Kant, J. (2011). SME financing in Europe: Cross-country determinants of bank loan maturity. *International Small Business Journal*, *29*(5), 489-507; interview with a representative from a business association.
[203] OECD Cogito (2022). From one crisis to another: The price for SMEs. OECD Cogito Blog.
[204] These findings do not, however, apply to the most energy-intensive sectors. See: Dlugosch, D., & Kozluk, T. (2017). Energy prices, environmental policies and investment: Evidence from listed firms. *OECD Economics Department Working Paper No. 1378*.

Likewise, past research has found that low interest rates increase the competitiveness of green energy technologies compared with brown energy technologies (i.e. energy from traditional polluting and non-renewable sources), and that stable interest rates are of greater benefit to green investments than to brown investments.[205] This view was also supported more recently by a member of the ECB Executive Board, according to whom renewable energies are more competitive when interest rates are low. This is because, as interest rates rise, financing investments in green technologies become more expensive, generating the risk that the higher costs of capital may slow down the pace of decarbonisation.[206] Investing with lower interest rates can help businesses reduce the payback period, thus minimising risks.[207] SMEs in the construction ecosystem that were interviewed suggested that rising interest rates has increased the cost of investing indirectly due to longer repayment periods.

SMEs often perceive the cost of implementing green practices to be too high[208], or higher than it actually is,[209] and doubt the return on such investments.[210] For example, one interviewee from an agri-food trade association confirmed that inflation had stalled the adoption of sustainable practices, adding that it could reduce crop yield. An organic farm, for example, might need four years to produce significant yield, while the costs associated with precision farming often outweigh the benefits derived from it. Therefore, high costs – as well as the length of time taken to produce the yield – disincentivise SMEs from making green investments.

Meanwhile, barriers relating to resources, such as time, skills, capacity and funding, become even more pronounced in times of inflation. The EIB Survey on Climate Innovation found that European firms suffer from a lack of available finance, this being the most frequently mentioned obstacle to implementing climate innovations.[211] Stakeholders who were interviewed for this study also largely agreed that it is most difficult for SMEs to access finance from banks due to the related risks. Within the textiles ecosystem, a recent survey showed that SMEs saw the green transition as their main challenge, but also that in two-thirds of cases, the need for financial support in order to achieve green objectives was also mentioned.[212] Within the construction ecosystem, interviewees highlighted that the new challenges brought about by high inflation are entangled with structural problems relating to sustainable finance provisions and corporate reporting requirements, particularly for SMEs seeking access to credit/finance. According to interviewees, SMEs also face problems when trying to obtain financing from public funds, due to excessive administrative burdens.

Recent research by the ECB has found that, given their dependence on external funding, SMEs are especially vulnerable in times of high inflation.[213] Furthermore, due to the rise in

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[205] Monnin, P. (2015). The impact of interest rates on electricity production costs. CEP Discussion Note 2015/3. Available at : https://www.strategie.gouv.fr/english-articles/supporting-energy-transition-role-low-interest-rates. Brown energy technologies are those that use non-renewable energy sources.

[206] Speech by Isabel Schnabel, Member of the Executive Board of the ECB, at the International Symposium on Central Bank Independence, Sveriges Riksbank, Stockholm. Available at : https://www.ecb.europa.eu/press/key/date/2023/html/ecb.sp230110~21c89bef1b.en.html.

[207] Tran, T., Do, H., Vu, T., & Do, N. (2020). The factors affecting green investment for sustainable development. *Decision Science Letters*, *9*(3), 365-386.

[208] Fleiter, T., Schleich, J., & Ravivanpong, P. (2012). Adoption of energy-efficiency measures in SMEs—An empirical analysis based on energy audit data from Germany. *Energy Policy*, *51*, 863-875.

[209] Rahbauer, S., Menapace, L., Menrad, K., & Decker, T. (2016). Adoption of green electricity by German small and medium-sized enterprises (SMEs) – a qualitative analysis. *Journal of Cleaner Production*, *129*, 102-112.

[210] Hrovatin, N., Cagno, E., Dolšak, J., & Zorić, J. (2021). How important are perceived barriers and drivers versus other contextual factors for the adoption of energy efficiency measures: An empirical investigation in manufacturing SMEs. *Journal of Cleaner Production*, *323*, online first.

[211] Delanote, J., & Rücker, D. (2022). How to Foster Climate Innovation in the European Union: Insights from the EIB Online Survey on Climate Innovation. *EIB Working Paper 2022/02*.

[212] Reuters (2022). Energy crisis chips away Europe's industrial might. Available at: https://www.reuters.com/business/energy/energy-crisis-chips-away-europes-industrial-might-2022-11-02/.

[213] Andersson, M., Di Stefano, C., Sun, Y., & Vinci, F. (2022). The recovery in business investment–drivers, opportunities, challenges and risks. ECB Economic Bulletin Articles. Available at: https://www.ecb.europa.eu/pub/economic-bulletin/articles/2022/html/ecb.ebart202205_01~ffb80444e5.en.html.

global commodity prices, supply disruptions and the increased costs of solar modules, wind turbines and battery packs, opportunities to become more sustainable are now more accessible to large companies than they are to SMEs.[214] **While this suggests that inflation should have a more negative impact on SMEs than on large businesses with regard to their respective capacities to adopt green practices, the regression models do not find such a differential impact**.

Inflation also has an indirect impact on the adoption of green practices, because it affects firms' turnover. Based on the Eurobarometer regression model, businesses with unchanged or increased turnovers were more likely to invest in resource-efficient measures than those whose turnover decreased (Table 21). The EIBIS regression models also show a robust positive association between turnover and the probability of a firm investing in energy efficiency measures (Table 20). Past research finds that inflation has a negative impact on turnover,[215] especially in those countries that are exposed to the current direct trade disruptions.[216] Likewise, the regression models in Table 21 show that one percentage-point increases in inflation can reduce turnover by 0.24 % on average. Thus, lower turnover is expected to translate to lower investments in adopting green practices. At the same time, the impact of inflation on turnover is not unilateral: some businesses are able to increase their turnovers by passing increased costs on to consumers (to see also how this can affect their profitability, consult Section 4.7).[217] Nevertheless, if this increased turnover only reflects larger production costs, it does not translate to an equal increase in profitability, and hence may not allow greater investment in the implementation of green practices (see, for instance, the simulated exercise on how inflation affects a firm's balance sheet in Section 4.7.3).

Furthermore, inflation may indirectly affect the adoption of sustainable practices if it reduces GDP growth as a result of contractionary monetary policy. Both the literature[218] and the regression models show that as GDP growth rate drops, higher investments in measures aimed at becoming more resource-efficient are less likely. Therefore, if measures to tackle inflation lead to lower growth in GDP (or a recession), investments to adopt sustainable practices would shrink.

However, these negative effects can be mitigated through the use of public funding or policy interventions. The literature shows that green investments are larger in those countries where government initiatives relating to sustainability are more prevalent. For example, green investments are two to three times larger in countries that apply feed-in tariffs to support the development of renewable energy sources,[219] compared with countries without such a regulatory instrument.[220] Policy support can, however, affect firms within the same ecosystem quite differently. For instance, one interviewee noted that firms in the construction ecosystem with high energy intensity, such as manufacturers of building materials, stand to gain the most from incentives to make investments in energy efficiency. Meanwhile, in wood-based sectors, such as parquet manufacturing, which is classified as inherently green and

[214] Jacobs, J. (2022). Rising prices and supply chain risks threaten Europe's renewable aims. *Financial Times*. Available at: https://www.ft.com/content/de817195-f21c-4055-ae0a-67430f20be1e.

[215] Sulistiyono, S., Nuriyaningsih, I., Fiorentina, F. N., & Putri, G. (2020). The effect of inflation on the number of medium small micro enterprises (MSMEs) 2016-2019 in Sukoharjo Regency. *Journal of Business Studies and Management Review*, *4*(1), 38-41.

[216] OECD Cogito (2022). From one crisis to another: The price for SMEs. OECD Cogito Blog.

[217] Ipinnaiye, O., Dineen, D., & Lenihan, H. (2017). Drivers of SME performance: a holistic and multivariate approach. *Small Business Economics*, *48*(4), 883-911; Menéndez, Á., & Mulino, M. (2022). Recent economic performance of Spanish SMEs and developments in their access to external financing according to the European Central Bank's half-yearly Survey. *Economic bulletin/Banco de España [Artículos], n. 3*. This is also confirmed by our regression models.

[218] See, for example, Eyraud, L., Clements, B., & Wane, A. (2013). Green investment: Trends and determinants. *Energy Policy*, *60*, 852-865.

[219] Policy designed to support the development of renewable energy sources by providing a guaranteed, above-market price to producers.

[220] Eyraud, L., Clements, B., & Wane, A. (2013). Green investment: Trends and determinants. *Energy Policy*, *60*, 852-865.

sustainable by the EU taxonomy, energy-efficient investments are perceived as small adjustments rather than a complete change of production model.

The positive impact of inflation on green investments

The high rates of inflation observed in 2022 also created incentives to invest in the adoption of sustainable practices, especially since inflation was at the beginning mainly driven by the skyrocketing energy prices. These incentives include the need to reduce overall energy bills as energy prices rise, as well as the pursuit of energy independence and energy security, which became particularly evident during the Russian invasion of Ukraine.[221] Indeed, the International Energy Agency (IEA) estimated that European industrial gas demand fell by 25 % in the third quarter of 2022.[222]

A **positive effect of energy price increases** is found in the EIBIS regression models, where self-perceptions about rising energy costs accounted for an increase in 2022 of over 5 percentage points in planned investment in energy efficiency, from 52.6 % to 57.7 % (Table 20, Model 6). **This increase was driven by SMEs (Model 7), while no significant effect was found among large firms**. These results bolster past findings that self-reported assessments on the importance of rising energy prices are an important determinant of eco-innovation.[223]

The literature shows that rising energy prices are also positively related to the level of green innovation: a 10 % increase in average energy prices results in a 3.4 % increase in the number of green innovations a firm adopts, and a 4.8 % increase in the ratio of green to non-green innovations. However, the impact of energy price increases is accompanied by a lag between this increase and innovation activities,[224] meaning that while the negative effects of inflation discussed above may be immediate, the positive effects may take longer to materialise. In line with this reasoning, almost two-thirds (63%) of chambers of commerce that participated in the Eurochambres Twin Transition Survey claimed that green investments had increased slightly in 2022, and were forecast to increase consistently once economic conditions improved.[225]

Such developments are more relevant for firms in the energy-intensive sector, because they have the most to lose when energy prices rise.[226] One representative of a business association mentioned that given the increase in energy costs, the inflation crisis pushed SMEs to adopt green practices *en masse*. Furthermore, according to the same interviewee, the adoption of sustainable practices pays off in the long term, and thus helps to mitigate risks in crisis situations in the future, so firms are motivated to make green investments. Indeed, interviewees operating in energy-intensive industries noted that even though SMEs do not have the resources to invest in new technologies, low-CO_2 technologies represent an exception. Recent work by the EIB also shows that energy-intensive firms are more likely to invest in energy efficiency, with 54 % of firms in this sector investing in energy efficiency measures compared with an average of 38 %.[227] Yet, according to interviewees, more drastic

[221] Andersson, M., Di Stefano, C., Sun, Y., & Vinci, F. (2022). The recovery in business investment–drivers, opportunities, challenges and risks. ECB Economic Bulletin Articles. Available at: https://www.ecb.europa.eu/pub/economic-bulletin/articles/2022/html/ecb.ebart202205_01~ffb80444e5.en.html.

[222] Reuters (2022). Energy crisis chips away Europe's industrial might. Available at: https://www.reuters.com/business/energy/energy-crisis-chips-away-europes-industrial-might-2022-11-02/.

[223] Triguero, A., Moreno-Mondéjar, L., & Davia, M.A. (2013). Drivers of different types of eco-innovation in European SMEs. *Ecological Economics*, *92*, 25-33.

[224] Ley, M., Stucki, T., & Woerter, M. (2016). The impact of energy prices on green innovation. *The Energy Journal*, 37(1), 41-75.

[225] Eurochambres (2022). Eurochambres Twin Transition Survey. Available at: https://www.eurochambres.eu/wp-content/uploads/2022/09/Eurochambres-Twin-Transition-Survey.pdf.

[226] Dlugosch, D., & Kozluk, T. (2017). Energy prices, environmental policies and investment: Evidence from listed firms. OECD Economics Department Working Paper No. 1378.

[227] EIB (2023). What drives firms' investment in climate action ? Evidence from the 2022-2023 EIB Investment Survey. Available at: https://www.eib.org/en/publications/20230114-what-drives-firms-investment-in-climate-change.

actions to reduce energy consumption would require the purchase of expensive state-of-the art energy-efficiency machinery, investment in which is currently being postponed by most firms due to the present economic environment.

4.4.4. Simulating the effect of inflation on sustainability investments

Given the dual effect that inflation has on green investments, the key question when thinking about future changes in sustainable practice adoption is which effect will win out. Figure 41 in Section 4.4.2 indicates that SMEs on average invested around 2.3 % of their turnover per year into becoming more resource-efficient during the period 2019-2020.[228] The total amount of turnover produced by the 24 million SMEs active in EU was around EUR 13.2 trillion,[229] and one-third of firms did not invest in sustainable practices. Therefore, the total amount of green investments in the period 2019–2020 was around EUR 200 billion per year on average.[230]

Assuming a similar trend in investments as is the case of digitalisation in 2023 and 2024, the three scenarios for the evolution sustainability investments are described below.

In the baseline scenario, a growth rate in sustainability investments by SMEs of between 1 % and 3 % is expected, leading to a total green investments of EUR 204–208 billion per year. In line with the outlook for the baseline scenario that sees a moderate expansion of the economy in 2023 and 2024, albeit at a slower pace than in pre-pandemic times (see Section 3.3), it is assumed that the projections for future sustainability investments may mimic those of digital investments in terms of growth rate (see Section 4.3.4). This is because the green and digital transitions reinforce each other.[231] The 'twin transition' points to the nexus between digital and green transformations and the strategic complementarities between these two types of investments, in the sense that a Green Deal cannot exist without digital.[232]

In the pessimistic and highly adverse scenarios, two circumstances could materialise, as discussed above. The rate of decline in sustainability investments could be between -1 % and 1 % if there is a combined negative effect of higher interest rates and high inflation, while prolonged economic uncertainty prevails.[233] In contrast, the growth rate could be between 3 % and 5 % if the positive effect of new opportunities prevails (SMEs may be more willing to make green investments to reinforce their resilience and cope with the effects of a crisis). In the former case, the amount of investments in sustainable practices would range between EUR 200 billion and EUR 204 billion; in the latter case, investments of between EUR 208 billion and EUR 212 billion per year would be expected.

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[228] The average of 2.3 % is based on 2021 data. The latter covers the preceding two years, i.e. 2019 and 2020. These data indicate that 80 % of businesses invested less than 5 % of their turnover; 13 % of businesses invested between 6-10 % of turnover, 5 % of businesses invested between 11-30 % of turnover; and 2 % of businesses more than 30 %. The weighted average is 4.6 %, i.e. 2.3 % per year in the period 2019-2020.

[229] Economic indicators for structural business statistics: Turnover or gross premiums written – million EUR [SBS_SC_SCA_R2]. 2019 data. Total business economy; repair of computers, personal and household goods; except financial and insurance activities. Firms from 0 to 9 persons employed = EUR 4.3 trillion; from 10 to 19 persons employed = EUR 1.8 trillion; from 20 to 49 persons employed= EUR 2.5 trillion; from 50 to 249 persons employed = EUR 4.7 trillion. Total turnover for SMEs = EUR 13.3 trillion.

[230] EUR 200 billion is equal to: EUR 13.2 trillion * 2.3 % * 66 %.

[231] However, the two transitions can sometimes clash. Digitalisation uses electricity, and many digital technologies are resource-intensive and create waste. For more examples see: European Commission (2022). The twin green & digital transition: How sustainable digital technologies could enable a carbon-neutral EU by 2050. Available at: https://joint-research-centre.ec.europa.eu/jrc-news-and-updates/twin-green-digital-transition-how-sustainable-digital-technologies-could-enable-carbon-neutral-eu-2022-06-29_en.

[232] DigitalEurope (2021). Uniting the 'twin transitions': there is no Green Deal without digital Available at: https://www.digitaleurope.org/events/digital-the-green-deal/.

[233] A recent EIB working paper found that the positive effect of higher energy prices on green investment is outweighed by growing uncertainty surrounding the economic environment; EIB (2023). What drives firms' investment in climate action? Evidence from the 2022-2023 EIB Investment Survey. Available at: https://www.eib.org/en/publications/20230114-what-drives-firms-investment-in-climate-change.

As with digitalisation, **the implementation of green investments by SMEs is not only driven by financial conditions and the economic cycle**. Other important drivers of investment decisions include: long-term commitments and actions from multiple productive layers of society, including policymakers at the EU and national levels, structural changes in business models and culture, access to technical expertise and skills, and the supply of critical materials and commodities.[234]

4.4.5. Conclusions regarding sustainability investments

The above research has shown that, while **uncertainty and diminished financial capacity brought on by the current high inflation causes SMEs to be reluctant to invest in resource efficiency, energy price hikes are simultaneously motivating firms to reduce their energy bills,** thus increasing by 6 percentage points the probability of them undertaking energy-efficient investments. Although existing research suggests that inflation should impact SMEs more negatively than large businesses due to the latter's greater capacity to adopt green practices, such an impact was not observed in the regression models. The baseline scenario predicts an increase in the adoption of green practices by SMEs in the next two years, following the trend of the aggregate level and digital investments foreseen in that scenario. In the pessimistic and highly adverse scenarios, while new opportunities for green investments might materialise, it is more likely that negative impacts will win out in the short run, as the evidence from regression models and desk research suggest. In this case, the study highlights that public support could help to stimulate green investments, which should help to offset the negative impacts in the short-medium term.

4.5. Participation in public procurement

Firms need to invest not only in order to adopt green or digital innovations, but also in order to participate in public procurement, to cover the cost of the bidding process and of work to be carried out before the first payment is disbursed by the contracting authority. Given the rise in labour costs observed at the end of 2021 and in 2022,[235] firms may now find it more expensive to prepare bids, and could therefore become more selective, submitting bids to fewer public tendering opportunities, on average.

Furthermore, many public authority procurement contracts run over multiple years. Long-term commitments could create problems in a an environment of high inflation: contracting authorities may be unwilling to change the terms of the contract, and contractors would in turn be unable to provide the services promised for the same nominal value of money. In such an uncertain environment, potential bidders compare the devaluation in the value of the contract due to high levels of inflation against what needs to be disbursed in order to retain and compensate staff throughout the length of the contract. If they come to the conclusion that the amount of money provided by the procurement could be insufficient to complete the required works or services, they may decide not to pursue the tender, or face cost overruns. Indeed, there is evidence from the literature on defence weapons systems that sudden bouts of inflation offer an important explanation for procurement cost overruns, with an average year of

[234] European Commission (2022). The twin green & digital transition: How sustainable digital technologies could enable a carbon-neutral EU by 2050? Available at: https://joint-research-centre.ec.europa.eu/jrc-news-and-updates/twin-green-digital-transition-how-sustainable-digital-technologies-could-enable-carbon-neutral-eu-2022-06-29_en; Moursellas, A., De, D., Wurzer, T., Skouloudis, A., Reiner, G., Chaudhuri, A., ... & Dey, P.K. (2022). Sustainability practices and performance in European small-and-medium enterprises: Insights from multiple case studies. *Circular Economy and Sustainability*, 1-26; Chatzistamoulou, N., & Tyllianakis, E. (2022). Commitment of European SMEs to resource efficiency actions to achieve sustainability transition. A feasible reality or an elusive goal? *Journal of Environmental Management*, *321*, online first.

[235] Eurostat (2023). Labour cost index – recent trends. Available at: https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Labour_cost_index_-_recent_trends.

unanticipated inflation resulting in cost overruns of more than USD 10 billion in this specific sector.[236]

Hence, following this logic, higher inflationary periods should decrease both the overall number of offers that potential contractors are willing to submit, and the percentage of offers submitted by SMEs. This section analyses whether this is indeed the case, based on a sample of contract award notices taken from the TED (Tenders Electronic Daily) database between 2018 and 2022.

This question is particularly important, given that public procurement plays a role in supporting innovation,[237] boosting SME entrepreneurship,[238] increasing productivity[239] and, more generally, in attaining broader industrial development objectives.[240] In addition, there is already widespread evidence of barriers to SMEs participating in and winning tenders.[241]

Key points

- Over time, the average number of offers per public contract award notice (CAN) increased from 3.03 in 2019, to 3.34 and 3.51 in 2020 and 2021 respectively, but decreased again to 3.14 in 2022. In particular, textiles displayed a significant increase in the average number of offers in 2020-2021, possibly driven by increased demand for personal protective equipment following the COVID-19 outbreak.
- The proportion of bids by SMEs has remained fairly stable over time. On average, SME bids make up just short of 72 % of all offers per CAN, ranging from a minimum of 70 % in 2020 to a maximum of 73.6 % in 2018. Most ecosystems are characterised by similar trends in the share of SME bids, with energy-related ecosystems and the proximity, social economy and civil security ecosystems displaying a lower share of SME participation.
- Inflation is associated with a small decrease in participation in public procurement, both overall and by SMEs. 2022 levels of inflation were estimated to lower the average number of offers per contract award notice from 3.26 to 3.12 (around 1 %, or slightly fewer than 1,000 of all offers lost), while the average marginal effect of inflation is to decrease the proportion of bids submitted by SMEs by around 0.11 percentage points. These effects also vary significantly by industrial ecosystem, with energy-intensive industries seeing a reduction in participation, and the agri-food sector an increase.
- The average contract value dropped in 2022 compared with 2021 (from EUR 1.9 million to EUR 1.7 million), so SMEs cannot expect to compensate for higher labour costs with higher earnings.
- Various strategies – such as dividing contracts into lots and launching them through open procedures – also contribute to promoting the participation of SMEs, even in times of high inflation. Several Member States began indexing public procurement

[236] Smirnoff, J.P., & Hicks, M.J. (2008). The impact of economic factors and acquisition reforms on the cost of defense weapon systems. *Review of Financial Economics*, *17*(1), 3-13.
[237] Edler, J., & Yeow, J. (2016). Connecting demand and supply: The role of intermediation in public procurement of innovation. *Research Policy*, *45*, 414-426.
[238] Harland, C., Telgen, J., Callender, G., Grimm, R., & Patrucco, A. (2019). Implementing government policy in supply chains: An international coproduction study of public procurement. *Journal of Supply Chain Management*, *55*, 6-25.
[239] Hoekman, B., & Sanfilippo, M. (2020). Foreign participation in public procurement and firm performance: evidence from sub-Saharan Africa. *Review of World Economics*, *156*(1), 43-71.
[240] Acemoglu, D., Akcigit, U., Bloom, N., & Kerr, W. R. (2018). Innovation, reallocation, and growth. *American Economic Review*, *108*(11), 3450-3491; Grandia, J., & Meehan, J. (2017). Public procurement as a policy tool: using procurement to reach desired outcomes in society. *International Journal of Public Sector Management*, *30*(4), 302-309.
[241] European Commission, & t33. (2021). SME needs analysis in public procurement. Luxembourg: Publication Office; Ancarani, A., Di Mauro, C., Hartley, T., & Tátrai, T. (2019). A comparative analysis of SME friendly public procurement: results from Canada, Hungary and Italy. *International Journal of Public Administration*, *42*(13), 1106-1121; Loader, K. (2013). Is public procurement a successful small business support policy? A review of the evidence. *Environment and planning C: government and policy*, *31*(1), 39-55; Flynn, A. (2017). Re-thinking SME disadvantage in public procurement. *Journal of Small Business and Enterprise Development*, *24*(4), 991-1008.

values to avoid contract cancellations in 2022 and 2023, yet the effects of such policies cannot yet be assessed.

- In the baseline scenario, a return to the levels of participation recorded in 2021 is unlikely due to tighter financial constraints, lower-than-expected GDP growth compared with previous spring forecasts, and the need for a more sustainable fiscal policy following the expansionary measures after the COVID-19 pandemic. In more adverse conditions, SMEs' participation in public procurement is likely to drop further, because they will face more rigid financial constraints, access to credit will be further reduced, and there will be increased aversion to the risk of taking on new projects or investments.

4.5.1. Data and indicators for participation in public procurement

Data concerning participation in public procurement were gathered from the TED dataset in two different ways:

- publicly available CSV data up to 2021;[242]
- web-scraped data for 2022 tenders. This was necessary, due to the CSV data only being available up to 2021.[243]

TED data include observations on the awardees and/or lots (into which tenders may be split when there are different types of tasks to address) within each contract award notice (CAN). Given that TED suffers from several quality issues, which have already been identified in past studies,[244] the research team engaged in several data cleaning steps to minimise these issues. The steps taken are detailed below:

1. Contract award notices with more than 20 lots (ranging up to 500), which corresponded to the 95th percentile in the 2022 data, were excluded. This was primarily an issue in the 2022 web-scraped data, given that CSV files are usually cleaned before they are shared with the public. This exclusion was justified, since such unusually high values may have been caused by human error when the contracting authorities were submitting data to TED. Furthermore, such large outliers would have distorted the regression results.
2. Only those observations for which the work or service to be supplied would take place in just one country were considered. This was because the location where the work was to be carried out needed to be matched with an unequivocal inflation data point, which varies by country.[245]
3. In accordance with Commission best practices,[246] the research team implemented both lower and upper limits for the value of the procurements, from EUR 4,500 to EUR 100 million. Values below EUR 4,500 are automatically considered errors, while values over

[242] See the TED webpage: https://data.europa.eu/data/datasets/ted-csv?locale=en.
[243] See the TED webpage: https://ted.europa.eu/TED/main/HomePage.do. As a further test of consistency, the values of key variables from a sample of the CSV data were compared with a sample of scraped data for the same period. Although the scraped data contained fewer observations, the values from the two samples differed only slightly, suggesting that the results would not be biased towards one of the two data collection methods.
[244] DG GROW, B – Planning, finance, data. (2021). Public Procurement Indicators 2018. Available at: https://ec.europa.eu/docsroom/documents/48156; see also Prier, E., Prysmakova, P., & McCue, C.P. (2018). Analysing the European Union's Tenders Electronic Daily: possibilities and pitfalls. *International Journal of Procurement Management, 11*(6), 722. In addition, TED only contains information on the awardees, but not on the other types of firms competing. As such, analyses based on TED can only include a limited amount of information regarding competitors, namely the firm size.
[245] Excluding these cases allows us to retain over 97 % of total observations.
[246] DG GROW, B – Planning, finance, data. (2021). Public Procurement Indicators 2018. Available at: https://ec.europa.eu/docsroom/documents/48156.

EUR 100 million are rare (95 % of observations have a tender value lower than EUR 20 million), and could potentially have a large impact on the results.

4. The number of offers received was also limited to 100. In the raw data, the number of offers went up to 999, which was likely to be a human error. The choice of 100 offers a reasonable upper limit, given that 95 % of the observations had 17 offers or fewer, and 99 % had 72 offers or fewer. This approach avoided an excessive number of observations being lost.[247]
5. Lastly, observations which exemplified logical inconsistencies were excluded; namely:
    a. either there were no offers to win the contract submitted by SMEs, but the awarded contractors were said to be SMEs; or
    b. 100 % of the offers came from SMEs, yet none of the awarded contractors were registered as SMEs.

In order to match public tenders to the relevant ecosystem, the research team manually recoded the CPV (Common Procurement Vocabulary) codes available in the TED dataset, which are employed to define the subject of a contract. Using a list of CPV codes,[248] the team manually matched them with those 2-digit NACE codes that were deemed most appropriate.[249] This exercise was necessary, as the team was not able to identify a prior mapping. The matching list can be found in Table 31 in Annex 2.

The data were collected for the EU Member States for the 2018-2022 period in order to compare the current situation with the pre-pandemic period.[250]

Following the data cleaning, the values for the **main dependent variables** of interest had to be calculated:

- the average number of offers per contract award notice; and
- the share of bids by SMEs per CAN.

The team then extracted unique observations to analyse, so that each observation would only include one value for each dependent variable.[251]

4.5.2. Trends in participation in public procurement

This section of the report explores the trends in participation in public procurement with regard to both the average number of offers per CAN, and what proportion of bids was submitted by SMEs. These trends are analysed both at the level of the aggregate value for all ecosystems, and broken down by ecosystem.

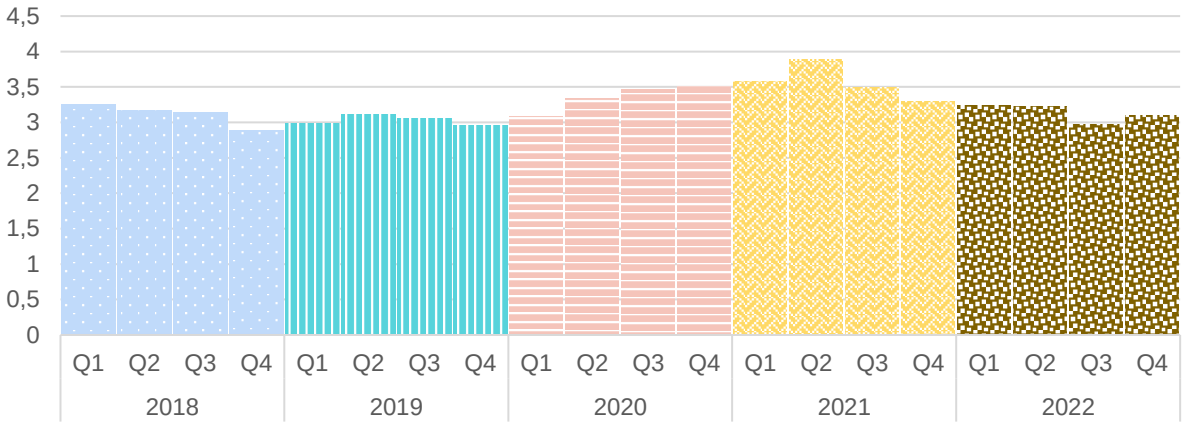
Trends in the average number of procurement offers

Over time, the average number of offers per CAN increased from 3.03 in 2019 to 3.34 and 3.51 in 2020 and 2021, respectively, but then decreased again to 3.14 in 2022 (Figure

[247] It should be noted, however, that even limiting the number of offers to 30 does not alter the results.
[248] Available at: https://www.publictendering.com/cpv-codes/list-of-the-cpv-codes/.
[249] Available at: https://ec.europa.eu/competition/mergers/cases/index/nace_all.html. CPV codes consist of up to nine digits: a main vocabulary defining the subject of a contract (the first two digits), and a supplementary vocabulary for adding further qualitative information (the remaining digits). Thus, for instance, 03000000 refers to 'Agricultural, farming, fishing, forestry and related products', with the first two digits ('03') indicating the defining subject of a contract. The supply of peanuts, specifically, has a CPV code of 03111200-4, which repeats the first two digits of the defining contract, as well as several other digits identifying the supply of peanuts ('111200-4'). To match CPV and NACE codes, the team took the first two to four digits of each CPV code, depending on in the level of detail with which each code could be matched.
[250] This includes observations for the pre-Brexit United Kingdom.
[251] More specifically, since the original data had multiple CAN observations in cases where multiple awardees or multiple lots were present, the team cleaned the data to retain only unique CAN observations. This was possible because contract values, procedures and place of work/services were the same for the awardees, while the number of lots per CAN was calculated separately, as for the dependent variables.

49). This trend may have been caused by political-economic circumstances (namely, the influx of government support following the COVID-19 crisis at the beginning of 2020, which was aimed at keeping the economy afloat). Indeed, there is evidence in the literature that, during recessionary times, public sector contracts provide the oxygen businesses need to survive, thanks to the guarantee that invoices will be paid.[252] Conversely, when the economy is booming, firms can rely on additional revenue streams from private sector clients, offsetting their reliance on public contracts.

Figure 49. Quarterly trends in the average number of procurement offers per CAN in the EU-27 and the UK, 2018-2022



Source: elaborated by PPMI, based on TED data.
Note: only pre-Brexit UK values included.

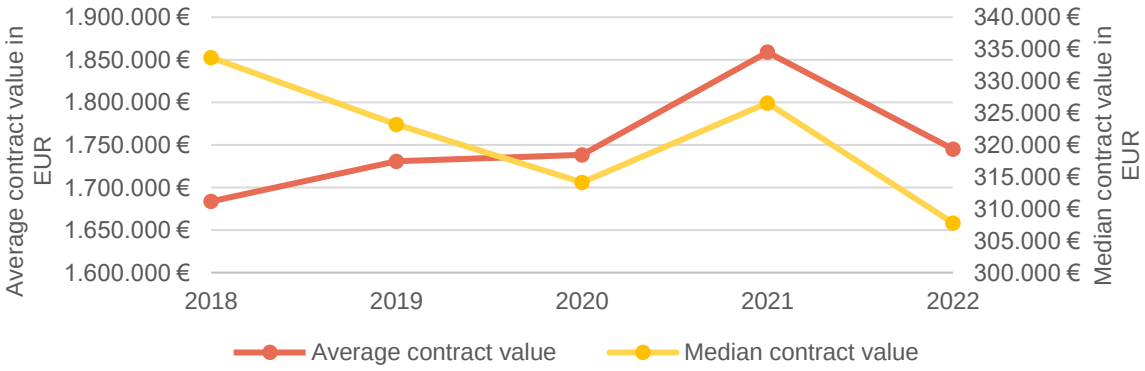
An alternative explanation to the decrease seen in 2022 may be rising inflation levels: if high levels of inflation persist into the future, while the value of the public contract is fixed and covers multiple years, the economic value of the procurement may be insufficient to carry out the work or services requested. However, this concern is only valid if governments do not adjust contract values upwards to account for high inflation. To test whether this was the case, Figure 50 plots the average and median contract value between 2018 and 2022.[253] It shows that in both cases, **the contract value actually decreased in 2022, when inflation was highest**. There is reason to assume that unadjusted contract values may deter potential contractors from submitting bids during periods of high inflation. Furthermore, businesses in several ecosystems, such as health and[254] tourism,[255] and in the social economy[256], are facing staff shortages that may force them to increase wages, further reducing their capacity to bid for public contracts (see also Section 4.6).

There are at least two arguments in favour of stronger inflationary effects compared with the government support hypothesis:

[252] Murray, J.G. (2009). Public procurement strategy for accelerating the economic recovery. *Supply Chain Management: An International Journal*, *14*(6), 429-434.
[253] The average (or mean) corresponds to the sum of all values divided by the length of the observation period with which these values are associated. The median helps to identify the value in the middle, which separates the lower half from the upper half. The fact that in Figure 49, the mean has been higher than the median since 2020 suggests that a few large-value procurement are driving the average figure up to EUR 320,000, while in reality 50 % of observations had values of less than EUR 310,000 (and 50 % had more than this value).
[254] *The Guardian* (2023). *Spiralling staff shortages have put the NHS in the last-chance saloon*. Available at: https://www.theguardian.com/society/2023/mar/31/spiralling-staff-shortages-have-put-the-nhs-in-the-last-chance-saloon.
[255] SchengenVisa (2023). *Germany's Tourism Sector Affected by Staff Shortages & Visa Delays*. Available at: https://www.schengenvisainfo.com/news/germanys-tourism-sector-affected-by-staff-shortages-visa-delays/.
[256] *NL Times* (2023). *Staff shortages in childcare putting safety at risk*. Available at: https://nltimes.nl/2023/03/21/staff-shortages-childcare-putting-safety-risk.

- Government spending has not decreased since 2021. As per Eurostat data, government purchases of goods and services increased in the EU-27, from EUR 202 billion in 2019 to EUR 219 billion in 2021, and EUR 238 billion in 2022.[257]
- As per Figure 49, the decreasing trend in the average number of offers per CAN began in Q3 of 2021. This followed a steep surge in energy prices, starting in Q2 of 2021.[258] Indeed, while during the low-inflationary period (up to Q2 of 2021) the average number of offers per CAN amounted to 3.53, this figure fell to 3.22 for Q3 of 2021 until the end of 2022, when headline inflation started to pick up pace.[259]

Figure 50. Average and median contract values in the EU-27 and the UK, 2018-2022 (TED)



Source: elaborated by PPMI, based on TED data.
Note: only pre-Brexit UK values included.

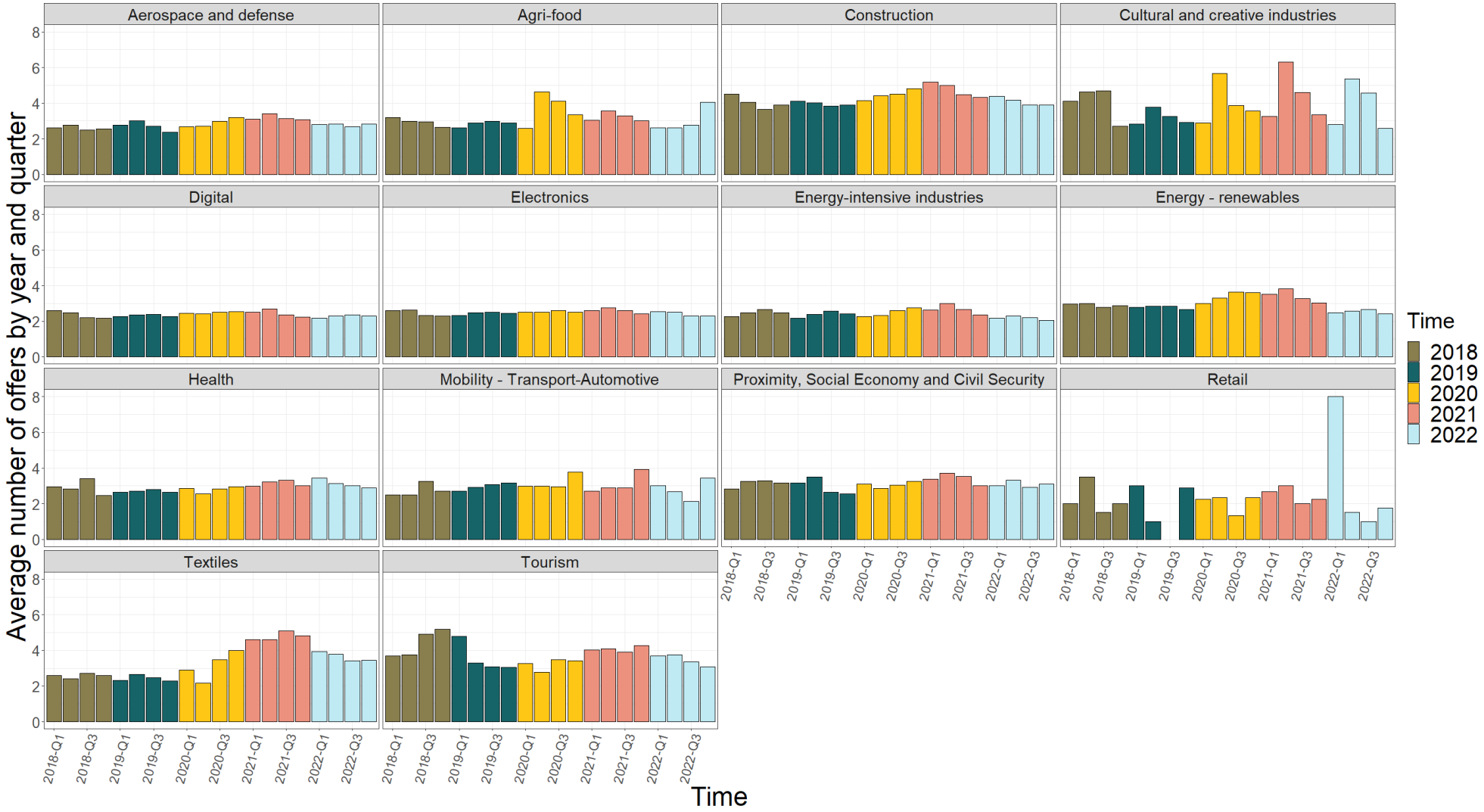
The next step is to explore differences in trends in participation in public procurement for each ecosystem, which are shown in Figure 51. In this figure, several trends stand out:

- many ecosystems show stable trends over time: this is true for the digital; electronics; energy-intensive industries; energy-renewables; and the proximity, social economy and civil security ecosystems;
- other ecosystems, such as cultural and creative industries, experience seasonal trends, with Q2 usually having a higher average number of offers;
- some ecosystems always have, on average, a higher number of offers than the rest – e.g. construction, when compared with digital or electronics;
- textiles displays a significant increase in the average number of offers in 2020-2021, possibly driven by increased demand for personal protective equipment following the COVID-19 outbreak;
- retail displays a very peculiar trend, with one quarter (Q1 of 2022) being a clear outlier. This is most likely to be due to the extremely small number of contract notices available in the dataset for this ecosystem – just 45 – which gives more weight to outliers.

[257] *Quarterly non-financial accounts for general government.* Available at: https://ec.europa.eu/eurostat/databrowser/view/GOV_10Q_GGNFA__custom_5604779/default/table?lang=en.
[258] European Commission. (2022). *SMEs and rising energy prices – A report by the SME Envoy Network, First findings & recommendations*. Available at: https://single-market-economy.ec.europa.eu/smes/sme-strategy/sme-envoys-network_en. See also: Eurostat (2022). Energy inflation rate continues upward hike, hits 27 %. Available at: https://ec.europa.eu/eurostat/web/products-eurostat-news/-/ddn-20220225-2.
[259] There is a statistically significant difference, at the 5 % level (p-value = 0.015), between the average number of offers for these two periods.

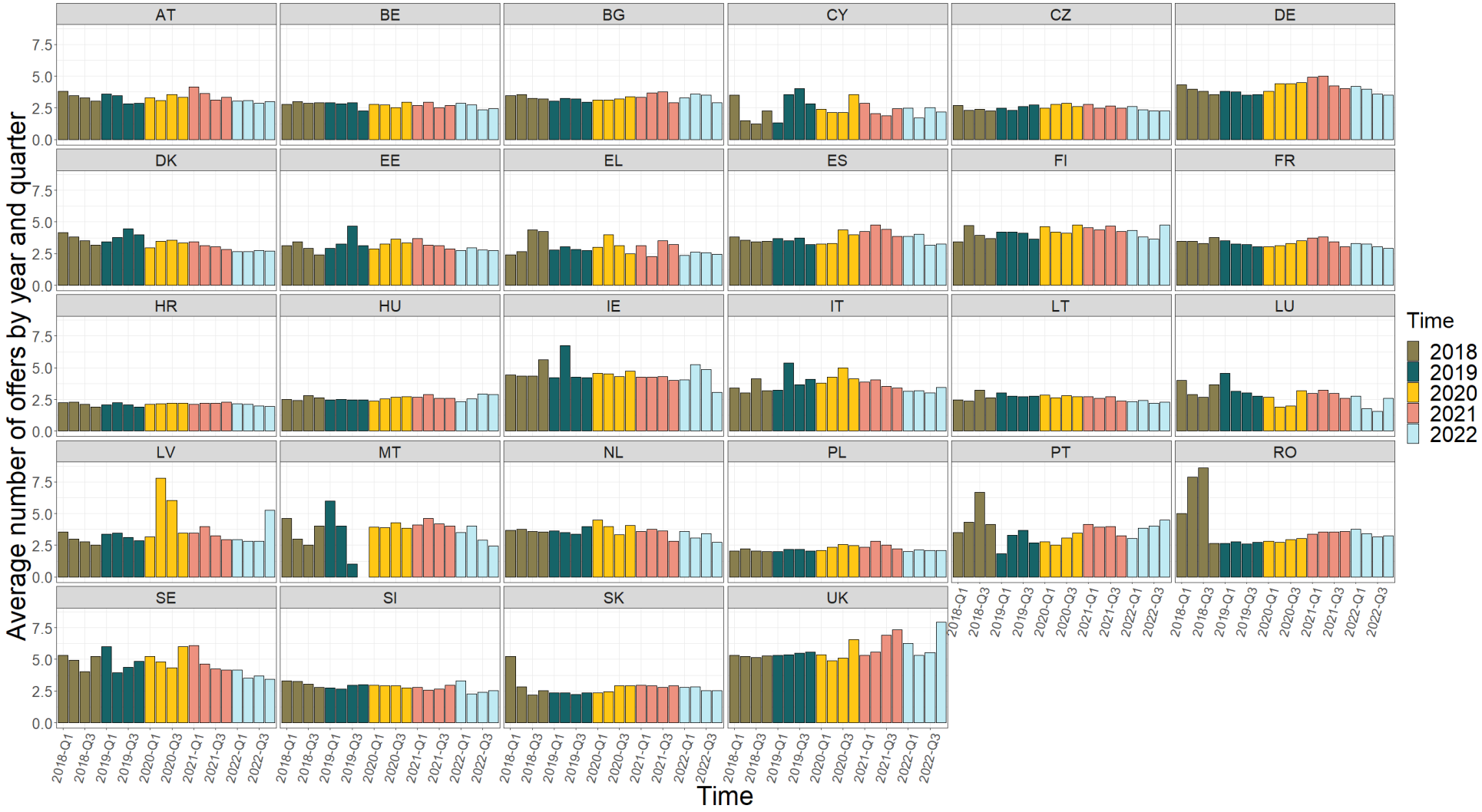
In terms of average offers by CAN for each country, the UK is by far the most consistent, with the highest average number of offers, followed by Ireland, Sweden, Finland and Germany, all of which average at least four during the sample period (Figure 52). Some countries also experienced spikes in the average number of offers, several of which occurred in 2020-2021 (most clearly in Latvia, but also in Sweden, the UK, Germany, Italy and Spain). Hence, the graph suggests that public authorities in bigger countries do not necessarily receive a higher average number of offers. At the same time, global shocks, such as the pandemic, may drive up the number of offers in multiple countries.

Figure 51. Quarterly trends in the average number of offers per CAN, by ecosystem, 2018-2022 (TED)



Source: elaborated by PPMI, based on TED data.

Figure 52. Quarterly trends in the average number of offers per CAN, by country, 2018-2022 (TED)

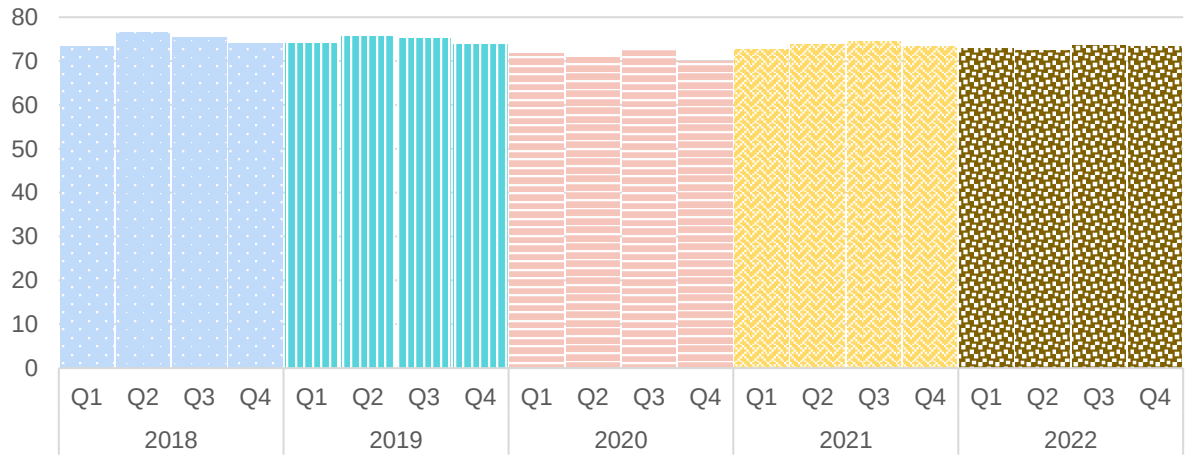


Source: elaborated by PPMI, based on TED data.

Trends in the share of procurement offers submitted by SMEs

The trend for the other main dependent variable of interest – the proportion of offers presented by SMEs per contract award notice – is displayed in Figure 53. **The proportion of SME bids has remained fairly stable over time**. On average, SME bids make up just short of 72 % of all offers per CAN, ranging from a minimum of 70 % in 2020 to a maximum of 73.6 % in 2018. Moreover, these figures are in line with the EU's Digital Market Scoreboard for public procurement, according to which the average proportion of SME bids in 2021 was almost 70 %.[260]

Figure 53. Quarterly trends in the proportion of bids submitted by SMEs (%), 2018-2022 (TED)



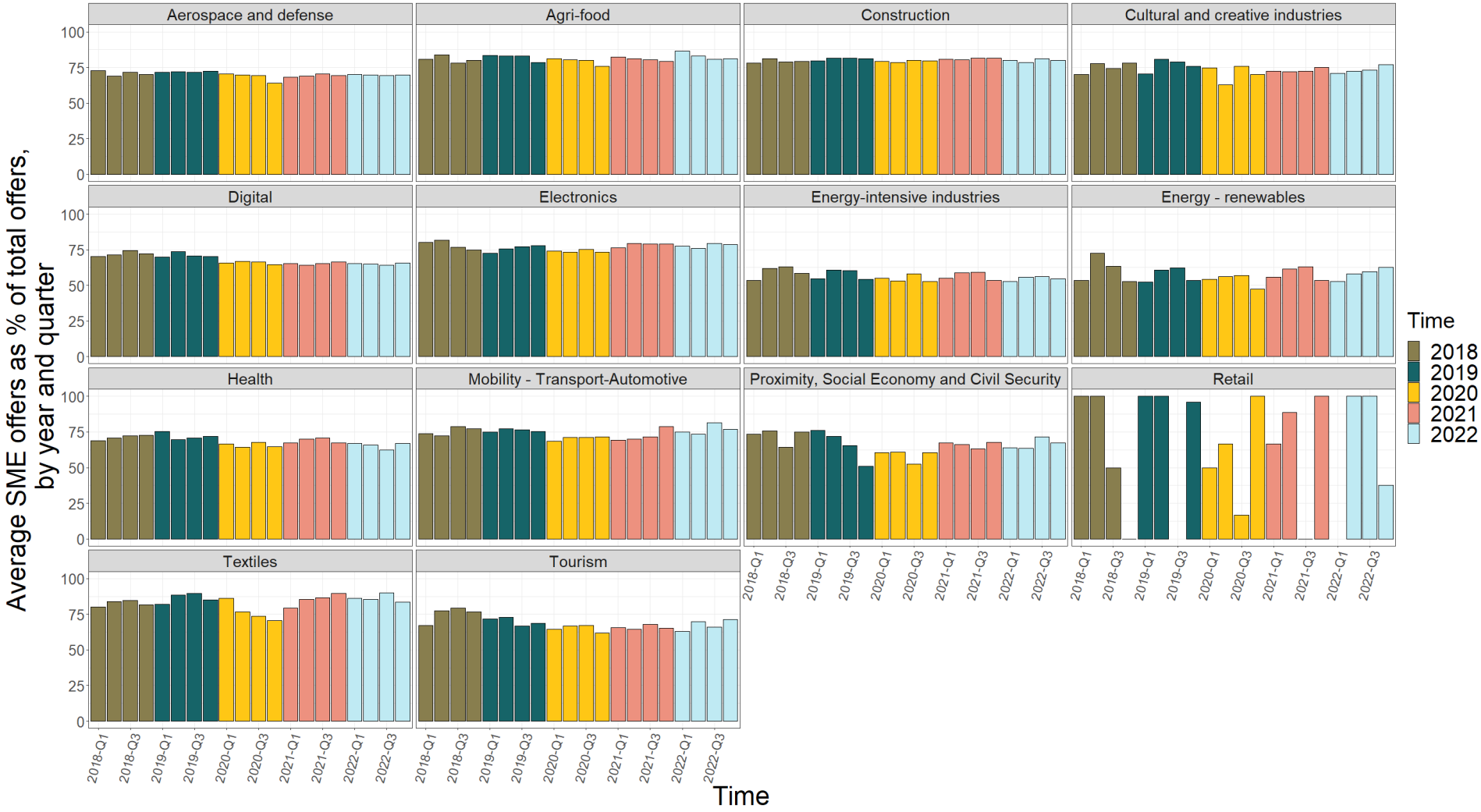
Source: elaborated by PPMI, based on TED data.

When looking at the trends for each ecosystem, there do not appear to be any significant differences between them (Figure 54). Overall, three trends stand out:

- in most cases, the averages do not change greatly over time, which suggests that the share of SMEs participating in public procurement has remained stable over time across most ecosystems;
- in some cases, there are significant differences in the average proportion between ecosystems, with the energy-related ecosystems, and the proximity, social economy and civil security ecosystem seeing fewer SMEs bidding, possibly due to the larger median value of procurements in these sectors, which stands at EUR 421,000 compared with an overall median of EUR 320,000.[261]
- in the textiles ecosystem, while the average number of firms bidding increased in 2020, the share of SMEs dropped during the first year of the pandemic. This may suggest that large companies, rather than SMEs, took advantage of the greater demand for protective gear in 2020.

[260] European Commission. (n.d.) Single Market Scoreboard – Access to public procurement. Available at: https://single-market-scoreboard.ec.europa.eu/business-framework-conditions/public-procurement_en.
[261] The median contract value is EUR 349,000 among energy-intensive industries, EUR 441,000 among energy-renewables firms, and 472,000 among firms in the proximity, social economy and civil security ecosystem.

Figure 54. Quarterly trends in the proportion of bids by SMEs, by ecosystem, 2018-2022 (TED)



Source: elaborated by PPMI, based on TED data.

4.5.3. The effect of inflation on participation in public procurement

The regression models presented in this section highlight two key findings, discussed more in further detail below:

1. **Higher inflation is associated with small decreases in the average number of offers submitted per contract award notice, amounting to 1 % or roughly 1,000 of potential offers being lost in 2022.**
2. **Inflation also reduces the proportion of bids submitted by SMEs by around 0.11 percentage points, with a stronger effect in energy-intensive industries, where price increases were among the highest.**

The overall effect of inflation on participation in public procurement

The regression models in Table 22 and Table 23, presented in Annex 2, support the idea that **when controlling for country- and sector-specific characteristics, increases in inflation are associated with a slight reduction in the average number of offers by firms per CAN**. In particular, Model 2 (Table 22) suggests that a one-percentage-point increase in the annual rate of change in inflation leads to a decrease in the average number of offers by 0.3 % – that is, by 0.01 offers. To put this into context, the inflation observed in 2022 would reduce the average number of offers from 3.26 to 3.12. This would amount to around 960 potential offers being lost out of the 96,000 submitted in 2021, or roughly 1 %.[262] The effect is driven by the highest levels of inflation: as Model 3 shows, the effect of 'very high' inflation (>20 %) is three times as strong than that of 'moderate' (5-10 %) or 'high' (10-20 %) inflation, when compared to a situation of 'low' inflation (0-5%).[263]

Similarly, the results show that the **average marginal effect of inflation is to reduce the proportion of bids made by SMEs by around 0.11 percentage points** (Table 24, Model 18 and Table 25, Model 26). However, these results should be approached with caution due to the degree of non-linearity present in the models, which is strong and could not be corrected for using standard techniques such as variable transformation. This is demonstrated by Model 19 in Table 24: while inflation appears to reduce the share of SME bids when annual inflation is above 20 %, the opposite is true when annual inflation ranges between 10 % and 20 %. This inconsistency may be explained by looking at different ecosystems separately: whereas inflation appears to reduce the share of SME bids in energy-intensive industries, it increases the share of SME bids for public contracts in the agri-food sector, and appears not to affect other ecosystems that were selected for in-depth analysis.

Measures that typically foster the participation of SMEs in public procurement – namely, open procedures and the division of contracts into lots – remain effective during times of high inflation. According to the regression models (Model 18 in Table 24), open procedures increased the number of average offers by 33.5 % in 2022 (35 % in the full sample), while

[262] The calculation of these estimates relies on data from 2021 rather than 2022, because the collection of 2022 observations relied on web-scraped data, which probably underestimates the total number of offers.

[263] The research team also tested an alternative operationalisation of inflation, using quarter-on-quarter changes. Models 10 and 11 support the findings from the models that use yearly inflation: 'very high' values of inflation decrease the average number of offers per CAN by 5.7 % more than a 'low'-inflation environment. It should be noted, however, that these models also control for the level of inflation during the previous quarter, since firms may need to detect a trend in inflation before taking action. In such cases, the models show that past changes in inflation have a stronger effect on participation in public procurement than current changes. This may be the result of the delayed effect of inflation on firms' decision-making, which may take several months to manifest both because firms first need to evaluate their capability to absorb market demands, and because in many cases they may not be able to pass costs on to consumers. Furthermore, for all the models described so far, the team also tested an alternative specification, whereby inflation changes are confined between a minimum of -40 percentage points and a maximum of 40 percentage points to avoid the potential effect of outliers, which in some cases are over 200 percentage points. Results hold throughout.

dividing tenders into lots increased the number of offers submitted by 11.1 % (12 % in the full sample). Hence, these measures still appear to be helpful in promoting the participation of SMEs in public procurement, even during times of high inflation. Furthermore, worried about potential contract cancellations, **some Member States have allowed for price recalculations in contracts longer than six months in one or more sectors of the economy, especially construction** (see Section 5.3.3), although it is too early to assess the effectiveness of these measures.

Lastly, GDP growth appears to not have any effect on the average number of offers: if, on the one hand, weaker economic growth may lead to a lower number of tender offers because fewer firms are economically able to compete, the significant amount of government spending engaged in by national authorities (as well as by the EU) during the COVID-19 crisis may have counter-balanced the negative impacts of the economic recession.[264] Similarly, no effect is observed in the models with regard to SMEs' participation when all 14 ecosystems are considered together (see below for ecosystem-specific results).

Overall, all of these models present a relatively low fit, since they explain less than 20 % of the total variation in the number of offers and the proportion of SME bids. This suggests that some important determinants may be missing – most probably those relating to company-level characteristics such as demographics and financial characteristics[265] and to project complexity (which requires high levels of expertise from the contractor, both in designing the project and carrying it out)[266]. Unfortunately, the TED data does not contain information on such variables.

Effect by ecosystem

Increases in inflation are seemingly associated with decreases in the average number of offers per CAN in the agri-food ecosystem (Models 4 and 12, with a decrease of 0.2-0.3 %), and with increases in the number of offers in the electronics ecosystem (Models 7 and 15, with an increase of 1.3-1.5%). The effect in agri-food in particular might be explained by the spike in the number of offers during the height of the COVID-19 crisis, when inflation was actually low. The seemingly positive effect in the electronics ecosystem probably reflects the growing demand for AI platforms and applications in Europe, which will also require significant investment in the electronic components necessary to sustain digitalisation,[267] as well as the growing importance of dual-use technologies for security and defence solutions, including semiconductors, along with robotic process automation by firms.[268] These factors are difficult to capture in regression models, which is why the effect may be attributed to inflation instead.

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[264] Indeed, when adding government spending as a further variable into the aggregate models, its effect significantly increases both the average number of offers and the proportion of SME bids per CAN, without having an impact on the effect of other variables (except for interest rates, which become non-significant). Nevertheless, this variable was not included since no data are available for Q4 of 2022.

[265] Flynn, A., McKevitt, D., & Davis, P. (2015). The impact of size on small and medium-sized enterprise public sector tendering. *International Small Business Journal*, *33*(4), 443-461; Flynn, A., & Davis, P. (2017). Explaining SME participation and success in public procurement using a capability-based model of tendering. *Journal of Public Procurement*, *17* (3), 337-372; Mark McKevitt, D., Flynn, A., & Davis, P. (2014). Public buying decisions: A framework for buyers and small firms. *International Journal of Public Sector Management*, *27*(1), 94-106; Di Mauro, C., Ancarani, A., & Hartley, T. (2020). Unravelling SMEs' participation and success in public procurement. *Journal of public procurement*, *20*(4), 377-401; and Ancarani, A., Di Mauro, C., Hartley, T., & Tátrai, T. (2019). A comparative analysis of SME friendly public procurement: results from Canada, Hungary and Italy. *International Journal of Public Administration*, *42*(13), 1106-1121.

[266] Baldi, S., Bottasso, A., Conti, M., & Piccardo, C. (2016). To bid or not to bid: That is the question: Public procurement, project complexity and corruption. *European Journal of Political Economy*, *43*, 89-106.

[267] European Commission (2023*). Commission presents new initiatives, laying the ground for the transformation of the connectivity sector in the EU*. Available at: https://ec.europa.eu/commission/presscorner/detail/en/ip_23_985.
Eit Community and European Union (2022). *Emerging AI and Data Driven Business Models in Europe*. Available at: https://eit.europa.eu/sites/default/files/emerging_ai_and_data_driven_business_models_in_europe_final.pdf.

[268] European Parliament (2021). Post Covid-19 value chains: options for reshoring production back to Europe in a globalised economy. Available at: https://www.europarl.europa.eu/RegData/etudes/STUD/2021/653626/EXPO_STU(2021)653626_EN.pdf
https://www.global-imi.com/blog/why-electronics-industry-getting-post-pandemic-boost

On top of the above factors, green and digital transition policies in Europe (see Section 4.3 and Section 4.4), along with technological sovereignty goals to reduce dependency on production from outside the EU, are expanding the EU market for digital technologies, which are being used to make products easier to maintain, to extend their lifecycle and to contribute to the adoption of a greener production model.[269] The strong political and financial commitment of European institutions towards these goals is likely to have supported the EU's electronic industrial ecosystem, including the participation of firms in public procurement, even during a period of high inflationary pressure.

In the other three ecosystems – construction (Models 5 and 13), energy-intensive industries (Models 6 and 14) and textiles (Models 8 and 16) – the effect of inflationary changes is either inconsistent or null.

With regard to the proportion of SME bids per CAN, the effect of the increase in energy prices is clearest in the energy-intensive industries (Models 22 and 30), in which the average marginal effect of inflation is to decrease the proportion of SME bids by 0.27-0.40 percentage points. In the other four ecosystems, the effect is either null or inconsistent. In particular, in the agri-food ecosystem, the average marginal effect of changes in inflation compared with the same quarter in the previous year is an increase in the share of SME bids, whereas quarter-on-quarter changes show a decrease in this share. This may be the effect of seasonal inflation trends in this ecosystem, which are not present in the other three ecosystems – construction, energy-intensive industries, and textiles.

4.5.4. Simulating the effect of inflation on future participation in public procurement

Figure *55* presents simulations for the number of offers per CAN in the scenarios for all of the 14 ecosystems, based on the results of the econometric models. The inflationary surge that began in the second half of 2021 has caused a gradual decrease in the average number of offers per CAN, which worsened further over the course of 2022.

In the baseline scenario, the expected gradual decrease in inflation towards target levels should favour a recovery in participation rates in public procurement, particularly by SMEs. Simulations show that it will take more than one year (only in the last quarter of 2024) to return to a level close to, but still lower than, the average number of offers per CAN observed at the beginning of 2021 (i.e. 3.5). Indeed, tighter financial constraints, lower-than-expected GDP growth compared with previous spring forecasts, and the need – particularly among highly indebted EU countries – for a more sustainable fiscal policy following the expansionary measures taken during the COVID-19 pandemic, are likely to keep the SMEs participation in public procurement at a level slightly lower than that seen in the past three years.[270]

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[269] EU Council (2022). Chips Act: Council adopts position. Available at: https://www.consilium.europa.eu/en/press/press-releases/2022/12/01/chips-act-council-adopts-position/; see also the New Circular Economy Action Plan (European Commission, 2020), approved by the European Parliament in 2021; European Commission (2020). Circular Economy Action Plan for a Cleaner and More Competitive Europe. Frankfurt, Germany: European Commission; Bossone, B. et al. (2022). Inflation and the ecological transition: A European perspective (Part II) Available at: https://blogs.worldbank.org/allaboutfinance/inflation-and-ecological-transition-european-perspective-part-ii .

[270] Discretionary fiscal support, including expenditures for public procurement, is projected to decline in 2024, thus shrinking national public budget balances. Indeed, the general escape clause of the Stability and Growth Pact, which provided for a temporary deviation from the budgetary requirements that normally apply in the event of a severe economic downturn, will be deactivated at the end of 2023. See: European Fiscal Board (2023). Assessment of the fiscal stance appropriate for the euro area in 2024. European Fiscal Board report, 28 June 2023. Available at: https://www.consilium.europa.eu/media/65609/2023-06-21-efb-assessment-of-euro-area-fiscal-stance-final_0.pdf.
European Commission (2023). Fiscal policy guidance for 2024: Promoting debt sustainability and sustainable and inclusive growth. Available at: https://ec.europa.eu/commission/presscorner/detail/en/ip_23_1410.

- In the **pessimistic scenario**, a tightening of monetary policy to cool down inflation has the effect of slightly reducing the average number of offers per CAN compared with the baseline scenario in 2023, but with a gradual return towards the 2021 levels during 2024 (

Figure *55*).

In the highly adverse scenario, in which an economic recession is expected to happen, the participation of SMEs in public tender will be driven by other factors (tighter financial constraints, lower GDP growth, lower levels of public expenditure in tenders, etc.), with inflation playing a negligible role. Moreover, during economic downturns, SMEs face increased risk aversion and may be more cautious about taking on new projects or investments.[271] In such a case, the recovery in participation rates will take a longer time, well beyond the horizon covered by the simulations. It is forecast that the number of offers per CAN will reach its lowest point in 2023 (2.88 on average across all ecosystems), and around 3 by the end of 2024.

In both the pessimistic and the highly adverse scenario, more limited participation in public procurement might have indirect detrimental effects on SMEs. Recent studies show that procurement contracts act as collateral for firms, helping them grow out of their financial constraints.[272] Indeed, winning a procurement contract is associated with a positive and long-lasting effect on firms' capacity to obtain credit, and via this channel, to increase their financial performance and market value. Moreover, it is possible that obtaining a contract in a given year may also increase a firm's chances of obtaining more contracts in the subsequent periods. In a scenario in which participation in public procurement is reduced, these positive effects do not materialise.

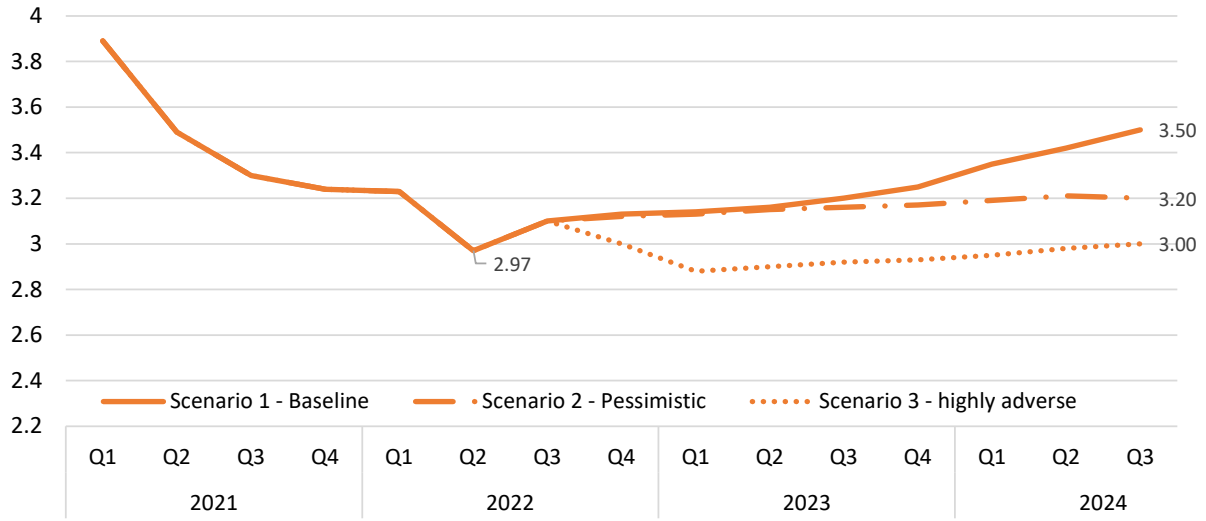
The percentage of bids submitted by SMEs shows a similar trajectory to the number of offers per CAN; therefore, only the evolution in the baseline scenario is visualised in Figure 57.

Moving to the ecosystem level, the persistence over multiple quarters of inflation rates higher than the medium-long term target of 2 % should reduce the level of participation in public procurement, particularly among firms in agri-food and energy-intensive industries, as

[271] Di Mauro, C., Ancarani, A., & Hartley, T. (2020). Unravelling SMEs' participation and success in public procurement. *Journal of public procurement*, *20*(4), 377-401; see also: Pircher, B. (2020). EU public procurement policy: the economic crisis as trigger for enhanced harmonisation. *Journal of European Integration*, *42*(4), 509-525.

[272] Di Giovanni, J., García-Santana, M., Jeenas, P., Moral-Benito, E., & Pijoan-Mas, J. (2023). Buy Big or Buy Small? Procurement Policies, Firms' Financing, and the Macroeconomy. World Bank Policy Research Working Papers 10522.

indicated by the econometric models (see the previous section).



Source*: elaborated by CSIL, based on PPMI estimates.*

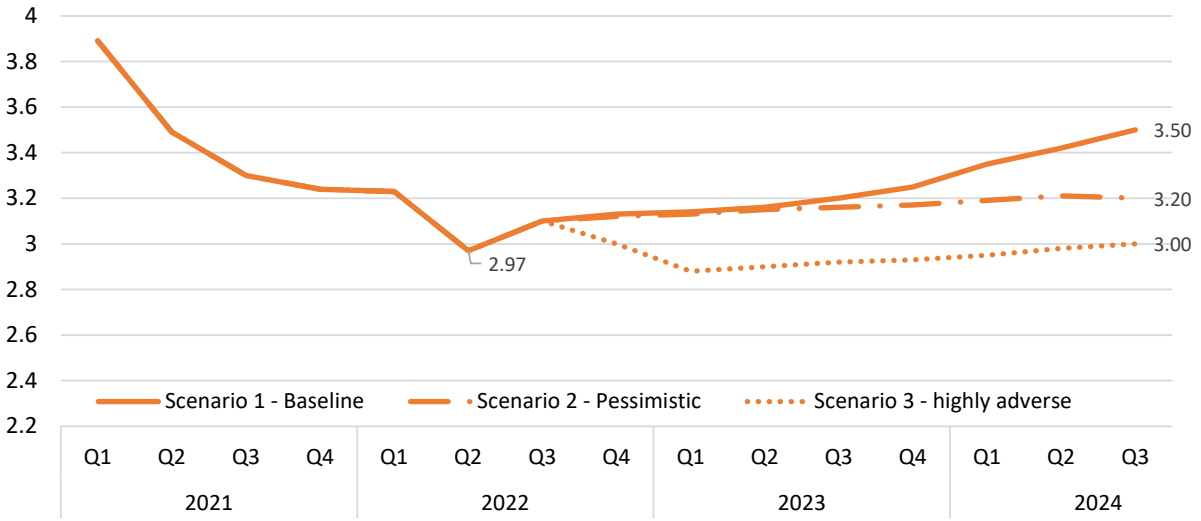
Note: 2023-2024 are projections.

Figure 56 shows that higher inflation will reduce the number of offers per CAN in the **agri-food ecosystem** somewhat more severely than in the other ecosystems, while Figure 57 shows that the share of bids submitted by SMEs in the **energy-intensive industries** will decrease somewhat more than in the economy overall, also as a consequence of inflation. Hence, **participation in public procurement by SMEs from these ecosystems is expected to recover even more slowly than for other industries in all of the future scenarios**.

In contrast to the evidence above, the number of offers per CAN and the share of participation by SMEs in the **electronics ecosystem increased during the inflation surge**. As discussed in the previous section, this is most probably due to the boost experienced by the electronics industry during the pandemic and in the post-pandemic period, with the market volume increasing both in Europe and around the world.[273] Although **the level of electronics consumption may vary depending on future scenarios, overall, the number of users and the market volume is projected to be even higher in the next couple of years,** driven by the reshoring of electronics production and demand for sustainable electronics, with inflation only playing a marginal role.[274] Accordingly, when considering the marginal impact of inflation on the number of offers per CAN, net of other possible driving factors, it is forecast to decrease

[273] European Parliament (2021). Post Covid-19 value chains: options for reshoring production back to Europe in a globalised economy https://www.europarl.europa.eu/RegData/etudes/STUD/2021/653626/EXPO_STU(2021)653626_EN.pdf. See also:
[274]Siemens (2023). 5 trends shaping the electronics industry in 2023. Available at: https ://blogs.sw.siemens.com/valor/2023/01/17/5-trends-electronics-industry-2023/#4-reshoring-electronics-production. See also the following link: https://www.statista.com/outlook/dmo/ecommerce/electronics/europe.

over time as inflation returns to its ordinary levels (

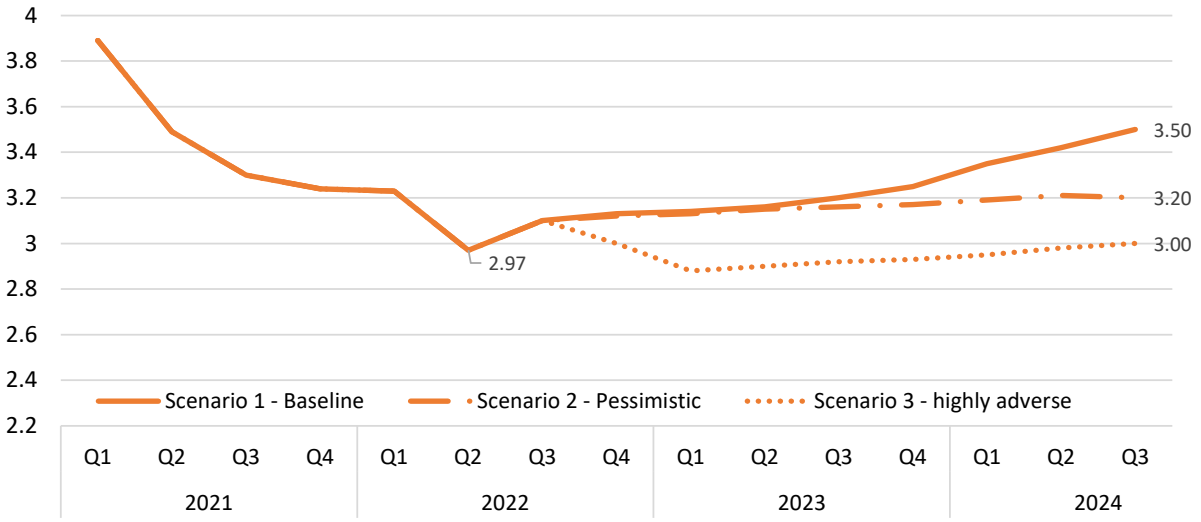


Source*: elaborated by CSIL, based on PPMI estimates.*

Note: 2023-2024 are projections.

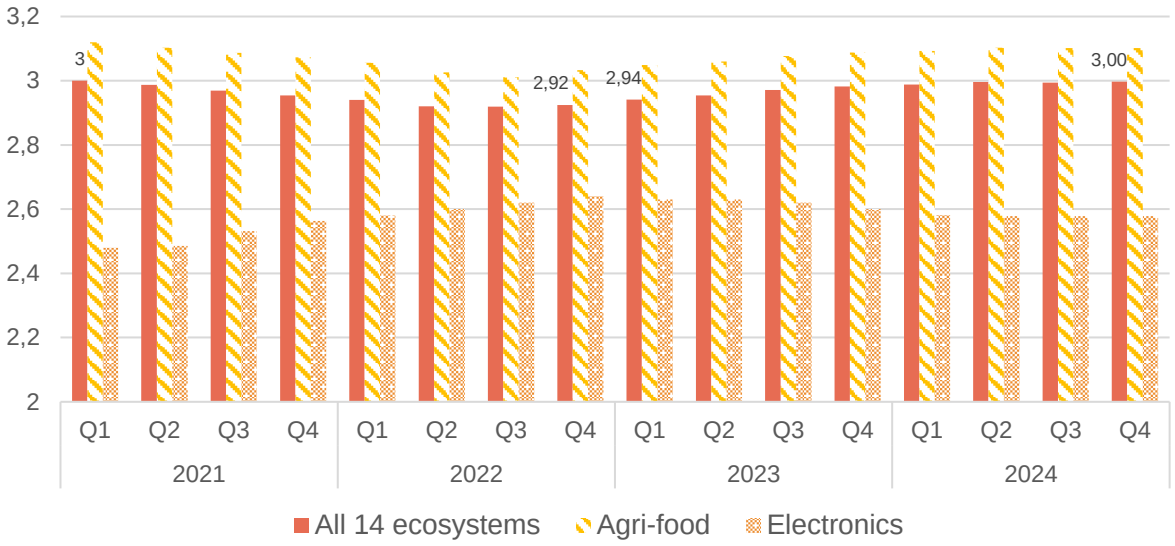
Figure 56). In other terms, the future trend in the number of offers within the electronics ecosystem will be affected less by changes in inflation, and more by other determinants.

Figure 55. Simulated variations of the effect of inflation on the number of offers per CAN, all 14 ecosystems in the three scenarios, EU-27, 2021-2024



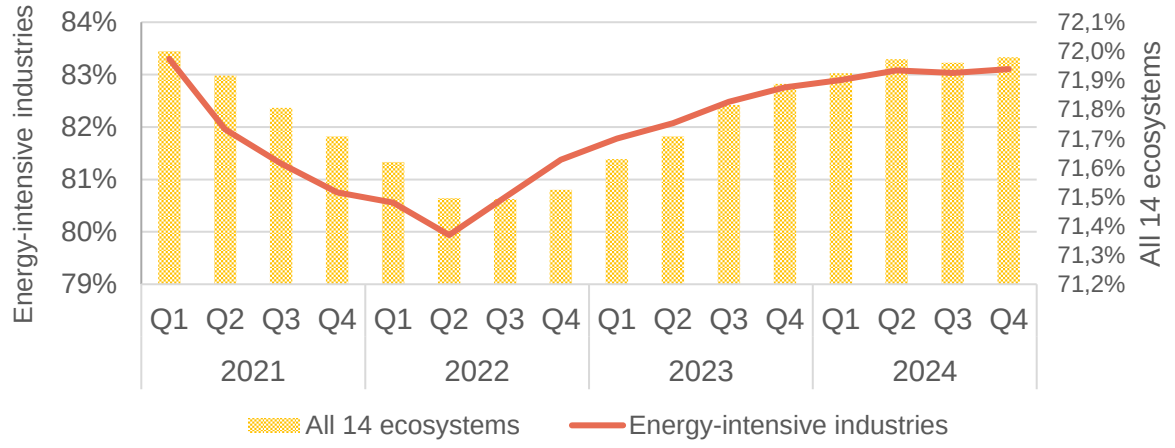
Source: elaborated by CSIL, based on PPMI estimates.
Note: 2023-2024 are projections.

Figure 56. Simulated variations of the effect of inflation on the number of offers per CAN in selected ecosystems, baseline scenario 2021-2024



Source: elaborated by CSIL, based on PPMI estimates.
Note: 2023-2024 are projections.

Figure 57. Simulated variations of the effect of inflation on the % of bids submitted by SMEs in energy-intensive industries (left y-axis) versus all 14 ecosystems (right y-axis), baseline scenario, 2021-2024



Source: elaborated by CSIL, based on PPMI estimates.
Note: 2023-2024 are projections.

4.5.5. Conclusions regarding participation in public procurement

This section of the report has shown that **inflation is associated with a small decrease in participation in public procurement, with the effects on SMEs being similar to those for all firms overall, equivalent to roughly 1 % of potential offers being lost due to inflation**. This is driven by the fact that participation in public procurement becomes riskier in times of high inflation because firms find themselves unable to deliver the services and goods promised for the agreed price when production costs rise rapidly. The investments required in order to submit a bid also becomes more expensive as wage costs rise, while the average contract value fell in 2022 compared with 2021 (from EUR 1.9 million to EUR 1.7 million), meaning that SMEs cannot expect to compensate for higher labour costs with higher earnings.

This effect varies significantly by industrial ecosystem, however, with agri-food being affected the most with regard to the average number of offers submitted per CAN, and energy-intensive

industries with regard to the share of offers submitted by SMEs. Despite these differences, though, the effect of inflation on participation in public procurement remains rather modest for all ecosystems.

Various strategies – such as dividing contracts into lots and launching them through open procedures – also contribute to promoting SME participation, even in times of high inflation. In 2022 and 2023, several Member States began indexing public procurement values to avoid contract cancellations, although it is too early as yet to assess the effects of such policies.

The above results should nevertheless be approached with caution, given the non-linearity observed in the regression models and their overall fit.

4.6. Access to skilled labour

So far, the present study has shown that high inflation negatively affects investment levels, with more profound consequences for green rather than for digital investments or investments required in order to participate in public procurement. Rising inflation may also have made it more difficult for firms to access skilled labour, since workers may demand higher wages to make up for a loss of purchasing power due to inflation. Yet, due to higher non-labour costs, firms have fewer resources with which to match expected growth in wage demands. Reduced access to skilled labour may also have affected SMEs more than large firms. Thus, this section explores how inflation, in the form of increased labour and production costs, has affected the ability of firms – and especially SMEs –to find skilled staff, using SAFE data from between 2014 and 2022.

Key points

- In 2022, firms reported similar levels of difficulty in accessing skilled labour as they had before the pandemic, even though labour costs increased by 78 % between the first half of 2019 and the first half of 2022.
- Increases in production or labour costs are associated with increases in the difficulties experienced by SMEs in accessing skilled labour. The effect of labour costs is also greater than that associated with other costs (e.g. energy, materials).
- Although accessing skilled labour is most difficult in the construction and industry sectors, the effect of inflation is slightly stronger in the services and trade sectors, though this may be temporary.
- The risk of a price-wage spiral is modest, and can be avoided even in the event of a high-inflation scenario in 2023-2024.
- Accessing skilled staff is a long-lasting, structural barrier for SMEs; therefore, it is expected to remain an obstacle in the near future in each of the three scenarios considered in this analysis, and is only partially linked to the economic cycle.

4.6.1. Data and indicators for access to skilled labour and firm-level inflation variables

Eurostat data are used to display trends in wage growth and vacancy rates in the labour market ,[275] as both factors are expected to directly influence firms' ability to access skilled labour. Moreover, as in other parts of this report, SAFE (the ECB Survey on Access to Financing of Enterprises), which uses surveys conducted between 2014 and 2022, is employed to estimate

[275] Vacancy rates are a common measure of labour market tightness, see: Eures. (2023). Report on Labour shortages and surpluses. Luxembourg: Publications Office of the European Union.

firms' ability to access skilled staff, as well as the degree to which they perceive production or labour costs to be a problem; trends in labour and other (materials, energy) costs; and a host of other characteristics at company level,.

The main dependent variable is operationalised as the difficulty that firms faced in finding skilled staff and experienced managers during the previous six months, measured on a scale from 1 to 10, where 1 indicates no difficulty and 10 great difficulty.[276] It should be noted that the SAFE questionnaire refers to this variable as the 'perceived importance of the availability of skilled staff or experienced managers'. However, to avoid repetition, in this report this is referred to simply as 'difficulty in accessing skilled labour'.

Three main proxies are employed to measure inflation from the SAFE dataset:

1. The extent to which **production or labour costs** were perceived as a problem by survey respondents, measured on a scale from 1 to 10, from 'not at all' to 'extremely important'.[277] As for the dependent variable, to avoid repetition, this variable is referred to simply as 'production or labour costs'.
2. Whether the firm's **labour costs** (including social contributions) have increased, decreased, or remained unchanged in the six months prior to the survey, as perceived by the survey respondents.[278]
3. Whether the firm's **other costs (materials, energy)** have increased, decreased or remained unchanged in the six months before the survey, also as perceived by the survey respondents.[279]

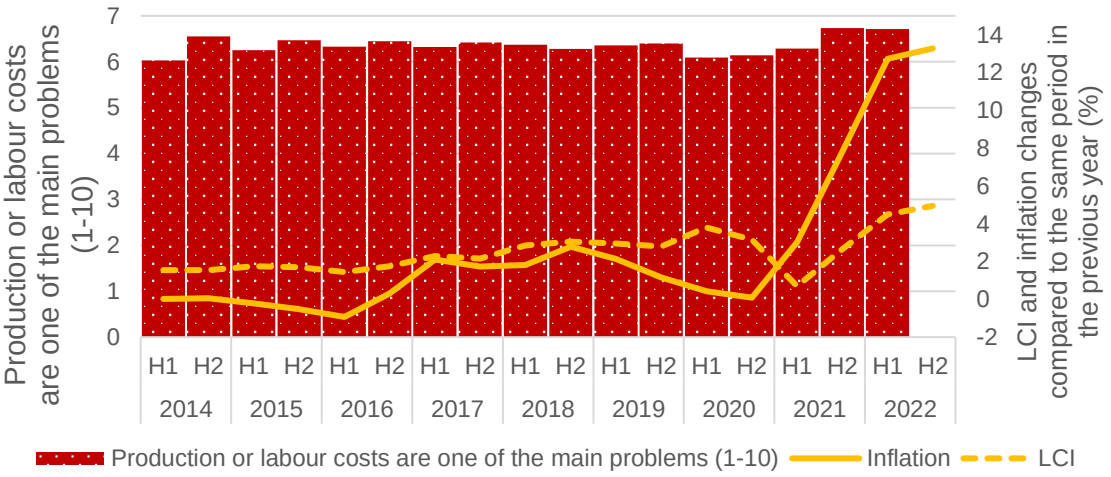
The reasons for employing these company-level measures of inflation instead of macro-level inflation measures are twofold. First, unlike the other aforementioned SAFE variables, which are recorded on a yearly basis, difficulty in accessing skilled labour is measured on a semi-annual basis. Hence, in this case, yearly measures of inflation do not offer sufficient granularity. The next-best solution – quarterly data – shows that the quarterly services producer price index (SPPI) is missing several values (more so than annual measurements), which follow a non-random pattern, and which may in turn affect the estimates of the regression analyses. Company-level measures of inflation in production, energy and labour costs are therefore preferred, although these are subjective measures. Nevertheless, given that that these are measured at the same level as the dependent variable, they provide greater variability and hence more power to detect the impact of inflation.

Since all SAFE variables are subjective, caution is warranted when interpreting its findings, as they concern respondents' *perceptions* of costs rather than actual cost estimates. Nevertheless, they correlate strongly with official inflation and wage growth statistics. Figure 58 shows the trend in production or labour costs against changes in both inflation and the labour cost index (LCI).[280] In particular, the trends suggest that, at least since the COVID-19 pandemic, problems in terms of production or labour costs have co-evolved with inflation, but have preceded changes in LCI.[281] Inflation and perceived production or labour costs dropped

[276] The mean is 6.04, and the median is 7, with the inter-quartile range being from 4 to 9.
[277] The exact question reads as follows: 'How important has the problem of costs of production or labour been for your enterprise in the past six months? Please answer on a scale of 1-10, where 1 means it is not at all important and 10 means it is extremely important.'
[278] The exact wording of the question reads: 'Have labour costs (including social contributions) decreased, remained unchanged or increased over the past six months?'
[279] The exact wording of the question reads: 'Have other costs (materials, energy, other) decreased, remained unchanged or increased over the past six months?'
[280] Please note that this indicator of inflation is not HICP, but is the same inflation indicator employed for annual SAFE analyses, based on a combination of HICP, PPI, CPPI, and SPPI, depending on sector. This is because perceptions of production costs are more likely to depend on this type of inflation rather than HICP. Nevertheless, correlation with HICP alone is high, with r = 0.93.
[281] Also note that while the reference period for the SAFE variable is April/September in H1 and October/March in H2, for inflation and LCI, H1 refers to January/June, and H2 to July/December. Hence, there is a slight inherent lag, with potentially delayed effects of the macro-economic context.

from pre-pandemic levels, and started to rise again in the second half of 2020. LCI, conversely, did not drop until the second half of 2020, and it took until the second half of 2021 to rise.[282] All three variables then rose, starting with inflation, followed by perceived costs, and ultimately LCI.

Figure 58. Production or labour costs being a main problem in the previous six months (1-10) in the EU-27, 2014-2022 (SAFE)



Source: elaborated by PPMI, based on Eurostat and SAFE data.
Note: production or labour costs on the left vertical axis; inflation and LCI on the right vertical axis.

Other company-level inflation measures similarly correlate with official statistics. The shares of respondents declaring that their labour costs and other costs (materials, energy) have increased, decreased or remained unchanged in the previous six months, are shown in Figure 59 and Figure 60, respectively. The shares in Figure 59 are measured against LCI, while those in Figure 60 are against inflation. Figure 59 suggests that, during the COVID-19 pandemic, the majority of respondents saw their labour costs as unchanged, but a historically high share of respondents also said that labour costs decreased – possibly as a result of lay-offs, but also thanks to wage subsidies. Since the first half of 2021, a majority of respondents has agreed that their labour costs increased. This trend is also followed by parallel decreases and increases in LCI – which, in the first half of 2022, increased by 78 % compared with the first half of 2019 (prior to the pandemic). Figure 60 again displays a high degree of correlation between perceptions of other costs (materials, energy) and changes in inflation.[283]

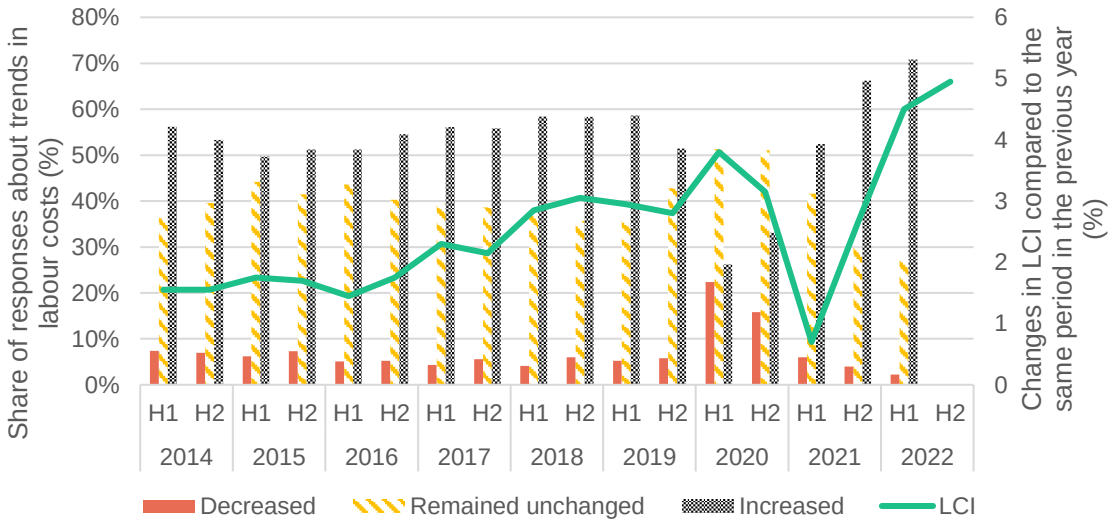
In addition to demonstrating correlation between perceived and actual costs, the graphs highlight that:

- Problems due to production or labour costs are at the highest levels since 2014 (6.55 vs 6.71 in 2022).
- All types of costs decreased in 2020, during the pandemic, although labour costs were subject to smaller decreases than materials and energy costs, possibly due to government support schemes. These costs have also all increased since 2021, with materials and energy costs being subject to the greatest changes.

[282] Indeed, the correlation between the SAFE indicator and inflation increases from r = 0.65 to r = 0.89 when only the period since the second half of 2019 is considered. Likewise, the correlation between the SAFE indicator and LCI increases from r = 0.15 to r = 0.45 when the SAFE indicator is lagged by one period, and from r = 0.18 to r = 0.72 when only the period since the second half of 2019 is considered.
[283] The correlation between the share of respondents who answered 'Increased other costs' and inflation is r = 0.86, while for the share of 'Decreased other costs' responses, it is r = -0.6.

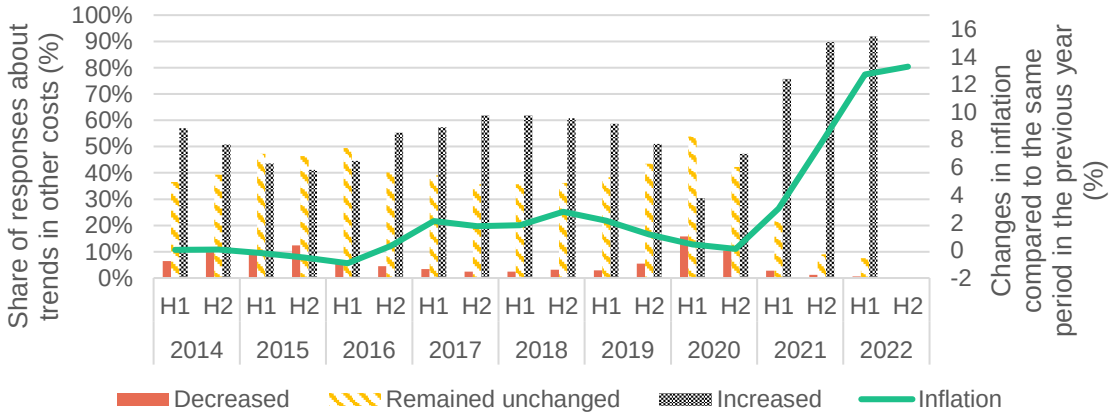
- Inflation experienced by businesses slowed during the second half of 2022, but labour costs continued to grow (albeit at a slower pace).

Figure 59. Perceived changes in labour costs against changes in LCI compared with the same period in the previous year (%) in the EU-27, 2014-2022 (SAFE)



Source: elaborated by PPMI, based on Eurostat and SAFE data.
Note: share of responses on the left vertical axis; LCI on the right vertical axis.

Figure 60. Perceived changes in other costs (materials, energy) against changes in inflation compared with the same period in the previous year (%) in the EU-27, 2014-2022 (SAFE)



Source: elaborated by PPMI, based on Eurostat and SAFE data.
Note: share of responses on the left vertical axis; inflation on the right vertical axis.

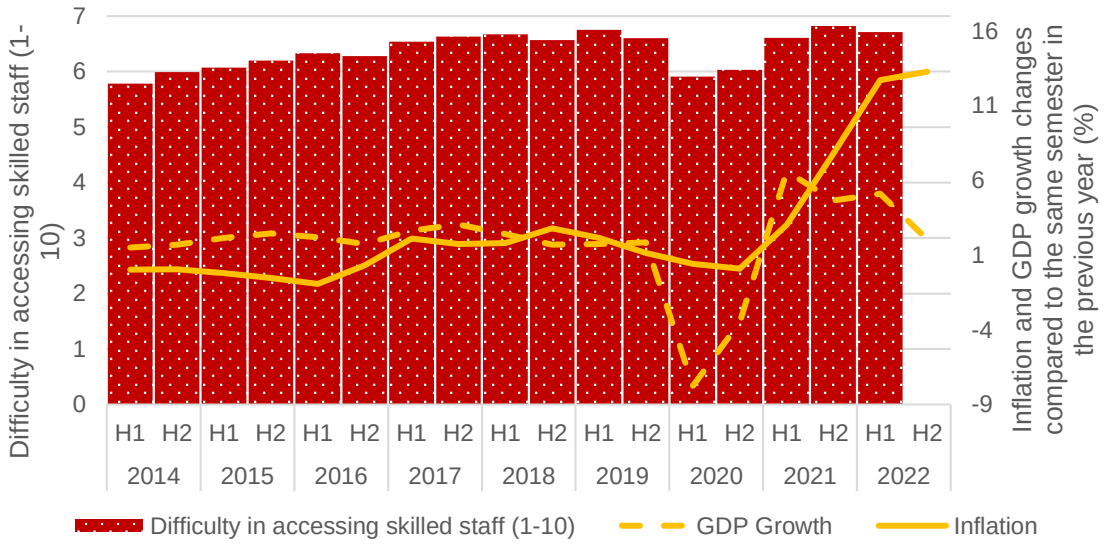
4.6.2. Trends in access to skilled labour

According to SAFE data, firms found it increasingly difficult to access skilled workers during the period from 2014 to 2019, which may be explained by the fact that the EU economy was growing, and firms required more skilled workers to match market demands (see Figure 61). Then, in 2020, firms' perceptions of their difficulty in finding skilled staff dropped as economies experienced COVID-19 lockdowns, reducing the demand for labour. **Firms' difficulty in accessing skilled labour has since returned to pre-pandemic levels – without, however, showing a marked increase compared with the past**.

Several factors have contributed to the increasing difficulty in accessing skilled workers observed since 2020. While inflation played a role (see the next section of the report), other factors also contributed to a tightening of labour markets. As shown in Figure 61, GDP growth

recovered, so firms began to demand more labour as economies re-opened. At the same time, participation in the labour force had declined, as some low-skilled, old or disadvantaged workers did not fully return to the labour market after the pandemic.[284] The pandemic also shifted workers' preferences away from low-paid, contact-intensive, physically strenuous, non-teleworkable or less flexible jobs.[285] Due to lockdown restrictions and work-from-home orders, many migrant workers returned to their countries of origin. Some of these migrants decided to stay there, contributing to labour shortages in Western Europe.[286]

Figure 61. Perceptions of the difficulty in accessing skilled staff in the past six months (1-10) in the EU-27, 2014-2022 (SAFE)



Source: elaborated by PPMI, based on SAFE and Eurostat data.

The construction and industry sectors experienced the greatest difficulty in accessing skilled labour throughout the period studied, including in 2021-2022, in line with recent studies showing greater labour shortages in these sectors over recent years.[287] Firms in services and trade, meanwhile, encountered fewer problems in finding skilled staff.

Russia's war of aggression against Ukraine may also have contributed to these trends. Labour shortages in male-dominated occupations were exacerbated when Ukrainian men aged between 18 and 60 returned to Ukraine as part of the country's general mobilisation.[288] In contrast, shortages in female-dominated occupations such as healthcare, hospitality and catering services in Europe decreased, influenced by the in-flow of Ukrainian refugees, the vast majority of whom were women and children.[289]

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[284] Duval, R. et al. (2022). Labour Market Tightness in Advanced Economies. *IMF SDN/2022/001.* Available at: https://www.imf.org/-/media/Files/Publications/SDN/2022/English/SDNEA2022001.ashx.

[285] *Ibid*.

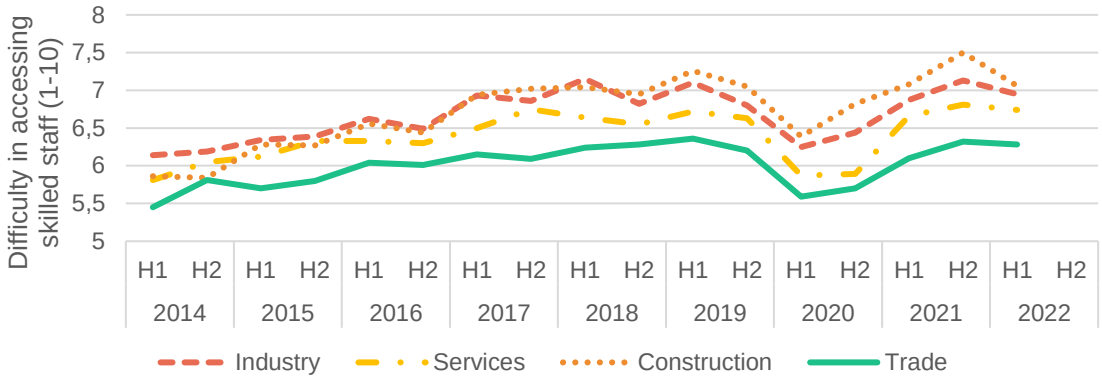
[286] It is difficult to estimate the number of migrant workers who returned to their countries of origin and remained there, but country-level information supports this notion. In the UK, various estimates based on different methodologies suggest that the migrant population has declined, see: Sumption, M. (2021). Where did all the migrants go? Migration data during the pandemic. UK Migration Observatory. Available at: https://migrationobservatory.ox.ac.uk/resources/commentaries/where-did-all-the-migrants-go-migration-data-during-the-pandemic/; Bloomberg. (2021, 17 September). U.K. Lost 200,000 EU Nationals as Brexit and the Pandemic Struck. Available at: https://www.bloomberg.com/news/articles/2021-09-17/u-k-lost-200-000-eu-nationals-as-brexit-and-the-pandemic-struck#xj4y7vzkg; Meanwhile, the populations of traditionally migrant-sending countries such as Lithuania have increased during and after the pandemic, primarily due to returning nationals (see: https://osp.stat.gov.lt/statistiniu-rodikliu-analize#/; https://123.emn.lt/).

[287] Eures (2023). Report on Labour shortages and surpluses. Luxembourg: Publications Office of the European Union.

[288] *Ibid*.

[289] European Commission, Directorate-General for Employment, Social Affairs and Inclusion (2022). Labour market and wage developments in Europe: annual review 2022. Luxembourg: Publications Office of the European Union.

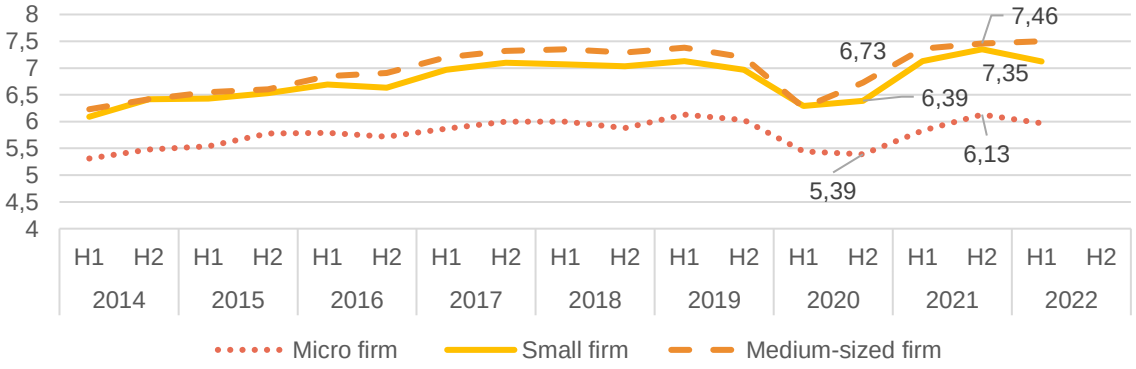
Figure 62. Perceptions of the difficulty accessing skilled staff in the previous six months (1-10) in the EU-27, by sector, 2014-2022 (SAFE)



Source: elaborated by PPMI, based on SAFE data.

Throughout the period studied, small and medium-sized firms reported greater difficulty in accessing skilled labour than micro-firms (see Figure 63). Micro-firms due to their size and scope, are generally less likely to hire full-time specialists. In this respect, looking for skilled staff becomes less of a priority for them compared with slightly larger firms. The figure further suggests that among respondents from small and medium-sized firms, the biggest increase in perceived difficulties in accessing skilled staff occurred in 2021.

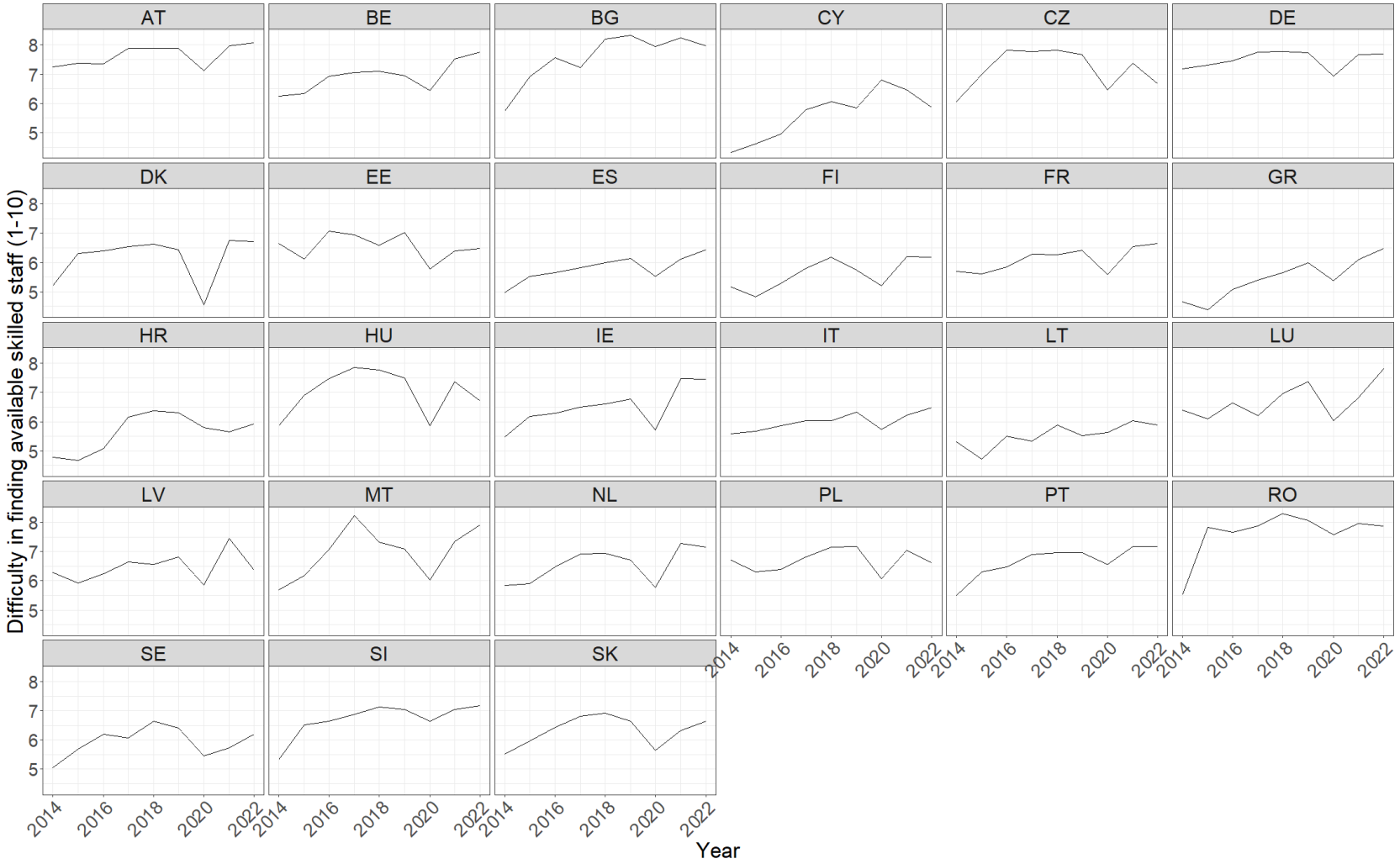
Figure 63. Perception in the severity of the problem in finding skilled staff in the previous six months (1-10) in the EU-27, by firm size, 2014-2022 (SAFE)



Source: elaborated by PPMI, based on SAFE data.
Note: data points refer to averages in the semi-annual surveys.

Lastly, significant inter-country variations are apparent in access to skilled labour: while this appears to be an important obstacle in countries such as Bulgaria, Germany and Romania, it is less of a problem in Spain, Italy, Lithuania and France (Figure 64).

Figure 64. Perceptions of the difficulty in accessing skilled staff in the previous six months (1-10) in the EU-27, by country, 2014-2022 (SAFE)



Source: elaborated by PPMI, based on SAFE data.

4.6.3. The effect of inflation and wage growth on firms' ability to access skilled staff

In this section, regression analysis is employed to estimate the effect of the three firm-level inflation indicators (production or labour costs; trends in labour costs; trends in other costs) on the difficulties experienced by firms in accessing skilled staff between 2014 and 2022.[290] The findings, reported in Table 26 in Annex 2, suggest that:

1. **Increases in production or labour costs are associated with increases in SMEs' difficulties in accessing skilled labour. The effect of labour costs is greater than the effects associated with other costs (e.g. materials, energy).**
2. **The risk of a price-wage spiral can be avoided even in the event of high-inflation scenarios in 2023-2024.**
3. **Although accessing skilled labour is most difficult in the construction and industry sectors, the effect of inflation is slightly stronger in the services and trade sectors, though this may be temporary. The small differential effect may be due to the structural nature of the problem in accessing skilled labour, which affects all ecosystems.**
4. **On average, the effect of increased production or labour costs on access to skilled labour is strongest among micro-businesses, compared with small and medium-sized firms, although the latter two groups experience more issues in accessing skilled labour overall.**

The effect of inflation on firms' ability to access skilled staff, and the risk of a price-wage spiral

As firms perceive their costs – whether related to production, labour, materials or energy – becoming a more critical problem, they also encounter greater difficulty finding skilled staff. This is demonstrated by the regression models presented in Table 26 in Annex 2. In particular, Model 2 shows that, for each point increase in SMEs' production or labour costs (as measured on a scale of 1 to 10), their difficulties in finding skilled staff increase by 0.39 points (also on a 10-point scale). Likewise, declaring that one's labour costs have increased, as opposed to decreased, is also associated with a higher level of difficulty in finding skilled staff, by 0.61 points (Model 5). Meanwhile, the effect on SMEs who declared increased trends in other costs (materials, energy) is 0.43 points (Model 6). Hence, difficulties in accessing skilled labour appear to be driven by increasing labour costs more than by other costs.

Given the importance of labour costs to firms' ability to access skilled labour, it is necessary to understand how wages will change in light of rising inflation. Wages and inflation are co-dependent: on the one hand, high inflation pushes workers to demand higher wages in order to make up for lost purchasing power; on the other hand, firms may need to raise prices to protect profit margins against higher wages.[291] As a result, the two can generate a feedback

[290] Please note that the response variable is on a bounded 1-10 scale, which means it should be analysed using ordinal regression models. However, for ease of interpretation, and given the large range of categories, linear regression models (OLS) were used. Tests of OLS assumptions confirm that the model abides by the linearity assumption. Note that this approach is justified in the literature, see Williams, R. (2022). Ordinal Dependent Variables. Available at: https://www3.nd.edu/~rwilliam/xsoc73994/OrdinalIndependent.pdf

[291] Boissay, F. et al. (2022). Are major advanced economies on the verge of a wage-price spiral? *BIS Bulletin No. 53.* Available at: https://www.bis.org/publ/bisbull53.pdf.

loop that contributes to keeping inflation high.[292] This loop is known as the '**price-wage spiral**', which is defined as a sustained parallel acceleration of both prices and wages.[293] As evidenced during the high-inflation period of the 1970s and 1980s, price-wage spirals pose substantial risks to firms and economies overall.

Nevertheless, the risk of a price-wage spiral in the EU during the current period of high inflation appears modest.[294] Unlike in the 1970s, central banks are now more independent of political influence and can make unpopular decisions that are nevertheless needed to control inflation – namely, they can raise interest rates.[295] This, in turn, lowers expectations that inflation will continue to rise, as evidenced by projections of inflation returning to desirable levels within the next two years (see Section 3.3) – which means that workers also feel less pressured to demand higher wages.[296]

Furthermore, automatic wage indexation is much less widespread than it was in the 1970s,[297] in part because rates of unionisation and the prevalence of collective agreements have dropped.[298] Indexation applies only to around 3 % of private sector employees in the euro area[299] and to only one-fifth of the euro area's public wage bill, although this proportion varies by country.[300] Belgium and Luxembourg are at the greatest risk of a price-wage spiral because both public[301] and private[302] wages are indexed automatically. According to a Belgium government representative who was interviewed, many businesses are indeed in distress precisely due to wage indexation, which is the subject of widespread debate, but is unlikely to be abandoned given that such a change would be politically unpopular. Instead, under the budget agreement for 2023 and 2024, Belgian authorities have decided to compensate employers for the impact of wage indexation. According to a representative who was interviewed, the government in Luxembourg has similar plans to cover part of the cost faced by firms as a result of wage indexation.

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[292] Suthaharan, N., & Bleakley, J. (2022). Wage-price Dynamics in a High-inflation Environment: The International Evidence. Reserve Bank of Australia Bulletin – September 2022. Available at : https://www.rba.gov.au/publications/bulletin/2022/sep/pdf/wage-price-dynamics-in-a-high-inflation-environment-the-international-evidence.pdf .

[293] Blanchard, O.J. (1986). The wage price spiral. *The Quarterly Journal of Economics*, *101*(3), 543-565; Alvarez, J. et al. (2022). Wage-Price Spirals: What is the Historical Evidence? *IMF eLibrary*, *221*(2022). Available at: https://www.elibrary.imf.org/view/journals/001/2022/221/article-A001-en.xml.

[294]Suthaharan, N., & Bleakley, J. (2022). Wage-price Dynamics in a High-inflation Environment: The International Evidence. Reserve Bank of Australia Bulletin – September 2022. Available at : https://www.rba.gov.au/publications/bulletin/2022/sep/pdf/wage-price-dynamics-in-a-high-inflation-environment-the-international-evidence.pdf; Harr, T., & Spange, M. (2023). Inflation – why did it rise and what are the drivers ahead? Danmarks Nationalbank Economic Memo 2023/3. Available at: https://www.nationalbanken.dk/en/publications/Documents/2023/02/InflationMemo_UDGIVELSE.pdf.

[295] Garriga, A.C. (2016). Central bank independence in the world: A new data set. *International Interactions*, *42*(5), 849-868; Corsello, F., Gomellini, M., & Pellegrino, D. (2023). Inflation and energy price shocks: lessons from the 1970s. Banca d'Italia. Available at: https://www.bancaditalia.it/pubblicazioni/qef/2023-0790/QEF_790_23.pdf?language_id=1.

[296] Harr, T., & Spange, M. (2023). Inflation – why did it rise and what are the drivers ahead? Danmarks Nationalbank Economic Memo 2023/3. Available at: https://www.nationalbanken.dk/en/publications/Documents/2023/02/InflationMemo_UDGIVELSE.pdf.

[297] *Ibid*.; Koester, G., & Grapow, H. (2021). The Prevalence of private sector wage indexation in theeuro area and its potential role for the impact of inflation on wages. ECB Economic Bulletin, 7/2021. Available at: https://www.ecb.europa.eu/pub/economic-bulletin/focus/2021/html/ecb.ebbox202107_07~f555b70c47.en.html.

[298] Trade union density – namely, the percentage of employees who are part of a trade union, fell from 20.9 % to 15.9 % between 2000 and 2018 in OECD countries, and from 34.1 % to 27.6 % in EU-27 countries during the same period. See: OECD (2023). Trade Union Dataset. Available at: https://stats.oecd.org/Index.aspx?DataSetCode=TUD.

[299] Koester, G., & Grapow, H. (2021). The Prevalence of private sector wage indexation in the euro area and its potential role for the impact of inflation on wages. ECB Economic Bulletin, 7/2021. Available at: https://www.ecb.europa.eu/pub/economic-bulletin/focus/2021/html/ecb.ebbox202107_07~f555b70c47.en.html.

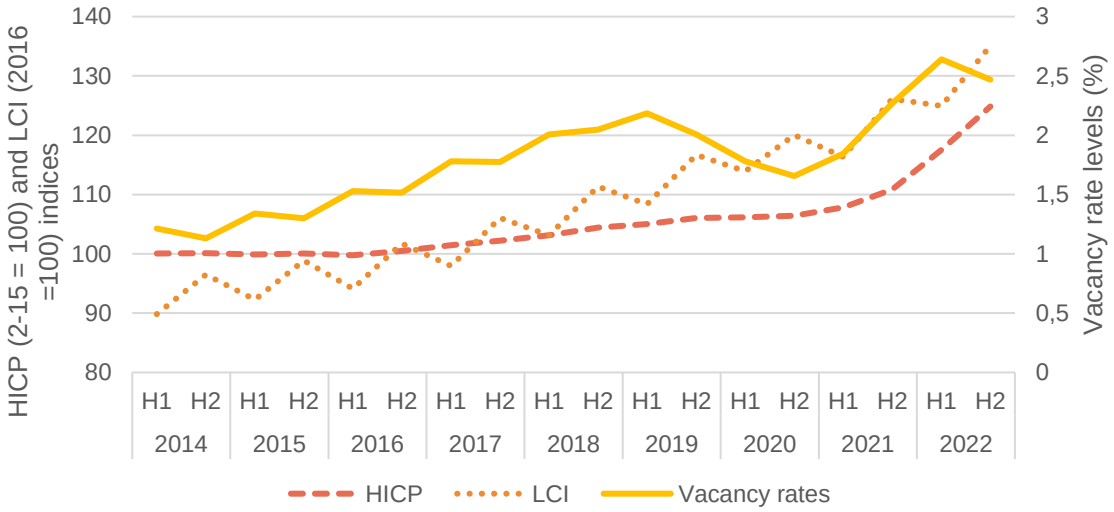
[300] Checherita-Westphal, C. (2022). Public wage and pension indexation in the euro area. ECB Economic Bulletin, 1/2022. Available at: https://www.ecb.europa.eu/pub/economic-bulletin/focus/2022/html/ecb.ebbox202201_08~ac43e1199c.en.html.

[301] *Ibid*.

[302] ECB (2008). Economic and Monetary Developments. Available at: https://www.ecb.europa.eu/pub/pdf/other/mb200805_focus05.en.pdf.

While a price-wage spiral is less likely to happen in other countries, given the lower prevalence of wage indexation,[303] the risk still remains. Expansionary fiscal policy – which was applied across the EU to help businesses and households shoulder increases in energy prices[304] – could contribute to inflation and, consequentially, to wage growth.[305] Indeed, a new forward-looking wage growth indicator based on salary listings in millions of job ads in France, Germany, Ireland, Italy, the Netherlands and Spain suggests that wage growth in October of 2022 reached 5.2 % year-on-year – more than three times pre-pandemic rate.[306] Similarly, the ECB indicator of wages negotiated in the euro area, which is not sensitive to the number of hours worked, increased in Q1 2023 at an annual rate of 4.4 % -- the highest reading since 1991 – while hourly labour costs rose by 5.3 % in the EU-27 and by 5.0 % in the euro area. The increase was strongest in services (5.8 %), followed by industry (5.5 %) and construction (4.4 %).[307] The accelerating rate of growth is also visible in the labour cost index (see Figure 65), which between 2020 and 2022 increased at twice the rate it had during the previous two years.

Figure 65. Inflation and LCI indices compared with vacancy rates (%) in the EU-27, 2014-2022



Source: elaborated by PPMI, based on Eurostat data.
Note: HICP and LCI based on indices (left vertical axis); vacancy rates are expressed in terms of the share for each semester (right vertical axis).

[303] Harr, T., & Spange, M. (2023). Inflation – why did it rise and what are the drivers ahead? Danmarks Nationalbank Economic Memo 2023/3. Available at: https://www.nationalbanken.dk/en/publications/Documents/2023/02/InflationMemo_UDGIVELSE.pdf; Checherita-Westphal, C. (2022). Public wage and pension indexation in the euro area. ECB Economic Bulletin, 1/2022. Available at: https://www.ecb.europa.eu/pub/economic-bulletin/focus/2022/html/ecb.ebbox202201_08~ac43e1199c.en.html; ECB (2008). Economic and Monetary Developments. Available at: https://www.ecb.europa.eu/pub/pdf/other/mb200805_focus05.en.pdf; industriAll Europe (2022). *High inflation – Some workers get automatic compensation*. Available at: https://news.industriall-europe.eu/documents/upload/2022/10/638010964303258417_E%20and%20LU%20-%20Wage%20indexation.pdf.

[304] Based on written responses submitted by SME envoys and the SME envoy report, see: European Commission (2022). SMEs and rising energy prices – A report by the SME Envoy Network, First findings & recommendations. Available at: https://ec.europa.eu/transparency/expert-groups-register/core/api/front/expertGroupAddtitionalInfo/46083/download.

[305] Harr, T., & Spange, M. (2023). Inflation – why did it rise and what are the drivers ahead? *Danmarks Nationalbank Economic Memo 2023/3.* Available at: https://www.nationalbanken.dk/en/publications/Documents/2023/02/InflationMemo_UDGIVELSE.pdf.

[306] Adrjan, P., & Lydon, R. (2022). Wage Growth in Europe: Evidence From Job Ads. *Central Bank of Ireland Economic Letter 7/2022.* Available at: https://www.centralbank.ie/docs/default-source/publications/economic-letters/wage-growth-europe-evidence-job-ads.pdfhttps://ideas.repec.org/p/cbi/ecolet/7-el-22.html.

[307] European Commission (2023). European Economic Forecast - Summer 2023. Institutional Paper 255 | September 2023, Paragraph 1.5.2. Labour market developments.

Nevertheless, as both the figure and the associated correlations show,[308] increases in LCI follow increases in both HICP and vacancy rates. This is important, because inflation is projected to decrease (see Section 3.2) and vacancy rates had already dropped in the second half of 2022, suggesting that wage growth should slow too. A recent ECB study also suggests that although wage growth is expected to be strong in the near term, beyond that, uncertainty about the economic outlook is likely to exert downward pressure on wage growth.[309] Analyses by the IMF have also shown that in the majority of historical cases concerning wage-price spirals, inflation and nominal wage growth tended to stabilise, and that an acceleration of nominal wages should not necessarily be seen as a sign that a wage-price spiral is currently taking hold.[310]

Lastly, an unexpected effect of increased inflation is that, by making access to skilled labour more difficult, it pushes firms to invest more in automation and digitalisation, thus bypassing higher wage costs (see Section 4.3).

Effects by sector

Increases in production or labour costs have, on average, a slightly stronger effect on the difficulty of accessing skilled labour in the **services and trade sectors**, compared with the industry sector. According to one interviewee, wage increases affect the services sector the most. Meanwhile, another interviewee suggested that it is particularly difficult to meet labour shortages in the wholesale retail sector, especially in those countries where wages are indexed to inflation.

In contrast, no difference is found between the effect of inflation on firms in industry and in construction (Model 3). Nevertheless, it should be noted that, regardless of production or labour costs, accessing skilled labour in construction has long been a structural challenge. The scarcity of skilled labour in this sector was identified by many interviewees as one of the drivers of inflation. Moreover, according to one industry expert, in countries such as Poland and other Southern and Eastern European Member States, nominal increases in wages have pushed **many SMEs to transition into the informal economy** by hiring workers without contracts in order to cut labour costs.

Similar findings from qualitative evidence on the importance of structural challenges in accessing skilled labour also apply to manufacturing industries. In the electronics ecosystem, interviewees noted that SMEs are facing difficulties in recruiting staff with specific expertise in AI. Often, AI specialists are moving to work for large companies in Europe or the US, where employment packages are more generous. Another problem is a general lack of new talent entering the European electronics sector, leading to medium- to longer-term recruitment problems.

Likewise, in textiles, interviewees noted that the availability of skilled labour is a structural issue: the share of young employees in the textile ecosystem is falling, and the ecosystem is facing the trend of an ageing workforce. These are structural trends affecting the ecosystem, and are not associated with the present inflationary context.

In agri-food, representatives of SMEs who were interviewed said they had faced challenges in accessing skilled labour in recent times, partly because the level of inflation had increased recruitment costs, but also due to other factors such as the COVID-19 pandemic and an ageing

[308] The correlation between HICP and LCI is r = 0.90, whereas it is r = 0.93 when HICP is lagged by one period. Likewise, the correlation between vacancy rates and LCI is r = 0.82, which increases to r = 0.86 when lagging vacancy rates by one period. However, these correlations are not a formal test of causality.

[309] Bodnár, K. et al. (2022). Wage developments and their determinants since the start of the pandemic. ECB Economic Bulleting, 8/2022. Available at : https://www.ecb.europa.eu/pub/economic-bulletin/articles/2023/html/ecb.ebart202208_02~2328747465.en.html#toc6

[310] Alvarez, J. et al. (2022). Wage-Price Spirals: What is the Historical Evidence? *IMF eLIBRARY 221*(2022). Available at: https://www.elibrary.imf.org/view/journals/001/2022/221/article-A001-en.xml.

workforce, rural locations, as well as structural and technological changes that have led to an increased demand for highly skilled labour in agricultural production.

Effects by size of firm

With regard to the effect of inflation by firm size, as production or labour costs increase, **micro-firms claim that access to skilled labour becomes more difficult to a larger degree than small and medium-sized firms** (Model 4). Qualitative research further shows that SMEs are particularly prone to suffering from 'poaching externalities'.[311] In a situation where many employers demand particular skillsets and qualifications, these skills are considered transferrable, and firms – in particular, those whose resources are constrained – will be hesitant to invest in such skills because trained and qualified personnel may then be poached by other competing firms. In such situations, trained employees could demand a higher wage from the new employer. These externalities are particularly relevant because, in general, SMEs pay lower salaries than large enterprises. More importantly, an excess demand is already in place for ICT competencies, as well as professionals will skills relating to the digital and green transitions. It is thus not surprising that inability to compete with the offers by other (presumably larger) employers in terms of wage, benefits and work flexibility was the top third reason for skill shortages among SMEs in 2023.[312] As such, SMEs' lack of visibility and awareness compared with large enterprises is another critical barrier preventing the former from accessing skilled staff.[313]

4.6.4. Simulating the effect of inflation on future access to skilled labour

This simulation exercise proceeded according to two steps: first, the research team projected the impact of inflation on production or labour costs; then, in a second step, the impact of these costs on access to skilled labour was estimated. [314]

Figure 66 shows the simulated impact of inflation on the SMEs' ability to access skilled labour in **the baseline scenario**. The inflationary pressure that began in the second half of 2021 has contributed to a gradual increase in production or labour costs. On a scale from 1 to 10, the analysis indicates that SMEs are likely to attribute a value close to 7 for the second half of 2022 and the first half of 2023 (that is, around 0.25 points higher than for the first half of 2022), suggesting that these costs will remain a primary concern for firms at least until the end of 2023 (red bars in Figure 66). In 2022, these concerns were driven by exceptionally high energy costs. By contrast, since early 2023 they have been driven in particular by wage growth aimed at recouping losses of purchasing power, and by increasing costs related to food processing.[315]

Beginning in the first half of 2024, the baseline scenario sees a decrease in production or labour costs along with a parallel and gradual reduction in inflation towards target levels. However, the simulations show that production or labour costs will remain higher than those

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[311] Jansen, M., & Lanz, R. (2021). Skills and Export Competitiveness for Small and Medium-Sized Enterprises. Available at : https://www.wto.org/english/tratop_e/devel_e/a4t_e/global_review13prog_e/skills_and_export_competitiveness_e.pdf.

[312] European Commission (2023). Flash Eurobarometer 537: SMEs and skills shortages, summary. Available at: https://europa.eu/eurobarometer/surveys/detail/2961, p. 7.

[313] ECB (2019), Export activities of euro area SMEs: insights from the Survey on the Access to Finance of Enterprises (SAFE), Economic Bulletin, Issue 8/2019; European Committee of the Regions (2019). EU policy framework on SMEs: state of play and challenges. https://cor.europa.eu/en/engage/studies/Documents/EU-SMEs/EU-policy-SMEs.pdf.

[314] Results of econometric models and macroeconomic projections for the euro area released by the ECB in spring 2023, and the European Commission 2023 Summer Forecast: ECB (2023). ECB staff macroeconomic projections for the euro area. March 2023; European Central Bank, https://www.ecb.europa.eu/pub/projections/html/ecb.projections202303_ecbstaff~77c0227058.en.html; profit margins are an additional main component of current inflation, and are expected to continue to expand in the second half of 2023, reflecting a high pass-through of cost pressures in a high inflation environment, before being squeezed in 2024. For details, see: European Commission (2023, September). European Economic Forecast – Summer 2023. Institutional Paper 255 | September 2023, Paragraph 1.5.2. Labour market developments.
ECB (2023). ECB staff macroeconomic projections for the euro area. March 2023. European Central Bank, Chapter 3, Prices and Costs.

recorded in the pre-pandemic period around 2019 (Figure 66). Similarly, the ECB forecasts that wage growth and unit labour costs will continue to increase during 2023, before slowing down due to the more restrictive monetary policy in the euro area (see the previous section).

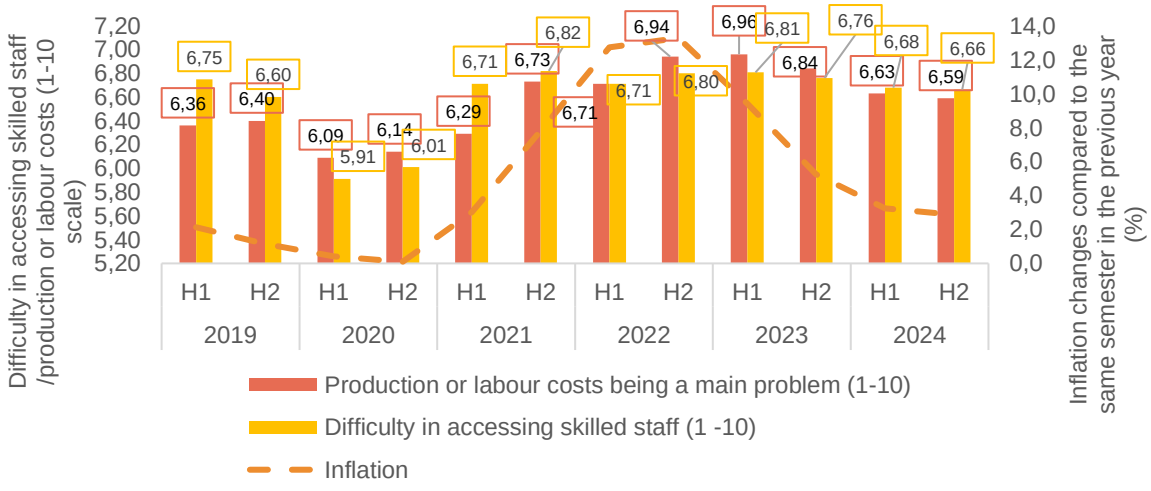
The impact of inflation on production or labour costs is expected to maintain the existing high levels of difficulty in accessing qualified personnel by SMEs over the simulated time horizon (yellow bars in Figure 66). In general, as the findings of the previous section show, **accessing skilled staff is a long-term, structural barrier for SMEs. It is therefore expected to remain an obstacle in the near future in each of the three scenarios considered in this analysis,** and is **only partially linked to the economic cycle**. Put differently, inflation directly impacts production and labour costs; but its second-order effect on access to skilled labour is weaker, due to the intervention of other, structural factors.

This relationship is visible in Figure 66. Using the same scale from 1 to 10 employed for the measurement of production or labour costs, the simulation suggests that by the end of 2024, difficulty in accessing skilled labour is expected to be around 6.7 out of 10 – a similar level to that seen in 2019, prior to the pandemic, and in 2021 before inflation pressure (yellow bars). Accordingly, this analysis corroborates evidence that it is the combination of inflation, monetary policy (which also influences SMEs' investment decisions), labour market imperfections, and the structural barriers described above, that make it harder to attract skilled labour for SMEs – rather than just inflation alone.

In line with this argument, the difficulty in accessing skilled labour experienced by SMEs **in the pessimistic scenario** will remain close to the trend observed in the baseline scenario. Tighter monetary policy and relatively high inflation will negatively affect production, labour and financial costs, but with limited additional impact on the access to qualified labour.

In the highly adverse scenario, it is possible to assume that difficulties in accessing skilled labour will be further exacerbated. These are likely to be higher than in 2022, although no quantitative estimates can be provided.

Figure 66. Simulated effect of inflation (as measured by production or labour costs) on access to skilled labour, baseline scenario, 2019-2024

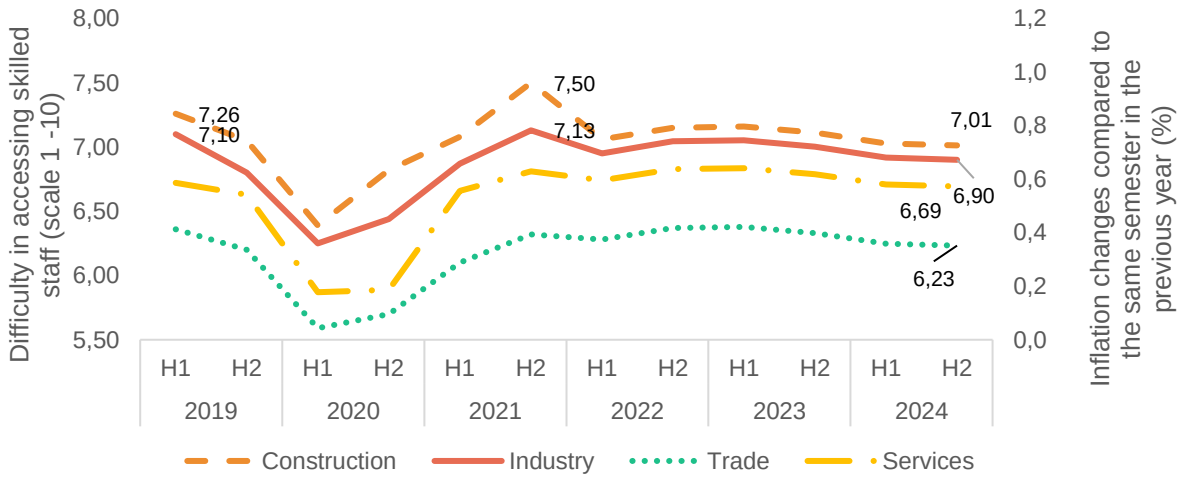


Source: elaborated by CSIL, based on PPMI estimations.
Note: H2/2022 to H4/2024 are projections.

Moving to effects at sectoral level, Figure 67 illustrates difficulty in accessing skilled labour on a scale from 1 to 10 for each sector, as in the SAFE survey. **The general trend previously**

discussed will apply to each sector. In the baseline scenario, as inflation (measured in terms of production and labour costs) is expected to decrease gradually, SMEs' expectations regarding access to qualified labour will improve gradually, but only to a limited extent – returning, by the end of 2024, to the already high levels seen in 2019. Indeed, long-standing differences between sectors will remain, because the recruitment of qualified staff by SMEs depends on the structural characteristics of the labour market in each sector, as well as on medium- to long-term investment trends, with SMEs in the industry and construction sectors experiencing greater difficulties.

Figure 67. Simulated effect of inflation (as measured by production or labour costs) on access to skilled labour by sector, baseline scenario, 2019-2024



Source: elaborated by CSIL, based on PPMI estimations.
Note: H2/2022 to H4/2024 are projections.

Companies of all sizes, particularly SMEs, are embracing drastic changes, such as adopting data-driven AI solutions; new approaches to digital marketplaces; e-commerce and supply chain strategies; and, importantly, new or substitution of staff (see Section 4.3). Skilled staff are necessary for the digital transformation of manufacturing processes, and innovation to avoid the loss of a competitive position. Studies from European countries confirm the importance of skills shortages as a barrier to innovation in the industry, specifically in the manufacturing sector. **The deterrent effect of skills barriers is more severe in more technologically advanced countries where demand for skilled labour is higher**, but also depends on the level of technology in question.[316] In the future, the acceleration of digital transformation, automation, and the transition to climate neutrality are expected to make competition for qualified workforce tougher, particularly for SMEs in the industry sector.[317]

Similarly to industry, the construction sector has historically experienced greater difficulty in accessing skilled labour, as well as higher labour and production costs. The present analysis

[316] Belitz, H., & Lejpras, A. (2016). Financing patterns of R&D in small and medium-sized enterprises and the perception of innovation barriers in Germany. *Science and Public Policy*, *43*(2), 245-261; Gardocka-Jałowiec, A., & Wierzbicka, K. (2019). Barriers to creating innovation in the polish economy in the years 2012–2016. *Studies in Logic, Grammar and Rhetoric*, *59*(1), 211-225; Madeira, M.J., Carvalho, J., Moreira, J., & Duarte, F.A. (2017). Barriers to Innovation and Innovative Performance of Portuguese Firms. XXVII *Jornadas Hispano-Lusas Gestión Científica*; Hölzl, W., & Janger, J. (2014). Distance to the frontier and the perception of innovation barriers across European countries. *Research Policy*, *43*(4), 707-725.

[317] Competence and skill development in a context of the green and digital transition. Available at: https://www.eesc.europa.eu/en/our-work/opinions-information-reports/opinions/competence-and-skill-development-context-green-and-digital-transition.

suggests that this situation is unlikely to improve in the short term, due to other contributing factors.

The ongoing implementation of information technologies in the construction sector (referred to as 'Construction 4.0') is expected to change the management of construction projects due to the **increased automation of operations**. Consequently, demand for qualified personnel in the fields of architecture, engineering and construction is expected to increase in addition to demand for unskilled individuals. Despite the increasing significance of the construction industry in terms of employment and added value to GDP, younger and more qualified people do not appear to be attracted to the sector, making it challenging to meet current and future needs for a skilled workforce.[318] The limited duration of employment contracts, limited career prospects, and the less attractive image of the construction industry compared with prospective careers in other sectors such as business, computer-based activities, health and education, are the factors that limit the appeal of the sector compared with others.[319]

4.6.5. Conclusions regarding access to skilled labour

Overall, the above analyses suggest that **firms with higher production or labour costs also encounter more difficulties in accessing skilled staff**. The impact of labour costs is greater than that of costs associated with energy or materials. Given the importance of labour costs in relation to access to skilled labour, the research team further conducted an investigation into how wage growth is expected to develop in the near-term. The risk of a price-wage spiral is found to be modest across the EU overall, although those countries in which automatic wage indexation is most prevalent – namely, Belgium and Luxembourg – are more at risk than others, and thus require additional interventions from the state.

Moreover, the regression findings suggest that the effect of increases in the perceived severity of production or labour costs is slightly stronger among firms in the services and trade sector compared with industry. Nevertheless, interviews with key stakeholders highlighted the **deeply structural challenge of accessing skilled labour**, especially in manufacturing industries and in construction. Likewise, trends suggest that small and medium-sized enterprises are more likely to find access to skilled labour a problem compared with micro-firms, due to their more urgent need for full-time specialists. However, the regression results also suggest that, as labour and production costs increase, the impact on micro-firms becomes greater in terms of their difficulty in accessing skilled labour. In a transformation period during which the digital and green transitions are driving up demand for new skills, this may have important implications for the ability of micro-firms to grow and remain competitive.

In a scenario in which inflation is expected to remain high but then gradually decrease over the next two years, the analysis shows that the role played by inflation in SMEs' ability to access skilled labour is expected to fade out. In contrast, other factors linked to SMEs' structural characteristics (lack of human resources policies, lower wages compared with large enterprises, and poaching externalities) will continue to drive the problems they experience in accessing qualified personnel. On top of these factors, ongoing structural challenges and profound changes in the manufacturing, industry and construction sectors are expected to increase competition to recruit a qualified, skilled workforce.

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[318] Brucker Juricic, B., Galic, M., & Marenjak, S. (2021). Review of the Construction Labour Demand and Shortages in the EU. *Buildings*, *11*(1), 17; Vula Rizvanolli, B. (2022). Overview Article – Fostering the demand for a skilled labour force in the construction industry. Article Available at the European Commission website: https://build-up.ec.europa.eu/en/resources-and-tools/articles/overview-article-fostering-demand-skilled-labour-force-construction; in 2021, the construction industry employed 13 million people in the EU-27, accounting for 29.8 % of total industrial employment, and generating 11.1 % of GDP in the EU-27.

[319] Vula Rizvanolli, B. (2022). Overview Article - Fostering the demand for a skilled labour force in the construction industry. Available at: https://build-up.ec.europa.eu/en/resources-and-tools/articles/overview-article-fostering-demand-skilled-labour-force-construction.

4.7. Profitability

Studying the s of inflation on late payments, bankruptcies, investments, participation in public procurement and access to skilled labour separately makes it difficult to understand the extent to which inflation affects SMEs overall: all of these effects hit SMEs at the same time. Therefore, the final impact explored in this report is profitability. Profitability affects all other impacts: less profitable firms are more likely to make payments late, given that their cushion for absorbing delayed payments is smaller; firms that are not making profits are also at a higher risk of bankruptcy. Investment – whether in green and digital innovations, or the resources needed to bid for public procurement contracts – becomes more difficult for less profitable firms due to their reduced internal financing capacity. Lower profits also mean that firms' ability to offer higher wages deteriorates, leading to difficulties in accessing skilled labour. By exploring the effect of inflation on profitability, therefore, this report sheds light on how SMEs are faring in general in the current high inflation environment.

Profits can be driven up by both internal factors (e.g. fixed costs, access to finance, capacity utilisation, investment in R&D and innovation, firm size and structure),[320] as well as external ones (e.g. market competition, economic environment, public intervention).[321] Among the latter, higher inflation rates can increase production costs and reduce consumer demand, thereby squeezing profit markups.[322] However, if firms are able to pass rising production costs on to customers, they can actually increase their profits.

Key points

- Inflation initially reduces profit margins, but it then increases profitability if firms are able to pass costs down to consumers. These findings explain the trends observed: after falling from 41.8 % in Q4 2021 to 41.5 % in Q2 2022, the gross profit share of non-financial corporations has hit record levels in Q1 2023 – equivalent to 42.0 %. This signals the risk of a profit-inflation spiral, whereby inflation is driven by the excessively increased mark-ups firms choose in order to maintain their profit growth.
- However, the overall increase in profitability referred to above masks substantial differences between firms. The ability of firms to pass costs on to consumers depends on their position within the value chain, how sensitive the demand for specific products is to price changes, types of clients, firm size and ecosystem.
- Most data sources suggest that firms in agri-food and energy-intensive industries have seen the greatest increases in profitability over the last two years. Meanwhile, businesses that are unable to pass on costs are more often SMEs, whose survival may be at risk when the cumulative impacts of inflation are considered. In 2023, only

[320] For instance, on access to finance, see: McKenzie, D., & Woodruff, C. (2008). Experimental evidence on returns to capital and access to finance in Mexico. *World Bank Economic Review*, *22*(3), 457-482; on firm size, see: Hall, M., & Weiss, L. (1967). Firm size and profitability. *Review of Economics and Statistics*, *49*(3), 319-331, and Becker-Blease, J.R., Kaen, F.R., Etebari, A., & Baumann, H. (2010). Employees, firm size and profitability of US manufacturing industries. *Investment Management and Financial Innovations,* 7(2), 7-23; on the utilisation of capacity, see: Coelli, T., Grifell-Tatjé, E., & Perelman, S. (2002). Capacity utilisation and profitability: A decomposition of short-run profit efficiency. *International Journal of Production Economics*, *79*(3), 261-278.

[321] On market competition, see: Ammann, M., Oesch, D., & Schmid, M.M. (2013). Product market competition, corporate governance, and firm value: Evidence from the EU area. *European Financial Management*, *19*(3), 452-469; on the economic environment and public intervention, see: Xu, J., Akhtar, M., Haris, M., Muhammad, S., Abban, O.J., & Taghizadeh-Hesary, F. (2022). Energy crisis, firm profitability, and productivity: An emerging economy perspective. *Energy Strategy Reviews*, *41,* doi: https://doi.org/10.1016/j.esr.2022.100849, and Agiomirgianakis, G.M., Magoutas, A.I., & Sfakianakis, G. (2013). Determinants of profitability in the Greek tourism sector revisited: The impact of the economic crisis. *Journal of Tourism and Hospitality Management*, *1*(1), 12-17.

[322] McCann, F., & McGeever, N. (2022). Enterprise policy issues for distressed businesses following the unwinding of pandemic supports. Central Bank of Ireland Working Paper No. 9/FS/22. Available at: https://www.centralbank.ie/docs/default-source/publications/financial-stability-notes/enterprise-policy-issues-distressed-businesses-following-unwinding-pandemic-supports.pdf; Roman, T., Marcu, N., Rusu, V.D., Doacă, E.M., & Siriteanu, A.A. (2023). Tax Payment and the Performance of SMEs: A Longitudinal Analysis on EU Countries. *Sustainability*, *15*(2), 927.

62 % of EU firms said that passing costs on to consumers is a strategy to deal with the recent developments in the energy market, although fewer than 50% of firms in the textiles and retail ecosystems agreed, against over 70% in transportation and almost 80% in agri-food. Even within the ecosystems, some firms are better positioned to pass costs on to consumers. This was the case of food processing manufacturers in agri-food and luxury brands in textiles, both of which enjoyed a less elastic demand.

- Reduced rate of GDP growth, increased interest rates, reduced turnover and late payments are associated with decreases in profitability, which is why profit margins are expected to drop over the next two years across all scenarios. Specifically, in the baseline scenario, a slight decline in profit margins is already expected in 2023 and will continue into 2024, lowering them to between 4 % and 5%. In the pessimistic scenario, profit margins will still remain positive by 2024, although they will be lower, at around 3 %. In the highly adverse scenario, profit margins will become negative, falling to as low as -5 %.

4.7.1. Data and indicators for profitability

The data on profitability used come from ECB SAFE (2014-2022, on a semi-annual basis), Orbis (2013-2021, on a yearly basis), and Eurostat and the ECB (2008-2022), which includes some country-level data on firms' gross profits. In particular, this section focuses on three main indicators:

1. the **gross profit share of non-financial corporations** in 19 European Union Member States (Eurostat and the ECB);[323]
2. whether a **firm's profit decreased, remained unchanged or increased** over the previous six months (SAFE);[324]
3. the firm's **profit margins**, measured as the ratio between profit/losses before taxes and operating revenues (Orbis).[325]

Different indicators are suitable for different empirical settings, detailed in Table 5. For instance, to nominally quantify profit, the Eurostat/ECB indicator on gross profit shares is the most suitable as it comes from official statistical data, although it is only available at country level. The SAFE indicator provides company-level data up to 2022, but does not quantify what level of profits firms are achieving. This is instead possible with the Orbis indicator, which is, however, temporally limited, as it only covers the years up to 2021. By combining insights from these three datasets, the section provides a more holistic overview of how firms' profitability is affected by rising inflation.

[323] The precise indicator is gross operating surplus as a percentage of gross value added, based on four-quarter-cumulated sums.
[324] For ease of interpretation, the regression models using SAFE data will employ a binary variable where 1 = the firm declared increased profits in the previous six months, and 0 = otherwise. However, Model 11 also presents the results from an ordered logit model, in which the response variable is unchanged. The results hold for this specification as well. However, one should be cautious in interpreting the findings from the ordered logit model, since the assumption of proportional odds (jumping from one category to another in the response variable) is not always met in this case.
[325] Two further variables from Orbis are also tested as robustness checks. The first is the firm's return on equity (ROE), measured by the ratio between net income and shareholders' equity. The second is the firm's return on capital employed (ROCE), which measures the amount of profit a company generates for each EUR of capital employed. Please note that both ROE and ROCE include wrongly inputted values at the lower and upper bounds of -999 and 999, respectively. For this reason, the sample was trimmed so that the bottom and top 0.5 % of observations for these variables are deleted. This creates new ranges of -320 to 300 for ROE, and of -170 to 170 for ROCE. The correlation between profit margins and ROE is r = 0.93, and with ROCE it is r = 0.99, whereas the correlation between ROE and ROCE is r = 0.89.

Table 5. Pros and cons of different measures of profitability

Indicator	Description	Pros	Cons
Gross profit share of non-financial corporations (Eurostat/ECB)	Gross operating surplus as a percentage of gross value added, based on four-quarter-cumulated sums	• Official statistics, so the most reliable indicator • Data available for 2008-2022	• Available only at the country level • Not possible to break down by firm size or ecosystem
Declaring decreased, unchanged, or increased profits (SAFE)	Whether a firm's profits have decreased, increased or remained unchanged in the previous six months	• Data available for 2014-2022 • Data are semi-annual, providing more granularity • Data can be broken down by firm size and sector	• Subjective measure of profitability • Unable to quantify profits • Does not include large firms
Profit margin (Orbis)	Profit margin, measured as the net profit before taxes over the total operating revenues	• Objective measure of profitability • Clear quantification of the profit margin • Data can be broken down by firm size and ecosystem	• Lack of observations for 2022 (2013-2021) • Excludes micro enterprises

Source: elaborated by PPMI.

The inflation variable is measured in the same ways as in previous chapters, which have employed Orbis and SAFE data. For Orbis, the inflation variable is as described in Section 3.1. Meanwhile, for SAFE, due to the semi-annual nature of the dependent variable – the respondents' perceived importance of production or labour costs as a problem – a scale of 1 to 10 is used. This has been discussed in greater depth in Section 4.6.1.[326] Lastly, in relation to the Eurostat/ECB data, due to the macro-level nature of gross profit shares, which lacks information on inflation at sectoral level, the research team employed changes in the HICP compared with the same quarter in the previous year, lagged by two quarters to address potential issues of reverse causality.

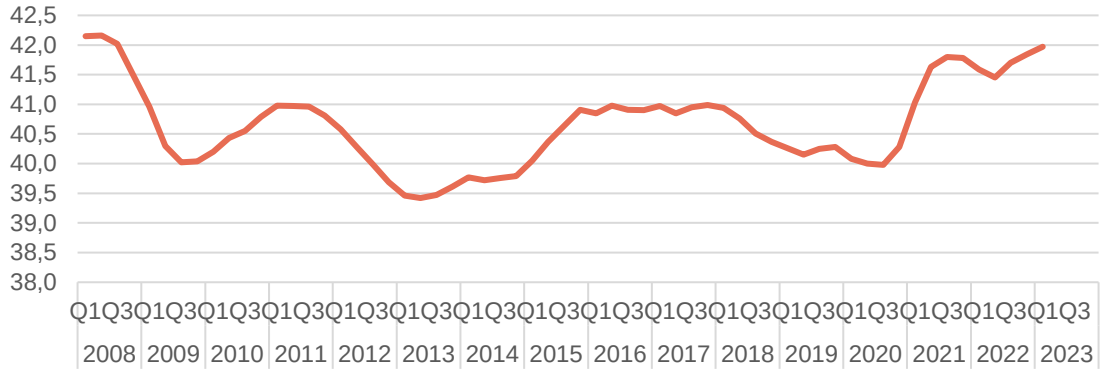
4.7.2. Trends in profitability

After falling in 2020 during the pandemic, the gross profit share of non-financial corporations increased sharply in 2021 – to the highest level observed in the past decade – before decreasing again slightly in the first half of 2022.[327] This is supported by all of the data sources reviewed (see Figure 68, Figure 69 and Figure 70 below). Nevertheless, Eurostat and ECB data suggest that **profitability began to increase again in the second half of 2022**, with some members of the ECB highlighting the risk of a **profit-price spiral**.[328] The European Economic Forecast suggests that in 2022, unit profits grew at the fastest rate since 2005, with an annual increase of 9.3 %.[329] Unit profits have increased faster than unit

[326] As in previous chapters, 'production or labour costs' is used as shorthand for this variable to avoid the repetition of 'perceived importance'. Nevertheless, it is good to bear in mind that this SAFE variable represents a subjective measurement of effective production or labour costs.
[327] It should be noted, however, that marked differences in the levels of profit shares exist between countries, with Ireland leading the way, averaging around 75 %, thanks to a number of large multinational corporations being based in this country. The share is far lower in France, amount to around 32 % of the average gross profit share.
[328] A profit-price spiral functions in a similar way to the wage-price spiral discussed in Section 3.5. Essentially, inflation becomes driven by the fact that firms are continually raising prices to maintain their profit margins. For more information, see: ECB (2023). *New York Times* interview with Fabio Panetta, Member of the Executive Board of the ECB. Available at: https://www.ecb.europa.eu/press/inter/date/2023/html/ecb.in230401~ec65174af7.en.html.
[329] For details, see: https://ec.europa.eu/economy_finance/forecasts/2023/spring/Box_I_2_3-Profit%20margins%20and%20their%20role%20in%20euro%20area%20inflation.pdf.

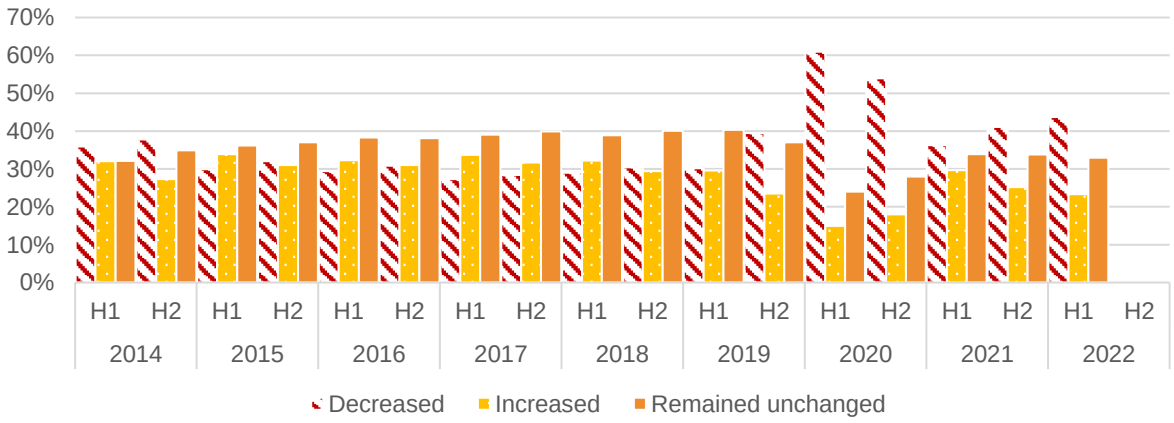
labour costs since the beginning of 2022.[330] In the US, too, firms have started to post record high profits.[331]

Figure 68. Gross profit share of non-financial corporations in 19 EU Member States (%), Q1 2008 – Q1 2023 (Eurostat/ECB)



Note: changes are measured compared with the same quarter in the previous year.
Note: gross profit share is defined as the gross operating surplus divided by gross value added, based on four-quarter-cumulated sums.

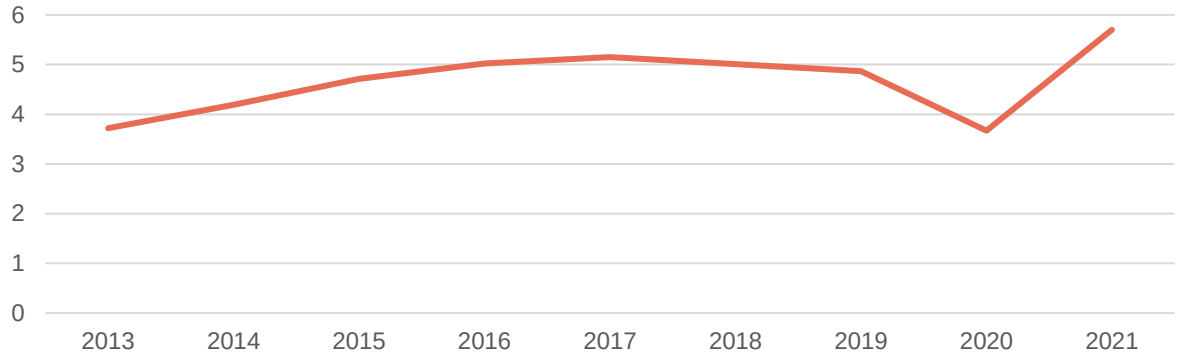
Figure 69. Trends in the share of respondents declaring decreased, increased, or unchanged profits (%) in the EU-27 for all firms, 2014-2022 (SAFE)



Source: elaborated by PPMI, based on SAFE data.

[330] ECB (2023). How tit-for-tat inflation can make everyone poorer. Available at: https://www.ecb.europa.eu/press/blog/date/2023/html/ecb.blog.230330~00e522ecb5.en.html.
[331] Axios (2021). Corporate profit margins at record high despite rising costs. Available at: https://www.axios.com/2021/08/11/profit-margins-record-high-rising-inflation.

Figure 70. Trends in average profit margin (%) in the EU-27, 2013-2021 (Orbis)

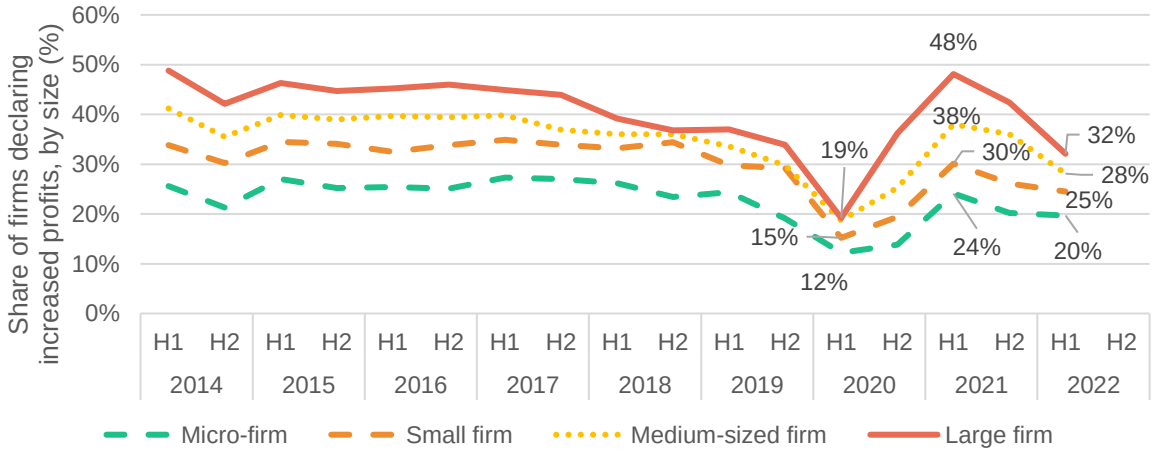


Source: elaborated by PPMI, based on Orbis data.
Note: Malta and Luxembourg are excluded from Orbis data due to their small number of firms.

The key question in the context of the present report is whether the rise in profitability observed in 2021 and 2022 is driven by SMEs or by large firms, with different data sources pointing to mixed conclusions. One the one hand, gross profit shares are much larger in Ireland than elsewhere (75 % vs 45 % across the EU as a whole), and the Irish economy is characterised by the presence of several large multinational corporations. Furthermore, SAFE data suggest that the larger the firm, the more likely it is to declare increased profits throughout the period studied (see Figure 71). In particular, the post-pandemic increase in profits was highest for large firms (an increase of 29 percentage points), and smallest for micro-firms (an increase of 12 percentage points). While 2022 observations were not yet available for the Orbis data at the time of the analyses, Figure 72 also appears to suggest that the post-pandemic increase in profit margins has been slightly greater for large firms (2.13 percentage points) than for small firms (2.1 percentage points).

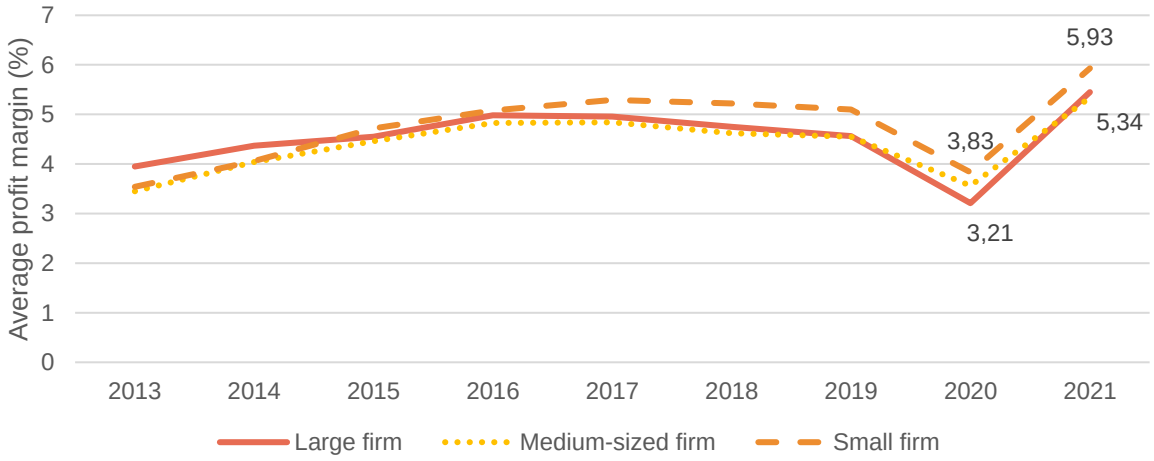
Conversely, SAFE data suggest that large firms suffered the most as a result of inflation and the Russian war of aggression against Ukraine, which saw the share of firms declaring increased profits decline by 16 percentage points between 2021 and 2022, compared with a fall of 4 percentage points for micro-firms, a 5-percentage point reduction for small firms, and a 10-percentage point decrease for medium-sized firms (Figure 71). Orbis data also portrays higher overall profit margins for small and medium-sized firms compared with large firms, beginning from around 2017 (Figure 72). These contradictions could be explained by the fact that the SAFE survey asks about *overall* profits – which may be greater in large firms, even if their profit margin is lower on average than that of SMEs.

Figure 71. Trends in the share of respondents declaring increased profits in the EU-27, by firm size, 2014-2022 (SAFE)



Source: elaborated by PPMI, based on SAFE data.

Figure 72. Trends in profit margins (%) in the EU-27, by firm size, 2013-2021 (Orbis)



Source: elaborated by PPMI, based on Orbis data.
Note: Malta and Luxembourg are excluded due to their small number of firms.

According to the SAFE data all sectors (with the exception of services) present similar trends in terms of falls in profitability during the COVID-19 pandemic, a subsequent increase, and an eventual decline during the first half of 2022. The services sector stands out in that the share of firms declaring increasing profits continued to rise in the first half of 2022, unlike in other sectors. This is probably because the services sector was less vulnerable to energy price increases and supply chain disruptions.[332]

Despite similar trends overall, differences exist between sectors in terms of the magnitude of changes in firms' profitability. Between the first half of 2021 and the first half of 2022, the self-reported profitability of firms in the **industry and trade sectors decreased the most**, with respective falls of 12 and 11 percentage points in the shares of firms declaring increased profits – compared with only 6 and 4 percentage points in construction and services, respectively. This is also supported by trends regarding the firms whose self-reported profits decreased.

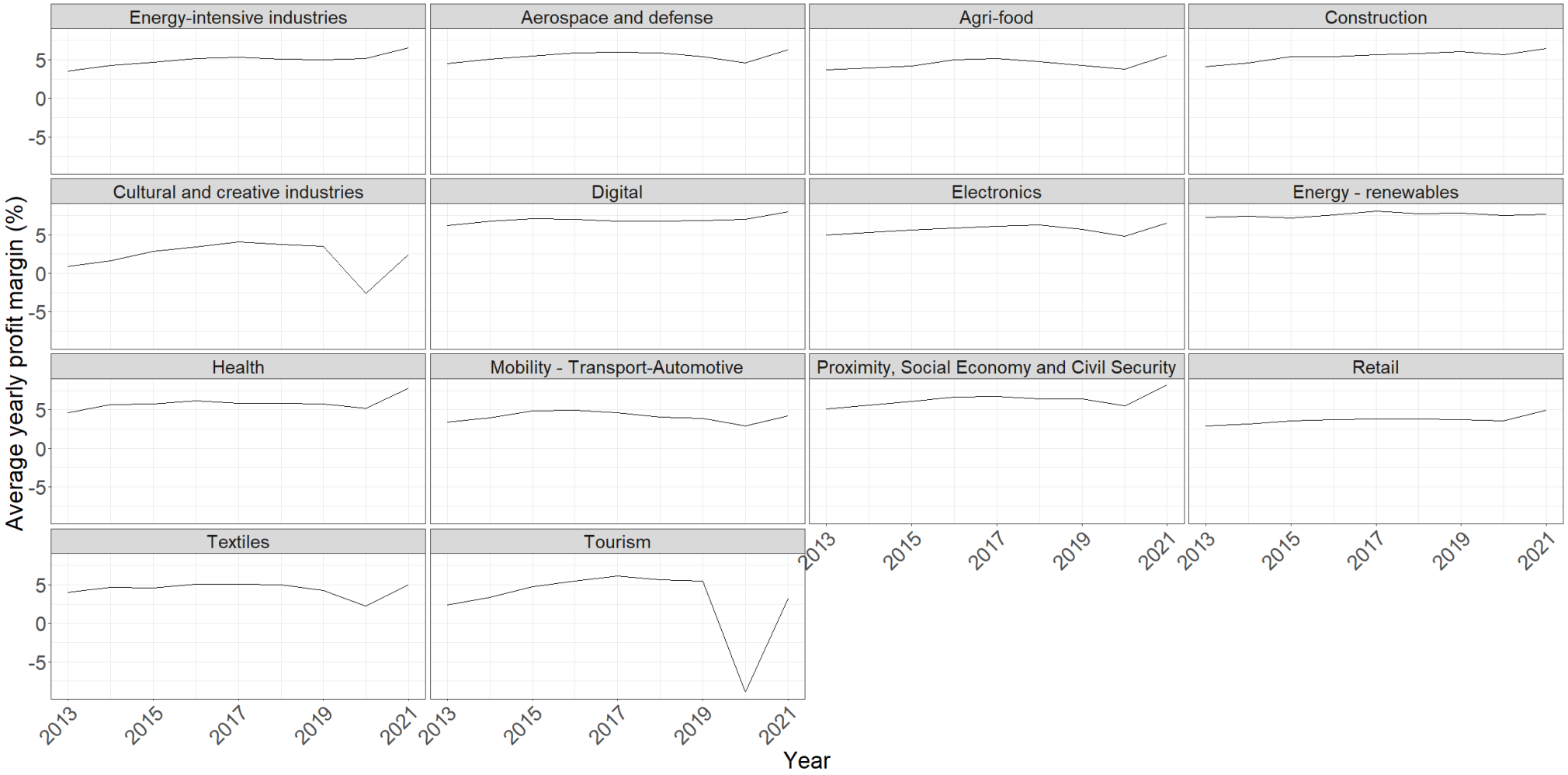
[332] Strategy& (2022). How to approach rising energy costs – why the energy crisis could trigger deindustrialization in Europe. Available at: https://www.strategyand.pwc.com/de/en/industries/energy-utilities/how-to-approach-rising-energy-costs.html.

While no 2022 data are available for Orbis, this dataset provides a more granular view of the post-COVID-19 recovery. Firms across all ecosystems display an increase in profit margins in 2021, due to the boost in aggregate demand that followed the COVID-19 crisis (Figure 73). This increase was especially pronounced in health (48 % increase compared to previous year), which was probably driven by significant investment in the sector following the pandemic; aerospace (38 %); transport (44 %); and proximity and the social economy (48 %), which benefitted from the greater degree of mobility and contact that came after the pandemic. For all of these ecosystems, the rise in the average profit margin exceeded pre-pandemic levels. While the average profit margin increased even more markedly in tourism, textiles and creative and cultural industries, profitability did not return to pre-pandemic levels by the end of 2021.

Likewise, firms in most countries experienced increased profitability following the pandemic (with the exception of Cyprus, which is likely to be an extraordinary case due to its small and services-driven economy, especially financial services).[333] This recovery was strongest in Greece (almost 7 percentage points), thanks to increased demand in tourism following the lockdowns, and in the Netherlands (almost 4 percentage points), which is an important hub for freight transport and energy-intensive industries, both of which also benefited from the restarting of production across the value chain (Figure 74).

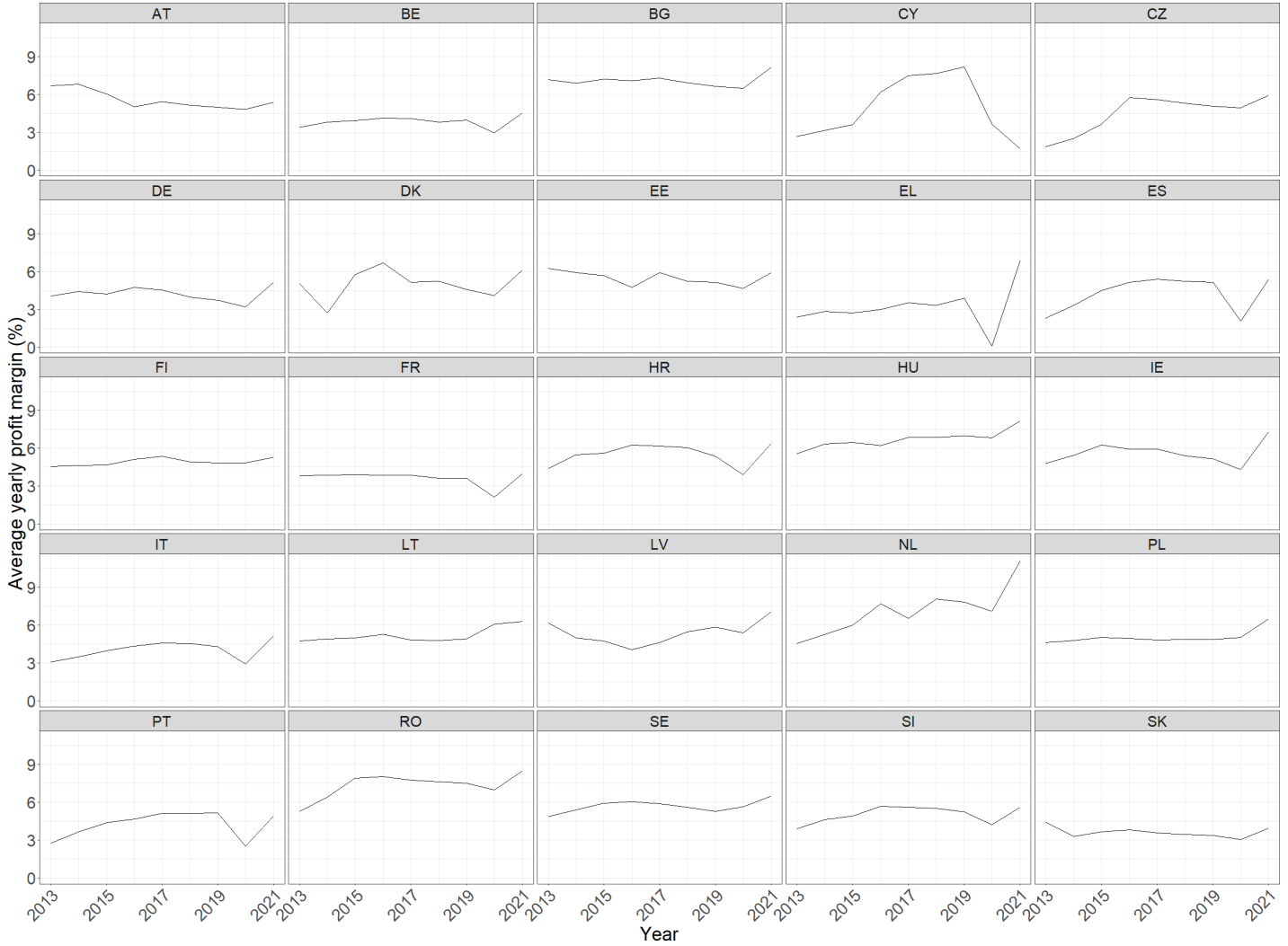
[333] As a reminder, financial corporations are excluded from the analysis, which may explain Cyprus's downward trajectory.

Figure 73. Trends in profit margin (%) in the EU-27, by ecosystem, 2013-2021 (Orbis)



Source: elaborated by PPMI, based on Orbis data.
Note: Malta and Luxembourg are excluded due to their small number of firms.

Figure 74. Trends in profit margin (%) in the EU-27, by country, 2013-2021 (Orbis)



Source: elaborated by PPMI, based on Orbis data.
Note: Malta and Luxembourg are excluded due to their small number of firms.

4.7.3. The effect of inflation on firms' profitability

This section presents the regression analyses used to estimate the effect of inflation and higher perceived production or labour costs on firms' profitability between 2014 and 2022 (using SAFE data) and between 2013 and 2021 (based on Orbis data). To ensure that the results hold when the data from the second half of 2022 are included, a country-level model is tested using quarterly data on the profitability share for 2019-2022 as a robustness check (using the Eurostat/ECB measure). Quantitative findings are corroborated by qualitative evidence gathered during desk research and interviews.

The results from the regressions highlight three key findings, discussed in further depth below.

1. **Despite initially reducing profit margins, inflation subsequently increases them when firms are able to pass cost increases on to their consumers. However, this is an averaged effect, which varies significantly depending on a particular firm's ability to pass down costs, which relies on the firm's position within the value chain, how sensitive the demand for specific products is to price changes and types of clients, as well as firm size (more so than the ecosystem in which it operates).**
2. **The indirect effects of inflation – through the reduction of GDP growth, increases in interest rates, the increased prevalence of late payments and worsening access to finance – reduce profits.**
3. **When profit margins are considered, SMEs appear to suffer more from inflation than large firms. With regard to perceptions concerning changes in overall profit, the opposite is true.**

The overall effect of inflation on firms' profitability

The impact of inflation on firms' profitability is time-sensitive. When the effect is measured in the same year or semester as profitability (i.e. during the current period), the changes in the inflation rate seen in 2022 would be expected to reduce profit margins by 0.6 percentage points. However, the opposite is true when inflation is lagged, meaning that the effect is measured of inflation in the previous year or semester on this year's profitability. Lagged inflation is associated with an increase in profit margins of 0.5 percentage points in 2022.

These results may seem complicated at first glance, but they are intuitive. Rising inflation initially increases production costs, which reduce firms' profits. According to one study, for example, German SMEs face an additional financial burden or between EUR 113 billion and 228 billion per year due to soaring inflation rates, persistent savings expectations, and opportunity costs due to lower GDP growth.[334] However, with time, many firms pass costs on to their consumers, which helps them restore profits. This is evidenced by the fact that there was a marked increase in the share of EU companies reporting higher turnovers in 2022 compared with 2021.[335] Furthermore, price increases are the most common strategy for dealing with rising costs, as cited by 75 % of Austrian SMEs, followed by cost reductions, downsizing and restructuring (45 %).[336]

[334] Zemmrich, L., Hofmann, E., Buchhauser, M., & Stickler, N. (2022). Economic Impact of Rising Inflation and Savings Expectations on German SMEs and Ways Forward. Available at: https://hz.group/insights/publications/economic-impact-of-rising-inflation-and-savings-expectations.

[335] See Chart 1.6 here: ECB (2022). Financial Stability Review, November 2022 – Overview. Available at: https://www.ecb.europa.eu/pub/financial-stability/fsr/html/ecb.fsr202211~6383d08c21.en.html#toc13.

[336] Strzyzowski, S. (2022). How companies deal with inflation and volatility. *Die Wirtschaft*, 10/08/2022.

The direct negative effect of inflation on profitability is slightly greater than the positive effect, but these two effects largely cancel each other out, resulting in a 0.1 percentage point average reduction in profit margins, all other factors remaining constant.[337] However, **in the current environment, everything else is not constant: company turnovers, for example, are set to increase as firms pass costs on to their consumers, which explains why profits have grown in the second half of 2022 despite the negative overall inflation effect** (see Figure 68).

The average effect of inflation may mask differences between firms depending on their ability to pass costs on to consumers. The agri-food case study (see Annex 3) suggests that this ability depends on **firms' position within the value chain**. For example, in 2022, European food retailers increased their prices by around 12 % year-on-year. In contrast, food producers increased their prices by 17 %,[338] which suggests that retailers – which are closer to the end consumer – are less likely or able to pass down costs compared with producers. This is supported by studies from other regions. In Latin America, for example, consumer-dependent sectors in particular face tighter margins as their costs rise.[339]

Furthermore, as quoted in previous sections, producers that have **fixed-price contracts** with their clients are also less able to pass down costs. This is demonstrated in the construction case study (Annex 3), which shows that firms which signed fixed-term contracts of two or three years immediately before the increase in inflation were unable to increase their prices, and therefore suffered the most from the higher production costs, which in turn squeezed their profit margins. Similar concerns were echoed by the owner of a business in the automotive ecosystem that produces parts for large car brands. in an interview, a representative of another SME, which produces microcontrollers, claimed that large firms – which are the SME's clients– pay a fixed price for devices that they sell on to professional users and consumers. Therefore, SMEs are obliged to absorb costs even if this poses a threat to their continued financial survival. For these firms, the negative effect may be much stronger than the positive, yet the available data are insufficient to capture this variability.

Lastly, **elasticity of demand** also plays a role in which firms are able to pass costs on to consumers. In the textiles ecosystem (see Annex 3), passing on costs is easier for leading high-end brands than it is for companies operating in price-sensitive segments (e.g. workwear, home textiles, etc.). When luxury brands LVMH, Kering and Chanel presented their annual results in early 2022, they indicated clearly that they would be revising the prices of their most iconic products upwards repeatedly during the year.[340]

Some firms use an environment of rapid price changes to their advantage by **increasing prices more than is needed to offset production cost increases**. For example, 56 % of retailers were reported to have stated in one online survey that 'inflation has given them the ability to raise prices beyond what's required to offset higher costs'.[341] In Australia, two large retailers, Coles and Woolworths, which together control two-thirds of the market, have seen

[337] Similar negative effects of inflation were reported in recent research from the UK covering the period 2017-2021. Here, the authors used a subjective measure of price uncertainty and measures of firm price inflation forecast errors to show how, in both cases, profit margins decline. See: Yotzov, I., Anayi, L., Bloom, N., Bunn, P., Mizen, P., Öztürk, Ö., & Thwaites, G. (2023). Firm Inflation Uncertainty (No. w31300). NBER Working Paper No. 31300. Available at: https://www.nber.org/papers/w31300.

[338] Allianz SE (2023). European food inflation – hungry for profits?, 14 April. Available at: https://www.allianz.com/en/economic_research/publications/specials_fmo/europe-food-inflation.html.

[339] Moody's Investors Service (2022). Frequently asked questions on inflation and interest rate rises in Latin America. Available at: https://www.elseguroenaccion.com.ar/wp-content/uploads/2022/07/Moodys-Sector-In-Depth-Financial-Stability-Latin-America-Caribbean-18Jul22-1.pdf.

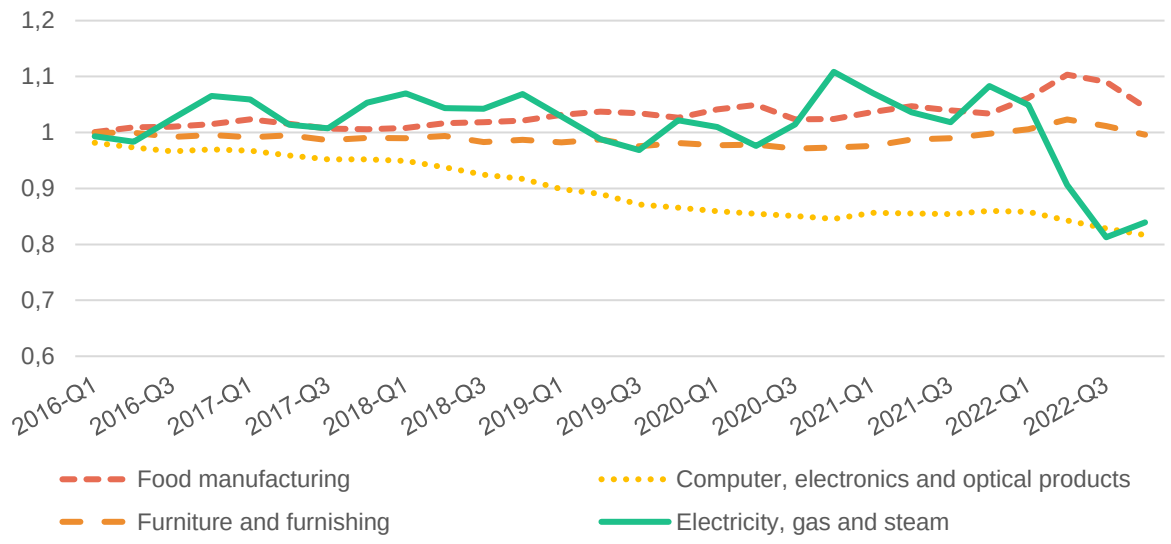
[340] Fashion Network (2022). Caught between inflation and rising costs, fashion seeks to strike new balance. Available at https://ww.fashionnetwork.com/news/Caught-between-inflation-and-rising-costs-fashion-seeks-to-strike-new-balance,1424510.html.

[341] Stoller, M. (2021). *Corporate Profits Drive 60% of Inflation Increases*. Available at: https://mattstoller.substack.com/p/corporate-profits-drive-60-of-inflation.

their profit margins increase by almost two percentage points since the pandemic.[342] Exploiting inflation to achieve excessive profits has become known as **greedflation**.This explains why the average effect of inflation may appear minimal despite several SMEs interviewed claiming that inflation is squeezing their profit margins.

Across various industries, one study estimates the pass-through rate – which indicates the proportion of increased costs that can be passed on to customers –varies from 82 % in pharmaceuticals to 103 % in motor vehicles.[343] Using a different methodology, Figure 75 below shows the heterogeneity in pass-through rate in four selected NACE sectors (food, electronics, furniture and energy) in 21 Member States between 2016 and 2022.[344] Most notably, the figure suggests that the pass-through rate has been on the rise in food manufacturing in 2022, in line with recent reports of profit-driven food inflation, as well as recent surveys suggesting that almost 80 % of food manufacturers see passing costs on to customers as a valid strategy to deal with increasing energy prices, the highest percentage among the sectors analysed, and well above the EU-27 average of 62 % (conversely, fewer than 50% of firms in retail and textiles saw it as a viable strategy).[345] Conversely, the pass-through rate in energy has diminished steadily in 2022, after policy-makers began subsidising energy prices (see Section 5.1.1), which meant that the full increase in producer prices was not felt by consumers.

Figure 75. Pass-through rate in four selected NACE sectors, in the EU-27, Q1/2016 to Q4/2022



Source: elaborated by PPMI, based on Eurostat data from PPI, HICP and value added.
Note: Cyprus, Estonia, Latvia, Luxembourg, Malta and Slovakia are excluded due to a lack of data. The pass-through rate was calculated by dividing the producer price index, lagged by two quarters, by the consumer price index of goods and services most relevant to each NACE sector. A pass-through rate value of 1 means that all costs are passed on to consumers, below 1 means that firms absorb part of the cost shocks, and over 1 means that they manage to make an increased profit from the input price shocks.

[342] *The Guadian* (2023). Australia's big supermarkets increased profit margins through pandemic and cost-of-living crisis, analysis reveals. Available at: https://www.theguardian.com/business/2023/may/22/australias-big-supermarkets-increased-profit-margins-through-pandemic-and-cost-of-living-crisis-analysis-reveals.
[343] Strategy& (2023). How to approach rising energy costs. Available after request to download at: https://www.strategyand.pwc.com/de/en/industries/energy-utilities/how-to-approach-rising-energy-costs.html.
[344] Here, pass-through rate was calculated by dividing the producer price index, lagged by two quarters, by the consumer price index of goods and services most relevant to each NACE sector. A pass-through rate value of 1 means that all costs are passed on to consumers, below 1 means that firms absorb part of the cost shocks, and over 1 means that they manage to make an increased profit from the input price shocks.
[345] From preliminary analyses in the forthcoming EIB Investment Report, based on EIBIS 2023.

Furthermore, the indirect channels of inflation (decreases in GDP growth, increases in interest rates) also significantly affect profitability. Namely, every percentage point reduction in the real GDP growth rate is associated with a drop of 0.2 percentage points in the average profit margin. The effect associated with interest rates is even greater: for every percentage point rise in the interest rates, the profit margin is expected to decrease by 0.35 percentage points (see Table *27* in Annex 2).[346] This is because higher interest rates mean that it becomes more expensive for firms to pay back their loans, again reducing profitability. Hence, firms with greater levels of debt are more likely to see their profits shrink in times of high inflation.[347]

In addition, regression models using SAFE data also highlight that the harder it is for SMEs to access finance, the more their profitability drops (on average, by 0.3 percentage points). Given the rise in ECB interest rates that occurred in September 2023, up to 4.50 %, this would amount to a decrease in the probability of firms registering higher profits, from 21.2 % in 2022 to 20.3 % in 2023. As discussed in Section 4.3, high inflation environments make it more difficult for firms to acquire loans given the overall economic uncertainty, which in turn makes traditional lending institutions less likely to extend credit to smaller firms. Meanwhile, firms' need for external financing rises when inflation is high, in order to offset greater production costs,[348] **highlighting the need for government support in this regard**.

All of the findings presented above are broadly consistent with the results from the literature, the macroeconomic model that used official Eurostat/ECB data (see Table 28 in Annex 2), as well as the analyses of SAFE data (Table 30 in Annex 2). In line with the results in this section on the report, most studies find that the relationship between inflation and profitability is negative,[349] unless firms are able to pass costs on to consumers.[350]

Effect by ecosystem and sector

Overall, the impact of inflation on different ecosystems appears to be mixed and varies significantly depending on when the impact was measured, using which data sources, via which methods, as well as on the differences within each ecosystem. As demonstrated in Table 6, most evidence suggests that the impact of inflation on agri-food and energy-intensive industries is associated with increased profitability among firms in these ecosystems. Nevertheless, caution is needed when interpreting these results, given the recent resurgence in profitability at the end of 2022 (see Figure 68), meaning that not enough time has passed for data to become available for an in-depth analysis of these effects.

[346] However, due to the temporal limitation of Orbis, which only covers a period during which the ECB had not yet raised interest rates to excessive levels, it could also be that the effect of interest rates is driven by non-Eurozone Member States.
[347] Vătavu, S. (2014). The determinants of profitability in companies listed on the Bucharest stock exchange. *Annals of the University of Petrosani. Economics*, *14*, 329-338.
[348] Higgins, R. C. (1977). How Much Growth Can a Firm Afford? *Financial Management*, *6*(3), 7-18.
[349] Hassan, S. R., & Muniyat, S. (2019). Factors influencing the profitability of pharmaceutical companies in Bangladesh. In: *Message From The Conference Chairs* (p. 770); Odusanya, I.A., Yinusa, O.G., & Ilo, B.M. (2018). Determinants of firm profitability in Nigeria: Evidence from dynamic panel models. *SPOUDAI-Journal of Economics and Business*, *68*(1), 43-58; Roman, T., Marcu, N., Rusu, V.D., Doacă, E.M., & Siriteanu, A.A. (2023). Tax Payment and the Performance of SMEs: A Longitudinal Analysis on EU Countries. *Sustainability*, *15*(2), 927; Rusu, V.D., & Roman, A. (2022). The relationship between financing decision of SMEs and their performance. In: *Business Development and Economic Governance in Southeastern Europe* (pp. 353-367). Springer, Cham.
[350] McCann, F., & McGeever, N. (2022). Enterprise policy issues for distressed businesses following the unwinding of pandemic supports. Working Paper No. 9/FS/22. Central Bank of Ireland; Salgado, R. (2022). *Japan: Economic Outlook and Policy Priorities.* International Monetary Fund, Asia and Pacific Department.

Table 6. Summary of the impact of inflation on profitability, by ecosystem

Ecosystem	Increased profitability?	Decreased profitability?	No significant impact or mixed impact?
Agri-food	Yes, according to Orbis data, analysis performed by the ECB,[351] a recent study in Germany[352] and the Economist Intelligence Unit[353]	Yes, according to the National Bank of Belgium when referring to 'food industry (fish, starch)'[354] and a PwC study, which considers agriculture and food separately[355]	Yes, according to the case study and a study by Allianz Research, which found that big packaged-food players with a strong market positioning have been able to pass on price increases to consumers, while food distribution stores are seeing changes in consumers' consumption patterns[356]
Construction	Yes, according to analysis performed by the ECB[357] and a recent study from Germany[358]	Yes, according to SAFE and Orbis data analysis as well as a PwC study[359]	Yes, according to the case study
Electronics	Yes, according to trade unions in Austria[360]	Yes, according to the National Bank of Belgium when referring to 'traditional manufacturing (motor vehicles, electric motors, electronics)'[361] and experts interviewed for this study	Yes, according to Orbis data and the case study
Energy-intensive industries	Yes, according to Orbis data, analysis performed by the ECB,[362] a recent study from	Yes, according to analysis by the Central Bank of the	Yes, according to an LSE study, which found an insignificant impact of energy prices on profitability, with variations within subsectors (positive

[351] ECB (2023). How tit-for-tat inflation can make everyone poorer. Available at: https://www.ecb.europa.eu/press/blog/date/2023/html/ecb.blog.230330~00e522ecb5.en.html.
[352] Ragnitz, J. (2022). Gewinninflation und Inflationsgewinner. *ifo Dresden berichtet*, *29*(05), 24-28.
[353] Economist Intelligence Unit (2023). Rising cost of food defies inflation slowdown, 19 April. Available at: https://www.eiu.com/n/rising-cost-of-food-defies-inflation-slowdown/.
[354] National Bank of Belgium (2022). Belgian Prime News No. 98. Available at: https://www.nbb.be/doc/ts/publications/bpnews/bpn98.pdf.
[355] PwC (2023). Viewpoint: Major impact energy crisis on profitability Dutch companies Rising energy prices causing significant increase in costs. Available at: https://www.strategyand.pwc.com/nl/en/industries/energy-utilities/major-impact-energy-crisis.html.
[356] Allianz Research (2023). Agrifood sector rirsk report. Available at: https://www.allianz-trade.com/en_global/economic-research/sector-reports/agrifood.html.

[357] ECB (2023). How tit-for-tat inflation can make everyone poorer. Available at: https://www.ecb.europa.eu/press/blog/date/2023/html/ecb.blog.230330~00e522ecb5.en.html.
[358] Ragnitz, J. (2022). Gewinninflation und Inflationsgewinner. *ifo Dresden berichtet*, *29*(05), 24-28.
[359] PwC (2023). Viewpoint: Major impact energy crisis on profitability Dutch companies Rising energy prices causing significant increase in costs. Available at: https://www.strategyand.pwc.com/nl/en/industries/energy-utilities/major-impact-energy-crisis.html.
[360] Schneller, M. (2023), PRO-GE and GPA demand a 12.9% pay increase, Report by Trade Union PRO-GE – electrical/electronics industry. Available at: https://news.industriall-europe.eu/documents/upload/2023/3/638143767781081012_AT_-_Demands_2023.pdf
[361] National Bank of Belgium (2022). Belgian Prime News No. 98. Available at: https://www.nbb.be/doc/ts/publications/bpnews/bpn98.pdf.
[362] ECB (2023). How tit-for-tat inflation can make everyone poorer. Available at: https://www.ecb.europa.eu/press/blog/date/2023/html/ecb.blog.230330~00e522ecb5.en.html.

Ecosystem	Increased profitability?	Decreased profitability?	No significant impact or mixed impact?
	Germany,[363] and the National Bank of Belgium[364]	Netherlands;[365] the SAFE analyses, which concerned 'Industry' as a whole; and a PwC study[366]	impact for minerals; negative for mining)[367]
Textiles	Yes, according to the case study		Yes, according to Orbis data (effect is positive, but not statistically significant)

An analysis of profitability spanning an overall ecosystem or sector fails to capture the significant variation that exists within an ecosystem, which helps explain the contradictory results summarised in the table above. For example, an interviewee from an agri-food trade association pointed out that the dairy sector has benefitted from price increases because it is not impacted by diseases, and products such as pasteurised milk and milk powder can be stored. This means that these dairy products can now be sold for higher prices even though they cost less to produce. However, the egg and poultry sectors have faced specific challenges due to avian influenza, the need for investment to improve sustainability, energy prices, and animal feed. These types of products also cannot be stored for long, meaning that the impact on their profitability is likely to be negative.

Nitrogen fertiliser companies have also been affected negatively. Soaring natural gas required to make fertilisers have experienced price increases. These have resulted in producers cutting their output by over two-thirds in 2022, while the war in Ukraine has disrupted the supply of fertiliser from Russia, the world's largest exporter.[368] Overall, as food prices rise, consumers are likely to choose cheaper alternatives (e.g. poultry over beef), which will also benefit some agri-food sectors while hurting others.[369]

Similarly, interviewees in the construction ecosystem suggested that while the overall impact of inflation on profitability was negative, the renovation sector was an exception. Specifically, companies that work on improving the energy efficiency of homes experienced increased profit margins thanks to policies in this area designed to support demand, such as the so-called 'Superbonus' in Italy, whereby the government reimburses between 50 % and 110 % of the expenditures incurred for energy-efficient renovations. In energy-intensive industries, too, one study found a negative effect of inflation on mining, but positive effect on minerals.[370] In textiles and electronics, the evidence is similarly mixed (see Annex 3).

Effect by firm size

Taken together, the findings from the statistical analyses, interviews and the literature suggest that inflation erodes the profit margins of SMEs more than it does those of large

[363] Ragnitz, J. (2022). Gewinninflation und Inflationsgewinner. *ifo Dresden berichtet*, *29*(05), 24-28.
[364] National Bank of Belgium (2022). Belgian Prime News No. 98. Available at: https://www.nbb.be/doc/ts/publications/bpnews/bpn98.pdf.
[365] Dutch Committee for Entrepreneurship (2022). Entrepreneurship in the in-between. Towards a roadmap for the SME sector. Available at: https://cms.staatvanhetmkb.nl/wp-content/uploads/2023/01/State-of-the-SME-Sector-Annual-Report-2022_Entrepreneurship-in-the-in-between.pdf.
[366] PwC (2023). Viewpoint: Major impact energy crisis on profitability Dutch companies Rising energy prices causing significant increase in costs. Available at: https://www.strategyand.pwc.com/nl/en/industries/energy-utilities/major-impact-energy-crisis.html.
[367] London School of Economics (2023). Final Presentation Capstone Project The impact of energy prices on SME investment and profitability. Available at: https://institute.eib.org/wp-content/uploads/2023/04/EIF_LSE-Capstone_Final-Presentation_vF.pdf.
[368] Saleh, H. (2023). Ukraine war fallout benefits one of world's biggest fertiliser groups. *Financial Times*, 8 February. Available at: https://www.ft.com/content/850d8c0a-a853-4b0e-aba3-d63d18ab0c93.
[369] *Ibid*, p. 3.
[370] London School of Economics (2023). Final Presentation Capstone Project The impact of energy prices on SME investment and profitability. Available at: https://institute.eib.org/wp-content/uploads/2023/04/EIF_LSE-Capstone_Final-Presentation_vF.pdf.

firms.[371] Based on regression results (see Table 29, Model 4), for the increases in inflation observed in 2022, SMEs' profit margins would initially shrink by roughly 12 % (from 5.75 % to 5.04 %) compared to a decrease of 3% for large firms (from 5.45 % to 5.27 %). Hence, the impact on SMEs is around four times as large. This is in line with a study conducted among British companies, according to which the high inflation of 1977-1979 translated into a fall in their return on assets from 9.9 % to 4.7 % for all companies, although the most dramatic fall occurred in companies in smaller size ranges, where the average return on assets declined by as much as 7 percentage points.[372]

Furthermore, the online survey of retailers cited in the previous section shows that current price hikes are concentrated among big companies, with 63 % of large firms using inflation to more than offset costs, compared with 52 % of small and medium-sized businesses. Of those firms that have their increased prices by 50 % or more, 28 % were large enterprises, compared with the 6 % that were small and medium size enterprises.[373] The National Bank of Belgium, too, has stated that the recent rise in overall profitability in Belgium has been driven by a small number of very large companies.[374] Lastly, an interviewee from the electronics sector observed that in the production of micro-controllers, there was very limited scope for SMEs to pass on any increased costs to the large firms that are their customers within the value chain. Large clients did not allow these costs to be passed up the value chain, on the basis that the market expected the final prices of goods to remain stable.

Nevertheless, the impact of lagged inflation – which on average increases profit margins – is only significant for SMEs (see Table 27, Model 4), meaning that SMEs should be more likely to pass down costs than large firms. Yet this result is probably driven by the lack of availability of 2022 data in the Orbis dataset, given the evidence from the recent literature cited above.

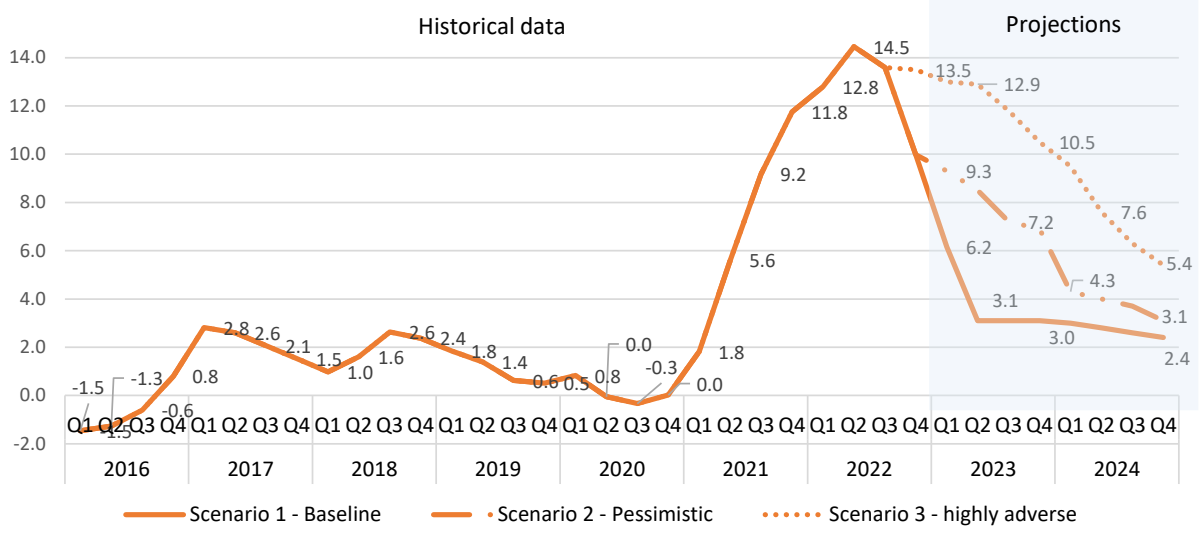
Furthermore, according to SAFE-based models, the larger the SME, the higher the probability that its profits are affected by rising production and labour costs (Table 28, Model 9). This is seemingly the opposite of Orbis-based findings, but it is important to remember that SAFE and Orbis data measure different indicators: whereas SAFE is concerned with the changes in self-perceived profit levels, Orbis data objectively measure profit margins. Hence, the results suggest that inflation erodes more of overall profits from larger firms, but that the impact on the profit margin is worse for SMEs.

4.7.4. Simulating the effect of inflation on future profitability

The analysis in the previous sections points to the fact that profits have a close and mutually dependent relationship with aggregate economic activity, including inflation. Hence, their

[371] Nevertheless, the impact of lagged inflation – which on average increases profit margins, as discussed above – is only significant for SMEs, meaning that SMEs should be more likely to pass down costs than large firms. Yet this result is probably driven by the lack of availability of 2022 data in the Orbis dataset, given the evidence from the recent literature, which shows that large firms are in fact more likely to pass down costs.
[372] Hughes, A. (1997). Finance for SMEs: A UK perspective. *Small Business Economics*, *9*(2), 151-168.
[373] Stoller, M. (2021). Corporate Profits Drive 60% of Inflation Increases. Available at: https://mattstoller.substack.com/p/corporate-profits-drive-60-of-inflation.
[374] National Bank of Belgium (2022). *Belgian Prime News No. 98*. Available at: https://www.nbb.be/doc/ts/publications/bpnews/bpn98.pdf.

development depends, in turn, on future economic scenarios (described in



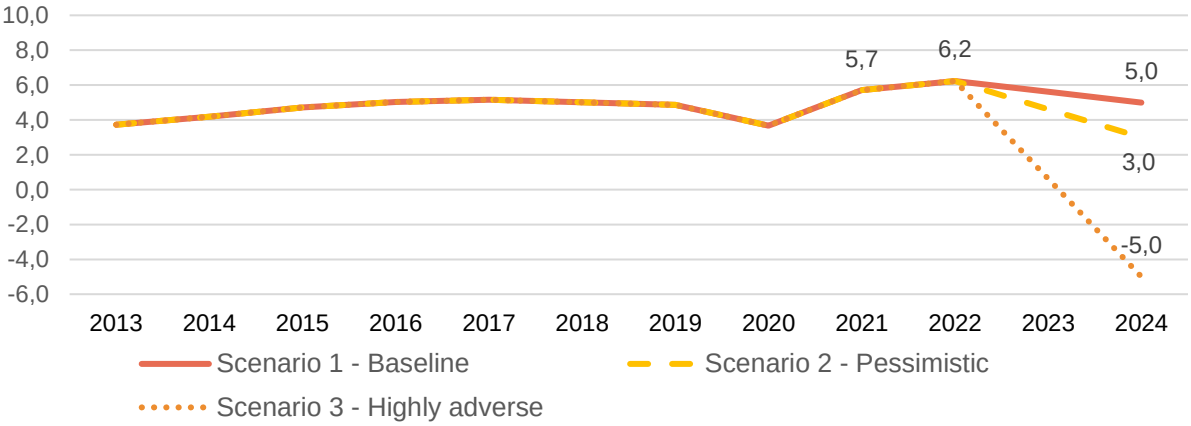
Source: elaborated by PPMI and CSIL.

Table 1 in Section 3.2).

The baseline scenario foresees margins that are still positive, but are lower. A decline in profit margins is already expected in 2023, given the overall effect of both inflation and the rise in interest rates.[375] Profit margins will fall further in 2024 (to 4-5 %), returning to patterns observed prior to the pandemic (

Figure 76).[376]

Figure 76. Trends in average profit margin (%) in the EU-27, Scenarios 2013-2024



Source: elaborated by CSIL, based on PPMI estimates.

[375] These estimates were elaborated taking into account historical co-movements between headline and core inflation and the GDP deflator. The GDP price deflator measures changes in the prices of all goods and services produced in an economy, and can be considered another proxy of inflation. The main difference between HICP (i.e. headline inflation) and the GDP deflator is that the latter is not based on a fixed basket of goods. The GDP deflator is relevant to this section of the report because movements in the GDP deflator are driven by developments in labour costs, profits and net indirect taxes – measured per unit of output, and can therefore be used to link inflation to these quantities.

[376] Profit margins could turn out more persistent, for instance if wages accelerate more than projected, and without any adjustment in prices. This hypothesis is less likely.

Note: the 2022 figure was extrapolated by applying the 9.3 % annual unit profit growth rate reported in the Economic outlook for the EA and EU[377] to the 2021 profit margins from Orbis. 2023-2024 values are projections.

This aggregate trend hides significant differences between ecosystems. Economic forecasts by the Commission released in spring 2023, and confirmed in the summer, suggest that **in the baseline scenario, services will continue to outperform (in terms of profitability) the manufacturing sector for the whole of 2023**. In particular, the energy-intensive manufacturing sectors are still reeling from the energy shock in 2022, since which they have generally been successful in passing on higher production costs to consumers. However, starting from 2023, the most energy-intensive sectors and companies will struggle to continue doing so, due to a lower level of acceptance of further price increases by customers in a (baseline) scenario that sees declining energy prices. Therefore, the growth rate of profit margins in energy-intensive manufacturing sectors may return to pre-pandemic levels of between 1 % and 2 % year-on-year by 2024.[378]

With regard to **construction**, the analysis above indicates that inflation has, in general, contributed to reducing profit margins via higher input costs, although with a few exceptions. The construction sector has contributed between 1 % and 2 % of the general increase in profit margins observed over the past five years, and this share is expected to contract (to less than 1 %) in the next two years, as housing investments and demand are particularly sensitive to interest rates due to the increasing difficulty of accessing loans and mortgages.[379]

The development of profit margins in the **agri-food industry** is characterised by some uncertainty. In this ecosystem, the pass-through of energy price fluctuations on into selling prices has probably already happened, with firms having already increased their sales prices to an optimum level that enables them maximise their margins while remaining at a level that clients are able (or willing) to pay.[380] As a result, they are not expected to increase prices further in 2023-2024 without losing sales. However, demand in the food market is inelastic, and firms can afford a higher mark-up because demand will react less. These two concurrent forces are likely to balance each other out. Evidence from the case study and interviews suggests that producers, wholesalers and retailers in this ecosystem will in the near future maintain the same profit margins they have had since 2021, of around 1-2 %.[381] In contrast, the case study on the **textile ecosystem** indicates that the overall economic performance of SMEs started to decline at the end of 2022 due to a contraction in demand – a trend that is likely to continue in 2023.

The future strength of demand, the evolution of macroeconomic conditions and the structural degree of competition will determine the evolution of profit margins in **the pessimistic and highly adverse scenarios**.

In the pessimistic scenario, economic growth projections for 2023 and 2024 have been revised downwards slightly due to lower aggregate demand than in the baseline scenario. Raising interest rates to reduce persistent inflation in combination with lower demand will eventually squeeze profit margins even more with respect to the baseline scenario because SMEs will have weaker pricing power in such a context and, at the same time, will be more dependent on borrowing. Profit margins will still remain positive, however, and are expected

[377] Available at: https://ec.europa.eu/economy_finance/forecasts/2023/spring/Box_I_2_3-Profit%20margins%20and%20their%20role%20in%20euro%20area%20inflation.pdf.

[378] Elaborated by CSIL, based on European Commission (2023). Economic outlook for EA and EU. Thematic boxes – Spring 2023. Box I.2.3 Profit margins and their role in euro area inflation.

[379] See: European Commission. (2023). Economic outlook for EA and EU. Thematic boxes – Spring 2023. Box I.2.3 Profit margins and their role in euro area inflation; see also: ECB (2023). Financial stability Review May 2023. Chapters 1.4 and 1.5. Available at https://www.ecb.europa.eu/pub/financial-stability/fsr/html/ecb.fsr202305~65f8cb74d7.en.html#toc7.

[380] Elaborated by the authors, based on European Commission (2023). Economic outlook for EA and EU. Thematic boxes – Spring 2023. Box I.2.3 Profit margins and their role in euro area inflation; see also: Allianz Research. (2023). European food inflation – hungry for profits? Available at: https://www.allianz-trade.com/en_global/news-insights/economic-insights/153urope-food-inflation.html.

[381] Valumics (2021). Profitability in the European food industries. Available at: https://valumics.eu/wp-content/uploads/2021/07/Profitability_European_food_industries_VALUMICS-Brief.pdf.

to be in the range 1-3 % in 2023-2024.The phasing out of COVID-19-related fiscal support, the exhaustion of the excess private savings accumulated during the pandemic, and weak economic activity may result in a **reduction in demand and investments in the pessimistic scenario, with generalised negative consequences for profit margins in all ecosystems**.

Price developments in the **highly adverse scenario** are likely to result in slower economic activity during the second half of 2023 and in 2024, with tighter financing conditions owing to a deterioration in the aggregate demand for goods and services, credit quality and the conditions required to obtain a loan from banks. **The slowdown in economic activity is likely to determine a decline in SMEs' profit margins to a value between close to -1 and -5 %,**[382] while wage adjustments for price growth will be smaller than expected. The impact of higher energy prices foreseen under this scenario will therefore generally be offset by a rapid opposing effect of worsening cyclical conditions, resulting in a lower level of inflation at the end of the forecast horizon.

Looking at the differences between ecosystems, higher energy prices may impact SMEs differently, depending on the extent to which their ecosystems can absorb second-round effects. The production of **energy-intensive** products is likely to become unprofitable due to a combination of high energy prices and weak demand. Producers might react by lowering production levels, which could create temporary shortages downstream in the supply chain, leading to increased prices. For example, the extreme energy intensity and homogeneous products delivered in industries such as basic metals and chemicals, etc., would make it very hard for producers to react to a second round of energy price increases without reducing supply. The same trend is likely to be observed in the **agri-food industry**, with the difference that the more inelastic demand in this sector ensures there is still room to set prices above marginal costs and still have a positive but lower mark-up compared with the pessimistic scenario.

Higher energy prices will harm the profit margins of the companies with lower market power even more. This can be the case for SMEs in the **construction** ecosystem. For instance, companies producing building materials, cement and bricks operate in small local markets. The pass-through of a second-round of energy price fluctuations will be, therefore, slower as these companies already have relatively high output prices. Increasing energy prices will therefore be mainly absorbed by a drop in their profit margin which, in combination with higher interest rates, could potentially lead them to bankruptcy (see Section 4.7.4). Similarly, and as mentioned above, companies in the **textile** ecosystem do not have a huge profit cushion and they will be loss-making as well.

4.7.5. Conclusions regarding the effect of inflation on future profitability

Overall, this section of the report has found that **while inflation initially reduces profit margins, it then increases firms' profitability after firms pass costs down to consumers**, if all other factors remain constant. However, it is clear that if firms pass costs on to their consumers, their turnovers will also increase, with a knock-on effect on profits. This explains the record-breaking profits observed in 2021 and 2022, which have in turn kept prices high.[383]

The ability of firms to pass on costs varies greatly, and depends on their position within the value chain, how sensitive the demand for specific products is to price changes, the

[382] As benchmarks for the behaviour of profit margins during periods of worsening cyclical conditions: in the last quarter of 2009, corporate profit margins in the Eurozone contracted at a rate of between 2 % and 6 % compared with the same quarter in 2008; while during the oil crisis in the 1970s, the contraction was between 5 % and 10 % year-on-year. See: ECB Monthly Bulletin (2010, April), Economic and monetary developments, Prices and costs, Box 4, pp. 39-41. Available at: https://www.ecb.europa.eu/pub/pdf/other/mb201004_focus04.en.pdf

[383] ECB (2023). *New York Times* interview with Fabio Panetta, Member of the Executive Board of the ECB. Available at: https://www.ecb.europa.eu/press/inter/date/2023/html/ecb.in230401~ec65174af7.en.html.

types of clients, and the size of the firm (more so than the ecosystem in which it operates). SMEs and firms in fixed-price contracts are more likely to see their profit margins shrink than other firms. At the sectoral level, most evidence suggests that food producers have been increasing prices more than is needed to offset the impact of inflation, which not only diminishes food affordability, but also increases the risk of a profit-driven inflation spiral. The evidence concerning other sectors is mixed.

In terms of indirect effects, **GDP growth and interest rates have among the strongest effects on profitability**. As GDP growth slows down, and with inflation levels returning to the targets set out by monetary policy thanks to increases in interest rates, a parallel deceleration in profit margins after the recent record high profits could begin to take place.[384] The main implication of this at policy level is that, as aggregate demand in the EU is forecast to fall strongly by 2023,[385] profit margins are expected to begin falling as well, **placing SMEs at a greater disadvantage** unless policy measures are complemented by SME-specific interventions.

5. Policy actions

This report has shown that the COVID-19 pandemic, coupled with Russia's war of aggression against Ukraine, has led to the disruption of energy and raw material supplies to the EU. This limited supply of goods has in turn increased production costs – which have, to an extent, been passed on to consumers, fuelling consumer price inflation. As consumer prices have risen, workers have begun demanding higher wages to maintain their purchasing power, which has also contributed to wage growth. All of these factors built on the effects of supply chain disruptions that had already begun during the pandemic, further exacerbating inflation.

To cool down the economy, the European Central Bank started to raise interest rates (see Box 1). This has helped somewhat: the annual pace of growth of non-energy prices began slowing in April 2023.[386] Furthermore, energy prices have come down from their peak in the middle of 2022, following a set of measures implemented by the European Commission and EU Member States to ensure the security and continuous supply of energy.[387] Nevertheless, challenges remain: non-energy inflation continues to grow, albeit at a slowing pace;[388] in addition, after slowing in the third quarter of 2022, labour costs increased again in the fourth quarter of 2022;[389] and the raw materials needed to produce EU goods are still in short supply. All of this, coupled with the negative effects of increased interest rates, is putting a strain on European SMEs, highlighting the need for policy action.

Box 1. ECB actions in response to high inflation since 2022

Keeping prices stable is the primary goal of the ECB. Stable prices are essential for economic growth and job creation. In the long run, the most effective way to shelter SMEs from the damaging effects of inflation is to bring the rate of inflation down.

[384] Intrum (2023). European Payment Report 2023. Available at: https://www.intrum.com/publications/european-payment-report/european-payment-report-2023/.
[385] IMF (2023). World Economic Outlook – A Rocky Recovery, April 2023. Available at: https://www.imf.org/en/Publications/WEO/Issues/2023/04/11/world-economic-outlook-april-2023.
[386] Eurostat (2023). Eurostat table TEICP210. Available at: https://ec.europa.eu/eurostat/databrowser/view/TEICP210/default/table?lang=en&category=shorties.teieuro_cp.
[387] SME Envoy Network (2022). SMEs and rising energy prices. Available at: https://single-market-economy.ec.europa.eu/smes/sme-strategy/sme-envoys-network_en
[388] Eurostat (2023). Eurostat table TEICP210. Available at: https://ec.europa.eu/eurostat/databrowser/view/TEICP210/default/table?lang=en&category=shorties.teieuro_cp.
[389] Eurostat (2023). Eurostat table LC_LCI_R2_Q. Available at: https://ec.europa.eu/eurostat/databrowser/view/LC_LCI_R2_Q/default/table?lang=en.

The ECB aims to bring inflation down by raising interest rates. Higher interest rates make it more expensive to borrow money, while also making it more lucrative to save money. As a result, when interest rates are raised, people and businesses spend less money and demand drops. Prices then rise less sharply, bringing inflation down.

In October 2023, the ECB Governing Council decided to keep the three key ECB interest rates unchanged after 10 consecutive hikes that began in July 2022. Over the course of these increases, the ECB has raised rates by a cumulative total of 4.5 percentage points – exceeding the highest interest rates applied during the peak of the 2008 financial crisis.[390] Although inflation is still expected to remain high throughout the first half of 2024, and price pressures in the Euro area remain strong, the Bank's decision not to intervene in interest rates was motivated by the fact that inflation dropped markedly in September 2023. At the same time, past interest rate increases are expected to continue to be transmitted forcefully into the financing conditions under which consumers and firms borrow money from financial intermediaries. This will further dampen down demand and thereby push down inflation.[391] In October 2023, the Governing Council considered the ECB's key interest rates to be at levels which, if maintained for a sufficiently long duration, would contribute substantially to the ECB's goal of reducing inflation to its 2 % target in the medium term.

This chapter of the report outlines possible actions for policymakers at both EU and Member State level that could help to address the current economic situation. Monetary policy actions are excluded. In addition, building on the analysis of policy actions implemented in 2022, we discuss both measures that are useful in a crisis situation, and those actions that should be avoided. Importantly, insufficient time has passed to allow the thorough evaluation of the policies that have been implemented by the Member States, so the present analysis draws on lessons learned from past episodes of high inflation, as well as feedback from stakeholders consulted during the study, and existing literature on policy actions taken during the current period. The examples provided represent a non-exhaustive selection of the measures implemented across the EU, and are instead intended to highlight the diversity of such measures. Table 7 summarises the policy measures, while the box below highlights key take-aways.

Key points

- Policy responses should be coordinated among different government agencies to account for the various ways in which inflation affects SMEs.
- Non-targeted measures can result in market-distorting effects and, in the context of high inflation, could stand in the way of bringing it down. For this reason, measures aimed at helping SMEs, such as providing funds to support the twin digital and green transitions, should be counterbalanced against the need to reduce public spending as a means of reducing inflation.

[390] In July 2022, before the decision to increase the rates taken on 27 July 2022, the interest rates were: 0.00 % (main refinancing operations), 0.25 % (marginal lending facility), and -0.50 % (deposit facility).
[391] Higher interest rates make it more expensive to borrow money, while also making it more lucrative to save money. As a result, when interest rates are raised, people and businesses spend less money and demand drops. Prices then rise less sharply, bringing inflation down.

Table 7. Summary of policy actions

Policy action	SME-specific	Time horizon	EU vs national
Actions to address the causes of inflation			
Promote EU energy independence by developing its own energy sources, investing in renewables, and promoting awareness about energy savings.		Short term and long term	Both
Ensure a sustainable supply of raw materials and production components by encouraging SMEs to consider the joint procurement of chips and components when these require minimum volume orders; monitoring and anticipating raw material shortages; and helping affected firms to find new markets.	Yes	Short term and long term	Both
Actions to mitigate the negative effects of inflation			
Create central monitoring units at national level to observe various inflationary impacts on SMEs and to build resilience against future crises.	Yes	Short and medium term	Both
Enhance access to external finance for SMEs using a mix of different financial instruments such as credit guarantees, subsidised loans, and equity investments.	Yes	Short and medium term	Both
Limit the support provided to unviable companies, while also reinforcing the restructuring mechanisms for viable companies by strengthening early warning systems and the lowering administrative costs of bankruptcy proceedings.		Short and medium term	Both
Promote timely payments by investigating the reasons for delay in government-to-business transactions		Short and long term	Both
Ease access for SMEs to investments available to support the twin transition by lowering the co-financing rates for SMEs and incentivising the use of tax credits.	Yes	Short term	National
Measures appropriate under crisis circumstances such as in 2022			
Target the most vulnerable businesses only by exploring the extent to which firms can successfully pass increased costs on to consumers. This can be achieved by looking at trends in their profitability and turnover.		Short term	National
Promote the use of extensions for payment obligations only to those companies that can clearly demonstrate they have a viable business plan.		Short term	National
Avoid broad-based indexation of public procurement contract values, although indexation may be necessary in a limited range of cases to avoid contract cancellations.		Short term	Both
Measures to avoid in the medium term			
Non-targeted and price-distorting measures to support households and businesses		Medium term	National

Note: Short term = within the next year or two; medium term = within the next five years; long term = longer than five years.

5.1. Measures to address the causes of inflation

5.1.1. Promote EU energy independence

At the heart of the inflation shock in 2022 were rising energy prices, stimulated in large part by the sanctions imposed on Russia following its invasion of Ukraine. This occurred in the context of high dependence on Russian energy, so to avoid another energy shock, the EU should seek to promote its energy independence. While Russian energy imports have already been reduced significantly thanks to the **REPowerEU programme**, this has mostly been accomplished by importing energy from other third countries.[392] For the EU to become truly energy-independent, it must develop its own energy sources by investing in renewables and reducing the amount of energy consumed.

These goals have already been set out in individual Member States' recovery and resilience plans, due to be implemented by 2026. At the Member State level, the successful implementation of these measures is key to ensuring energy independence and keeping energy prices low in the context of political turmoil. Examples of measures to promote energy independence are presented in the 2022 SME Envoy Network report.[393] Meanwhile, at EU level, it is important to focus on the smooth implementation of new trade agreements with third-country energy suppliers, additional opportunities for diversification, and on coordinating the actions of Member States when purchasing energy supplies.

5.1.1. Increase a sustainable supply of raw materials and production components, simultaneously helping those firms affected to find new markets

In addition to the energy shock, SMEs across all the ecosystems studied in depth in this report are suffering from rises in the prices of raw materials and production components. Examples include fertilisers, animal feed, steel, copper, aluminium, wood, clay materials (e.g. bricks, tiles), mineral products (gravel, cement and concrete), glass, semiconductors and electronics components, paper, pulp, wool, dyes and pigments, as well as natural and man-made fibres. Given the diversity of raw materials of which there is a shortage, a range of policy measures are needed.

The proposed **Critical Raw Materials Act**[394] is a strong step in the right direction. It includes provisions to **diversify the EU's supply of raw materials; reduce the administrative burden on raw materials projects; monitor critical raw material supply chains; invest in research, innovation and skills with regard to breakthrough technologies in critical raw materials; and to enhance efforts to recycle critical raw materials**, and so on. Nevertheless, it will be some time before the Act is adopted and fully implemented, whereas action is needed now to increase the supply of raw materials, thus bringing down the prices of raw materials and production components. Several examples of good practice have been identified in select Member States which could be implemented more widely. These are summarised below. The measures listed often combine the diversification of raw materials suppliers with efforts to help firms affected by the war find new markets. These measures are

[392] For example, since September 2022, Russian gas now accounts for only 8 % of all pipeline gas imported into the EU, compared with 41 % of EU gas being imported from Russia in August 2021. European Commission (2023). REPowerEU at a glance. Available at: https://commission.europa.eu/strategy-and-policy/priorities-2019-2024/european-green-deal/repowereu-affordable-secure-and-sustainable-energy-europe_en.

[393] SME Evoy Network (2022). SMEs and rising energy prices – First findings & recommendations. Available at: https://single-market-economy.ec.europa.eu/smes/sme-strategy/sme-envoys-network_en.

[394] European Commission (2023). Critical Raw Materials: ensuring secure and sustainable supply chains for EU's green and digital future. Available at: https://ec.europa.eu/commission/presscorner/detail/en/ip_23_1661.

in line with the **Commission's Communication on long-term competitiveness of the EU**, which explicitly mentions strategic autonomy and resilience.[395]

Box 2. Examples of national actions taken to assist companies in accessing raw materials

Germany

At the beginning of January 2023, the German Federal Ministry for Economic Affairs and Climate Action (BMWK) published the policy paper 'Pathways to a sustainable and resilient supply of raw materials'.[396] The aim of this raw materials policy is to provide companies with better support in diversifying their raw material supplies. While many of the measures proposed mirror those outlined in the proposed EU Critical Raw Materials Act, these are accompanied by additional measures that include quotas for recycling raw materials, support for the warehousing of raw materials by companies, and the establishment of a raw materials fund to increase production capacities. This fund is intended to provide grants, equity, loans and guarantees to finance projects for raw material extraction, processing and recycling in the EU and beyond, in accordance with the highest environmental, social and governance Standards.

Lithuania

Through the country's Public Institution Innovation Agency, Lithuanian companies are invited to make use of pre-paid access to international market research (Statista) as well as millions of business contacts databases (Orbis) in order to find new raw materials and components suppliers in other countries. Furthermore, the Republic of Lithuania's network of commercial attachés and its trade representative in Taipei (Taiwan) also provide assistance to companies seeking new trading partners.

Poland

Due to Russia's war of aggression against Ukraine, the Polish Development Fund (PFR), together with the Ministry of Foreign Affairs and the Ministry of Economic Development and Technology, launched a special hotline for Polish companies operating in eastern markets. Entrepreneurs received information on both sanction regulations and forms of assistance for companies affected by the current situation, including help with searching for new sales markets and access to alternative sources of raw materials and components.

In addition, Poland's Ministry of Economic Development and Technology engaged in bilateral contacts with representatives of the administrations of third countries to analyse possibilities in relation to the delivery and price conditions of raw materials and other products important for the Polish economy. Artificial fertilisers are one such example.

More generally, through the State Raw Materials Policy, cooperation agreements can be concluded between the geological services of Poland and other countries, providing the basis for research in those other countries. The geological information about mineral deposits obtained in this way is the foundation for an investment process relating to the use of natural resources, including specific mining investments. These measures are aimed at reducing the risks associated with undertaking investments in a given country. So far, Poland has concluded agreements with geological services in the Democratic Republic of Congo, Mongolia, Uzbekistan, Ukraine, Slovakia and the Dominican Republic.

[395] European Commission (2023). Communication from the Commission to the European Parliament, the Council, the European Economics and Social Committee and the Committee of the Regions. Long-term competitiveness of the EU: looking beyond 2030. Brussels, 16.3.2023. COM(2023) 168 final.

[396] BMWK (2023). Key issues paper: Ways to a sustainable and resilient supply of raw materials. Available at: https://www.bmwk.de/Redaktion/DE/Downloads/E/eckpunktepapier-nachhaltige-und-resiliente-rohstoffversorgung.html.

The Supply Chain Resilience platform[397]

The Supply Chain Resilience Platform, developed in cooperation with the European Cluster Cooperation Platform and the European Commission, aims to mitigate the effects of trade contacts lost as a result of the Russian war of aggression against Ukraine. It does so by establishing new business partnerships that can maintain the supply of specific goods by acquiring them from other sources. The platform connects companies looking for specific goods with companies that can supply them. It is designed for both businesses and humanitarian organisations. By the end of October 2023, 967 businesses from as many as 45 countries have registered on the platform.

Furthermore, the European Chips Act[398] sets out a strategy to reduce shortages of chips and semiconductors by **strengthening the EU's leadership in research and technology; building and reinforcing Europe's capacity to innovate in the design, manufacturing and packaging of advanced chips; putting in place an adequate framework to increase production by 2030; addressing skills shortages and attracting new talents; and developing an in-depth understanding of global semiconductor supply chains**. These measures, together with actions to invest in R&D&I activities (see Annex 3 regarding the electronics case study), will help to address the negative effects of shortages that have grown more acute due to inflation. However, in the short term, policymakers at both Member State and EU levels should **encourage SMEs to consider the joint procurement of chips and components that require minimum volume orders.** Placing orders for volumes higher than an individual company needs is an issue for SMEs even when inflation is low – but the problem becomes acute when the prices of these excess components rise substantially. This problem could be addressed, for example, by providing coordination support through the Enterprise Europe Network and the European Cluster Cooperation Platform, so that orders could be placed by clusters of SMEs at national or EU level.

Lastly, a number of SMEs interviewed for the present study stressed the need to **monitor and anticipate raw material shortages** at national level, because SMEs rarely have the resources to do so themselves. While this is one of the priorities included in the proposed Critical Raw Materials Act, it is important to stress that the JRC has already developed a Raw Materials Information System (RMIS).[399] **Additional awareness-raising actions relating to the RMIS, targeted at SMEs, could be a useful way to enable SMEs to take full advantage of the information provided through the RMIS**.

5.2. Measures to mitigate the negative effects of inflation

5.2.1. Create centralised national monitoring units to observe the impacts of inflation on SMEs

The present study has highlighted that inflation can affect the performance of SMEs in a variety of ways, and via different channels. The effects of inflation also vary between different industrial ecosystems and countries. As such, it would be useful to create **central monitoring units** within national governments, with the goal of monitoring the impacts of inflation on SMEs.

[397] Enterprise Europe Network (n.d.). The Supply Chain Resilience Platform. Available at: https://supply-chain-resilience-platform.b2match.io/home.
[398] European Commission (2023). European Chips Act. Available at: https://digital strategy.ec.europa.eu/en/policies/european-chips-act
[399] European Commission (n.d.). RMIS – Raw Materials Information System. Available at: https://rmis.jrc.ec.europa.eu/.

In particular, monitoring units could be made up of all relevant stakeholders, such as representatives from the national economy and finance ministries, central banks, business development agencies, statistical offices, business associations, and national experts. Each national monitoring unit would be in charge of identifying, within each country, those sectors and businesses most at risk with regard to different impacts of inflation, as well as estimating its effects in the short and medium terms. These monitoring units could then convene EU-wide meetings to periodically discuss their findings and alert each other about potential risks within certain ecosystems.

Central monitoring units would enable a coordinated response to the current environment of high inflation. This response could be similar to the comprehensive actions enacted in response to COVID-19, which tackled different aspects of the pandemic, ranging from emergency preparedness to digital health, gender issues and economic issues. For example, during the pandemic, a number of countries established emergency 'command centres' (e.g. the Inter-Ministerial Crisis Unit in France) to oversee and coordinate other entities involved in the pandemic response.[400] Such a solution would ensure that the dangers presented by persistent inflation are consistently monitored and not chronically underestimated, thereby laying some groundwork for future responses and promoting policy best practice.

5.2.2. Enhance SMEs' access to external finance using a mix of different financial instruments, including loans, subsidised loans and equity investments

Access to finance did not change much in the first half of 2022, compared with the previous semester – but firms' expectations regarding their future access to finance deteriorated across the EU, driven primarily by economic uncertainty. Firms interviewed for this study stressed the importance of maintaining access to external finance, given companies' reduced capacity to accumulate cash reserves due to their greater production costs. Worsening expectations regarding access to finance were found to be one of the key factors in the slowing-down of planned investment.

Since there is no single form of support that suits the needs of all SMEs, a mix of different forms of finance should be considered. In the context of a scarcity of public resources, policymakers should, with respect to SMEs' financing needs, favour the use of financial instruments such as **loans or loan guarantees targeting affected businesses**. More specifically, loan guarantees – which use public resources to share a portion of the risk associated with lending – offer the advantage of being deployed quickly and easily through the existing network of credit institutions. This enables such arrangements to reach a high number of enterprises. **Publicly supported loans (e.g. with lower interest rates)** can be used to support target enterprises that cannot be reached through the more standardised credit supported by partial guarantees. Such enterprises include those which lack a track record, such as start-ups, as well as informationally opaque SMEs, which find it more difficult to access commercial finance.

Some examples of loans and loan guarantees implemented in response to recent events are provided in Box 3. Based on the responses provided by representatives of the Member States, such measures were the most popular implemented in an attempt to enhance SMEs' access to finance during 2022.

[400] UCLG, Metropolis, LSE Cities, & LSE (2021). Multi-level Governance and COVID-19 emergency coordination. Analytics note 04. Available at: https://gold.uclg.org/sites/default/files/analytics_note_04_december_2021_0.pdf.

Box 3. Examples of loans and loan guarantees established in response to recent events

Germany

The KfW-Special-Program-Ukraine-Belarus-Russia-(UBR)-2022-SMEs enabled the provision of low-interest financing to German SMEs, sole proprietorships and freelancers that are affected by Russia's military aggression against Ukraine and by the sanctions implemented. The particular impacts on the companies affected can be demonstrated by declines in sales, losses of production, the closure of production facilities, or increased energy costs.[401]

Hungary

The Széchenyi Card Programme MAX+ promotes the competitiveness of Hungarian SMEs. The support available to enterprises includes interest rate subsidies (e.g. loans to enterprises at a fixed net interest rate of 5 %), guarantee fee subsidies, and management cost subsidies. Various MAX+ loan products are offered by the Széchenyi Card Programme, with different goals. These include:

- securing day-to-day operating expenses;
- supporting businesses in the tourism sector;
- purchasing working capital needed for the operation of the business;
- implementing green investment loan objectives to improve energy efficiency and technology change;
- supporting the smallest micro- and small enterprises, as well as start-ups, to achieve their agricultural and non-agricultural investment objectives; and
- helping agricultural enterprises to realise their development goals.[402]

Lithuania

The Ministry of Economy and Innovation, together with National Promotional Institution for Investment and Business Guarantees (INVEGA),[403] have accepted applications for direct loans to business entities affected by the war.[404] The maximum loan term length is three years for working capital loans, and six years for investment loans. Interest rates are set at not less than 5 %. Businesses were considered to be affected by war if:

- the share of the company's imports/export that were made to Ukraine and/or its imports to Russia and/or Belarus was not less than 25 % of its total imports/exports in year 2021; or
- the cost of the company's natural gas, heating and electricity supply made up at least 8 % of its annual costs (based on data from 2021);
- one or more of the company's economic activities was included in the Annex I of the European Commission Communication No. 2022/C 131 I/01 on the Temporary State Aid Framework.

[401] KfW (2022). Ukraine war and sanctions: KfW special program for companies. Available at: https://www.kfw.de/inlandsfoerderung/Unternehmen/KfW-Sonderprogramm-UBR/.
[402] For details, see: https://www.kavosz.hu/.
[403] INVEGA is the National Promotional Institution for Investment and Business Guarantees, established by the Government of the Republic of Lithuania. See: https://www.invega.lt/.
[404] INVEGA (2023). Direct loans to business entities affected by the war. Available at: https://invega.lt/verslui/visos-priemones/25/tiesiogines-paskolos-nuo-karo-nukentejusiems-verslo-subjektams-122.

Aid guarantees are also provided for loans and leasing transactions.[405] Companies can apply to receive aid guarantees until the end of 2023. Maximum terms are the same as above. Guarantees are provided for companies where:

- the share of the company's imports/exports to Ukraine and/or Russia and/or Belarus was not less than 25 % of its total imports/exports in the year 2021;
- the company's expenses for fuel, electricity and/or gas in 2021 accounted for at least 3 % of all company expenditure.

Netherlands

To increase financing options for investments in sustainability by SMEs, the SME credit guarantee scheme BMKB has been expanded with a green component: BMKB-Green (BMKB-G). By making use of this measure, SMEs can reduce their often sharply increased (energy) costs. In total, up to EUR 200 million in guarantees can be provided. Through the use of this expanded measure:

- The size of the surety loan available was increased from 50 % to 75 % of the loan amount in the BMKB-G. As a result, financiers could provide loans more easily and quickly, and SMEs could borrow more money and at an earlier stage.
- The term of the guarantee on the financing has been extended. For all financing using BMKB-G, it is possible to apply a guarantee with a maximum term of 12 years.
- The level of commission charged was also reduced. For financing under BMKB-G, commission is 2 % for a term up to and including 24 quarters, and 3 % for a term of between 25 and 48 quarters.

Companies in agriculture and fisheries, as well as large enterprises, are excluded.

Equity investments are another financial product that policymakers could consider promoting as part of a broader mix of access to finance measures. These are a niche financial product that is best suited to a small minority of SMEs – namely, innovative enterprises that have the potential for high growth. Despite being highly specialised, equity investments can cover a diverse range of enterprises over the course of their lifecycle, and can provide significant amounts of finance in the medium to long term. In general, public resources are especially necessary in supporting early-stage financing and in the scaling-up stage of SMEs' development. At the same time, publicly supported equity investments can help to develop financial markets by attracting business angels and venture capital investors – for example, through co-investment schemes.[406]

The use of financial instruments has accelerated significantly in recent years. In the context of the Cohesion Policy Programmes supporting SME competitiveness, the share of funds allocated in the form of financial instruments increased from around 20 % in the 2007-2013 period, to 33 % in the 2014-2020 period.[407] The COVID-19 crisis provided a test-bed to experiment with new forms of support, and an opportunity to rapidly build capacities for the use of such instruments.[408] However, publicly supported loans and other financing tools that involve public expenditures need to be counterbalanced against the need to reduce inflation

[405] INVEGA (2023). Assistance guarantees for loans and leasing transactions. Available at: https://invega.lt/verslui/visos-priemones/25/pagalbos-garantijos-paskoloms-ir-lizingo-sandoriams-116.

[406] t33, EPRC - University of Strathclyde, Metis (2015). Ex post evaluation of cohesion policy programmes 2007-2013, focusing on the European Regional Development Fund (ERDF) and Cohesion Fund (CF) Work Package 3: Financial instruments for enterprise support. *Final Report of the evaluation carried out on behalf of the European Commission DG REGIO No. 2014CE16BAT032*.

[407] Elaborations based on DG REGIO 2007-2013 Cohesion data from closure reports and 2014-2020 EC categorisation data.

[408] This issue is specifically tackled in an ongoing evaluation on behalf of the European Commission – DG Regional and Urban Policy (Ex post evaluation of Cohesion policy programmes 2014-2020 financed by the ERDF. Work package 6 – SME support. Contract N° 2021CE16BAT064). Results will be published by the end of 2023.

via fiscal instruments (e.g. by reducing public expenditures). As far as possible, they should not be employed as long-term industrial strategies.

5.2.3. Limit support to unviable businesses, and strengthen national early warning systems

The increase in bankruptcies observed in 2022 marked a return to pre-pandemic levels of bankruptcy, which had in part been artificially postponed by pandemic-related support measures. **A return to pre-pandemic bankruptcy levels should be considered appropriate,** and it is not necessary to postpone further bankruptcies using additional targeted support. The rate at which businesses exit the market is one of the drivers of endogenous economic growth.[409] Nevertheless, it is too early to tell whether or not the recent rise in bankruptcies will significantly exceed pre-pandemic levels – especially in the light of monetary tightening and the worsening economic outlook. Therefore, **national early warning systems – systems designed to detect insolvency risks at company level, and to assist companies in addressing them – could be strengthened** to ensure that viable businesses are saved.

Among other actions, **Directive 2019/1023/EU** already imposes requirements on the Member States to establish early warning tools; restructuring frameworks; the appointment in certain circumstances of a practitioner in the field of restructuring; and pauses in enforcement action, all of which will help to identify and help struggling SMEs. Member States have largely transposed the Directive into national law. Nevertheless, **significant challenges remain in the design and implementation of early warning systems**. Some Member States impose additional costs on companies that are already struggling, or share the alert information with creditors, reducing the companies' chances of accessing further credit and potentially, their chances of survival. Other Member States are only just piloting early warning tools, or only provide such services in certain regions. Different elements of existing early warning systems are often fragmented – making it difficult for entrepreneurs to understand where they should seek help, or which procedures to follow in their particular circumstances. Lastly, some Member States alert companies of the risk they are in without offering any advisory services, while others offer advice without having a functioning alert mechanism.[410]

Box 4 illustrates the early warning system in operation in Belgium, which combines both the alert and advice components, as well as an example from Portugal, which received the Grand Jury Prize at the 2023 SME Assembly. Additional examples can be found through Early Warning Europe[411] – a network helping companies in distress and advising Member States on the design of their early warning tools – as well as in a 2019 PPMI study on flanking measures in the context of business insolvency.[412]

Box 4. Examples of early warning systems integrating both the alert and advice features

Belgium[413]

The Chamber for Companies in Financial Difficulty within the Court for Enterprises in Belgium is responsible for collecting and synthesising information to identify struggling companies.

[409] Ahmad, N. (2006). A Proposed Framework for Business Demography Statistics. OECD Statistics Working Papers, No. 2006/3, *OECD Publishing*, Paris.
[410] Unpublished analysis shared by Early Warning Europe.
[411] Early Warning Europe (n.d.). A European Network Helping Companies in Distress. Available at: https://www.earlywarningeurope.eu/.
[412] PPMI (2019). The use of flanking measures in the EU and their implementation to the Lithuanian context. Available at: https://finmin.lrv.lt/uploads/finmin/documents/files/Flanking%20measures%20study(1).pdf.
[413] *Ibid*.

This includes information about unpaid taxes and social security contributions, court judgements relating to debt, companies' annual accounts, whether a company uses a fictitious address, etc. External accountants and auditors may also choose to report company managers to the court if they think the company is not taking appropriate steps to ameliorate its financial difficulties. Lastly, a private credit assessment firm, Graydon, also delivers the Chamber for Companies in Financial Difficulty a list of potentially at-risk companies. Graydon uses 13 indicators to identify companies at risk of insolvency. These consider company profitability, liquidity, indebtedness, the manager's previous experience with insolvencies, and others.

Based on the information received, the Chamber for Companies in Financial Difficulty determines whether to invite the company's managers for an interview. Managers must appear at the court in person, although they may be accompanied by other persons of their choice, including counsel and accountants. Appearance at the court is mandatory, and the interview is conducted by judges with expertise in accounting and banking.

Depending on the result of this interview, judges can make one of the three decisions:

1. The Chamber can send the case to the public prosecutor. The latter may initiate bankruptcy proceedings.

2. The Chamber can appoint an administrator, who has a maximum of four months to complete restructuring. Otherwise, bankruptcy or liquidation proceedings are initiated.

3. As of May 2018, the Court of Enterprises, after advice from the Chamber, also has the power to liquidate companies.

Although the Court cannot advise struggling companies, entrepreneurs can seek counselling services from organisations that provide specialist services such as Dyzo, Road to growth, Enterprises en Rebond, Centre for Companies in Difficulty. Dyzo, for example, is a non-profit organisation that helps entrepreneurs in difficulty. Entrepreneurs can contact Dyzo for an assessment of their company's chances of survival. If follow-ups are needed after the initial call, a further meeting can be held to analyse the situation in greater depth. Following this situation analysis, Dyzo specialists and company managers make a plan of action to restructure the company, terminate activities, sell the business, merge with another company, or declare bankruptcy. The services available include legal, accounting and social security advice; negotiations with creditors; budget management; the filing of paperwork for judicial protection with the Court for Enterprises; social security benefits claims; and bankruptcy filings. Services are provided free of charge thanks to public funding.

Portugal[414]

MAP (Portuguese: *Mecanismo de Alerta Precoce*) is an early warning mechanism in Portugal enabling more effective business restructuring processes. This mechanism aims to go further than the existing financial self-diagnosis tool[415] already available in the country. MAP is an information provision tool that provides companies with economic and financial indicators compiled from the Bank of Portugal's Balance Sheet Centre, based on data contained in the Simplified Business Information (IES) system, and analysed by IAPMEI.[416] In 2023, IAMPEI received the Grand Jury Prize at the SME Assembly for the MAP tool.[417]

[414] IAMPEI (2023). MAP | Mecanismo de Alerta Precoce. Available at: https://www.iapmei.pt/PRODUTOS-E-SERVICOS/Revitalizacao-Transmissao/Revitalizacao-Empresarial/MAP-Mecanismo-de-Alerta-Precoce.aspx

[415] IAMPEI (2023). Autodiagnóstico Financeiro. Available at: https://www.iapmei.pt/PRODUTOS-E-SERVICOS/Revitalizacao-Transmissao/Revitalizacao-Empresarial/Autodiagnostico-financeiro.aspx.

[416] IAMPEI, an agency under Portugal's Ministry of the Economy and Maritime Affairs, is responsible for business competitiveness and growth, with a special focus on small and medium-sized businesses.

[417] European Commission (2023). SME Assembly Day 2: Celebrating Success in Bilbao. Available at: https://single-market-economy.ec.europa.eu/news/sme-assembly-day-2-celebrating-success-bilbao-2023-11-14_en.

It is important to recognise that insolvency or restructuring proceedings impose **additional costs on businesses** – costs that struggling SMEs in particular may find it difficult to shoulder. Member States should therefore seek to reduce such administrative costs. A good example of this comes from Ireland, which amended its Companies (Rescue Process for Small and Micro Companies) Act in 2021 to provide a dedicated rescue process for small and micro-companies, the so-called 'Small Companies Administrative Rescue Process'. This complements the existing examinership[418] process, through which the protection of the Court is obtained to assist the survival of a company. However, the costs associated with examinership may put it beyond the reach of small and micro-enterprises. The new rescue process is designed to make rescue and restructuring more accessible and affordable to companies that are fundamentally viable, but are experiencing temporary difficulties.

5.2.4. Investigate the reasons for delays in government-to-business transactions

Early warning tools can help detect and address the risk of insolvency, but to reduce this risk, factors leading to business insolvency – such as late payments – should be diminished or eliminated. The Commission is currently revising the **Late Payments Directive** precisely with this goal.[419] The new proposal introduces a maximum payment term of 30 calendar days for all transactions involving B2B or public authorities. The present study has shown that payment delays remain when governments procure goods and services and that they are strongly country-dependent. Hence **additional research is needed to investigate the reasons for these delays**, **which may be country-specific**. One of the responses to the public consultation accompanying the revision of the Late Payments Directive, for example, highlighted that payment delays from Italian municipalities were reduced through institutional re-organisation, computerisation of invoices and payments, and ensuring cash availability at the municipal level. Some of the delays were caused by delays in payments from the state to local governments.[420]

Meanwhile, Member States have recently taken a number of diverging approaches to the issue of late payments. These are summarised in Box 5.

Box 5. Actions recently taken by several Member States with regard to late payments

Netherlands

On 1 July 2022, the Act 'Shortening legal payment term to 30 days' entered into force in Netherlands, which obliges large enterprises to pay SMEs within a maximum of 30 days. In addition, the country has been investigating whether it would be appropriate to establish public supervision of compliance with payment terms governing payments from large companies to SMEs.

Spain

Law 18/2022 of 28 September, on the creation and growth of enterprises, established several measures to reduce late payments:

i) the obligation to issue and send electronic invoices in commercial relations was extended to all companies and self-employed persons;

[418] Examinership is a process in Irish law whereby the protection of the Court is obtained to assist the survival of a company. It allows a company to restructure with the approval of the High Court.
[419] European Commission (2023). Late payments – update of EU rules. Available at: https://ec.europa.eu/info/law/better-regulation/have-your-say/initiatives/13665-Late-payments-update-of-EU-rules_en.
[420] *Ibid.*

ii) that companies not complying with the payment terms established in the Law against Late Payment are ineligible to access a public subsidy or to be a collaborating entity in its management. Public procurement regulations have been reinforced to guarantee that the awardees pay subcontractors the price agreed, on time;

iii) The creation of a 'State Observatory on Late Payment' in charge of monitoring the evolution of payment data, and the promotion of good practices in this area.

5.2.5. Make it easier for SMEs to access investments that are available to support the twin transition

The present study shows that SMEs are motivated to invest in the twin transition, but that longer-term and more substantial investments may be delayed as firms face higher immediate production costs and adjust to an environment of higher interest rates. In this context, government funding for the twin transition appears appropriate, especially in light of findings that it is effective in increasing the investments firms make in order to become more energy-efficient, to innovate and to adopt digital technologies.

Significant funding in relation to the twin transition, often in the form of non-repayable grants, is already available to SMEs via the Temporary Crisis Framework, the Recovery and Resilience Facility, and the European Structural and Investment Funds (ESIF). Nevertheless, according to business associations and SMEs interviewed for the present study, **small businesses are struggling to absorb these funds.** This is because usually, only a share of the investment is co-funded by public resources, and SMEs facing increases in their production costs that are unable to provide matching funding. Similar issues have been identified with the UK's Digital scheme – a government programme designed to provide free and impartial advice to 100,000 SMEs on how technology can help their business, as well as vouchers each worth up to GBP 5,000 to cover up to 50 % of the costs of buying pre-approved software. Despite a marketing campaign, the expanded eligibility of the scheme and positive feedback from previous users, it did not achieve the expected take-up, with fewer than 1,000 vouchers being redeemed by SMEs.[421]

Lowering the rate of co-financing required from SMEs in order to access funds available to support green and digital investments is one of the potential options to assist with fund absorption. Another option is to make available alternative forms of finance. More specifically, **tax credits** or publicly supported financial instruments with a repayable component could be considered, instead of non-repayable grants and subsidies. Indeed, tax credits are the primary means provided for small businesses to fund energy efficiency improvements by the US Inflation Reduction Act[422] In the context of the ESIF, financial instruments are already promoted as a preferred form of finance to support investment projects that are expected to generate net revenues or savings. Both tax credits and financial instruments generally entail a lower administrative burden on SMEs than grants and subsidies, and may therefore be better suited

[421] UK Government (2022). Final opportunity for businesses to access help to grow digital scheme. Available at: https://www.gov.uk/government/news/final-opportunity-for-businesses-to-access-help-to-grow-digital-scheme.

[422] The White House (2022). Fact sheet: How the Inflation Reduction Act will help small businesses. Available at: https://www.whitehouse.gov/briefing-room/statements-releases/2022/09/12/fact-sheet-how-the-inflation-reduction-act-will-help-small-businesses/#:~:text=The%20Inflation%20Reduction%20Act%20will%20reduce%20costs%20for%20small%20businesses,Small%20Business%20Health%20Care%20Costs.

to their needs and capacities, while at the same time being more targeted and requiring fewer public resources.

5.3. Measures that are appropriate under crisis circumstances

Public policies (at both national and EU levels) are expected to play an important anti-cyclical role in response to a crisis. This happened in the aftermath of the 2008/2009 crisis, and also after the COVID-19 pandemic (e.g. through the REACT-EU programme). Public policies can assist in **avoiding losing too many companies and jobs, helping businesses to resist and reinforce their structural resilience** in order to weather the challenges. Nevertheless, **non-targeted expansionary fiscal policy can result in market-distorting effects and, in the context of high inflation, could stand in the way of bringing down inflation**. Hence, the following discussion reviews which measures should be considered and which should be avoided, drawing on the variety of policies implemented by EU Member States in 2022.

5.3.1. Targeted support measures for businesses

Any fiscal support provided during episodes of high inflation should be **targeted at the most vulnerable businesses** which, despite being viable, would not otherwise be able withstand the price shock. Although broad measures support a greater number of businesses, they require increased public spending, which further stimulates inflation.

Across the EU, the **measures to support businesses implemented in 2022 and 2023 were most often targeted by sector**, prioritising those sectors with the highest energy intakes or those most exposed to fluctuations in the price of raw materials (e.g. energy-intensive industries, agri-food, construction). This is an effective approach in the short term. Nevertheless, the present study shows that even within those sectors most exposed to price fluctuations, firms vary greatly in terms of their ability to pass on costs to consumers. As a result, some firms report decreased profitability, while others are achieving record profits. **To avoid a situation in which governments further subsidise companies that are already profiting from inflation, public authorities should explore how much price increases have affected firms' costs, and what proportion of those increases firms were able to successfully pass to consumers.** The latter could be assessed by exploring whether firms' turnover and profitability has deviated significantly from historical trends. Alternative indicators – used to select firms eligible for support in Germany – could refer to declines in sales, losses of production, or the closure of production facilities.[423] Firms that raise prices more than is needed to offset increases in production costs should not be further supported, as this could fuel a profit-inflation spiral. Box 6 provides examples of recently adopted measures aimed at supporting vulnerable businesses.

Box 6. Targeted measures implemented in 2022 and 2023 to support businesses

Austria

Several targeted actions have been implemented to assist firms:

- Extraordinary credit for **self-employed persons and farmers** of up to EUR 500 each;

[423] KfW (2022). Ukraine war and sanctions: KfW special program for companies. Available at: https://www.kfw.de/inlandsfoerderung/Unternehmen/KfW-Sonderprogramm-UBR/.

- Energy subsidy for **energy-intensive companies**. Companies whose energy procurement costs amounted to at least 3 % of their production value in 2021, and whose national energy tax amounted to 0.5 % of their added value in 2021, were able to apply for a subsidy in 2022.
- Relief for domestic **SMEs with high fuel expenses**, especially in the **craft sector**, as well as **one-person enterprises**, via a fuel allowance with a volume of approximately EUR 120 million.
- Support for businesses to **switch over quickly to alternative, decarbonised forms of propulsion**: a total of EUR 120 million for the years 2022 and 2023.

Ireland

Enterprise Ireland assists viable but vulnerable firms of all sizes in the **manufacturing** and **internationally traded services** sectors. Two streams of funding are available under the scheme: the first assists firms suffering **liquidity problems** as a result of Russia's war against Ukraine, with total funding of up to EUR 2 million. The second stream has supported eligible companies experiencing **severe increases in energy costs** (which were at least 1.5 times higher in 2022/23 compared with 2021).[424]

Lithuania

At the end of 2022, the measure 'Subsidies to companies operating in the most affected sectors in order to mitigate the effects of energy price increases' (2022/C 131 I/01) was implemented on the basis of the Temporary Crisis Framework for state aid measures to support the economy following the Russian war of aggression against Ukraine. EUR 30 million was allocated for this measure. Subsidies were distributed to almost 1,300 companies operating in the following sectors: the **mining of metal ores;** the **manufacture of textile products; clothing sewing production;** the **production of wood and cork products** (except for the manufacture of furniture and products made from straw and other woven materials); the **paper industry and products made from paper**; the **manufacture of coke and refined petroleum products** (with certain exceptions); the **production of chemicals and chemical products**; the production of other **non-metallic mineral products**; and the production of **base metals**.

The amount of subsidies was linked to the taxes paid by the company in 2021. The estimated maximum amount of support was 30 % of the company's gross income and profit tax paid in 2021. The maximum subsidy that can be received by an individual firm was EUR 500,000, and the minimum EUR 500.

5.3.2. Extensions with regard to payment obligations

To help SMEs address short-term liquidity issues, extensions to the payment terms of tax and social security obligations may be needed (see Box 7). In addition, SMEs could seek loan extensions and holidays from their banks, which could be facilitated with government guarantees (see Section 5.2.2). Nevertheless, such measures should only be extended to those companies that are able to clearly demonstrate that they have a viable business plan, in

[424] For more information, see: https://www.enterprise-ireland.com/en/funding-supports/company/esetablish-sme-funding/ukraine-enterprise-crisis-scheme.html.

order to avoid a situation in which bankruptcies are artificially postponed (which occurred to some extent in the aftermath of the COVID-19 pandemic – see Section 4.2).

Box 7. Examples of measures allowing the deferment of payment obligations

Belgium

Companies experiencing difficulties in paying social security contributions can request an amicable repayment plan in response to problems related to the crisis. In addition to a classic amicable repayment plan, special repayment plans without penalties being applied to certain contributions can be used to cover this situation.[425]

Furthermore, the standard tax payment deadlines were increased from two to four months for all assessment notices within the assessment year 2022. A deferral of two months could also be applied to the payment of payroll tax deductions by businesses,[426] with similar provisions available for the self-employed.

Germany

Several relevant measures have been introduced, including:

- the maximum amount for loss carry-back[427] was increased until the end of 2023;
- a permanent extension of the option to carry-back losses to a two-year period;
- options for accelerated depreciation[428] for movable assets in 2022.

France

France introduced a deferral of tax and social security payments to relieve the cashflow of SMEs. This temporary measure could be considered at the request of companies. These deferrals did not apply to VAT, ancillary taxes or the payment of withholding tax. With regard to social security contributions, SMEs could request a payment deferral from the Urssaf (the French social security agency).[429] A similar measure was implemented with regard to customs duties.[430]

5.3.3. Indexation of public procurement contract values

The present study found that inflation has only a small effect on firms' participation in public procurement, on average resulting in 1 % of potential offers being lost. Nevertheless, interviews with representatives of the Member State highlight that some SMEs that have

[425] Social Security Company (n.d.). Amicable Instalment Plan. Available at: https://www.socialsecurity.be/site_nl/employer/applics/paymentplan/index.htm

[426] Federal Public Service Finance (2022). Reminder: energy crisis - general deferral of payments for the tax of natural persons, corporate tax, tax of non-residents and tax of legal persons (tax year 2022). Available at: https://financien.belgium.be/nl/Actueel/energiecrisis-algemeen-betaaluitstel

[427] A loss carry-back describes a situation in which a business experiences a net operating loss (NOL) and chooses to apply that loss to a prior year's tax return. This results in an immediate refund of taxes previously paid by reducing the firm's tax liability for the previous year in question.

[428] Accelerated depreciation refers to any one of several methods by which a company, for financial accounting or tax purposes, depreciates a fixed asset in such a way that the amount of depreciation taken each year is higher during the earlier years of an asset's life.

[429] Ministry of Economics and Finance and Industrial and Digital Sovereignty (2023). Business Owners, Are You Facing Difficulties? Available at: https://www.economie.gouv.fr/files/files/2023/guide_crise_chef_entreprise_DGE.pdf?v=1674488932.

[430] *Ibid*.

already signed contracts signed with public authorities are struggling to deliver the services at the fixed prices agreed. As a result, in Belgium, the government has provided for the possibility for the contracting authority in a public contract to grant advance payments to contractors (see Box 8). Elsewhere, Member States have created options to index the values of public contracts that depend on energy and raw material prices. These measures are diverse in their provisions, namely:

- Some target the construction sector specifically, while others apply more generally.
- In some cases, public authorities are obliged to index prices, while in others this is optional.
- In some countries, individual firms have to apply for their contract values to be indexed, while elsewhere the procedure is initiated by public authorities.
- In some cases, only energy price increases are considered, while in others, broader raw material price increases are taken into account as well.

These measures are associated with certain trade-offs. By indexing public contract values to inflation, public authorities are contributing to keeping inflation high (since this eliminates incentives to reduce the use of energy and raw materials that are in short supply). Furthermore, the indexation of contract values reduces firms' motivation to innovate or to use more sustainable energy sources that might allow them to deliver the contract within the fixed price. Nevertheless, in some cases, contract cancellations may be unavoidable in the short term in the context of high inflation, which could in turn diminish the results achieved in return for the money spent, and may entail additional administrative costs for public authorities when they have to re-contract. Such measures are also clearly beneficial to SMEs. Due to these mixed effects, such measures should gradually be phased out as the inflation outlook improves.

Box 8. Examples of measures adopted to assist companies struggling to deliver on their public contract commitments due to inflation

Belgium

In response to the current economic situation, the federal government created a possibility for the contracting authority in a public contract to support its contractor by granting an advance payment. According to the terms of a royal decree, the contracting authority could grant an advance of up to 20 %.[431]

Germany

In 2022, the Federal Ministry for Housing, Urban Development and Building and the Federal Ministry for Digital and Transport issued circulars addressed to contracting authorities at federal level, with regard to procurement relating to the construction of infrastructure projects:

- The first, issued on 25 March 2022, established a link between some of the economic upheaval and price increases. Price indexation clauses could be used with regard to specifically indicated raw materials/product groups. The circular also offered some facilitation with regard to the use of price indexation clauses. It was addressed towards contracting authorities at federal level, and was limited to the procurement of construction works. This circular was limited in time until 30 June 2022. Other contracting authorities/entities in the Länder or at municipal level were

[431] Federal Public Service Economy (2022). Temporary arrangement - Advances in public procurement. Available at: https://economie.fgov.be/nl/themas/ondernemingen/situatie-oekraine/tijdelijke-regeling.

not bound by this, but such ministerial circulars generally also provide guidance at Länder and municipality level.

- The second circular was issued on 22 June 2022. This established a prolongation until 31 December 2022, and a slight modification of the terms above. In general, it established a mechanism for calculating for price indexation clauses for construction procurement. However, in order to use this, the contracting authorities and the successful bidder needed to establish a so-called 'Basiswert 1', which formed the baseline for the indexation mechanism. Some aspects of the economic situation, however, were in such upheaval that construction undertakings simply could not reliably provide such a baseline value. This situation was not covered in the circular of 25 March. Accordingly, a mechanism (for such exceptional cases) was added (Formblatt 225a). Aside from this, the circular contained some additional clarifications with regard to that issued on 25 March.

- Based on a third circular released on 6 December 2022, the circulars above (in the version of 22 June) were extended once more until 30 June 2023.

- Since price fluctuations/increases also occurred in other branches of industry, the Federal Ministry for Economic Affairs and Climate Action issued a circular on 24 June 2022. Unlike the circulars above, this was not binding in nature, but was meant to provide guidelines for contracting authorities, and to some extent encouraged the use of price indexation clauses.[432]

Portugal

An extraordinary price review mechanism was introduced in Portugal. Among its various measures, the following ones stand out:

1) The possibility for the contractor to submit a request for an extraordinary price revision whenever a certain material, type of labour or equipment is subject to an increase of at least 3 % in the contractual price, and the year-on-year rate of change in the cost was equal to or greater than 20 %.

2) In addition to the extraordinary price revision regime, the contracting authority was granted the possibility to extend the deadline of the contract.

3) Furthermore, at a pre-contractual stage, contracting entities were allowed to select as winners proposals with a price higher than the base price of the procedure.

4) Lastly, it was expected that the price revision would be supported by funds entered into the budget programme for the respective sectoral area.

[432] Federal Ministry for Economic Affairs and Climate Action (2022). BMWK circular on dealing with price increases in public procurement (supplies and services). Available at: https://www.bmwk.de/Redaktion/DE/Artikel/Europa/auslegungsrundschreiben-preissteigerungen-ukr-rus.html.

5.4. Measures to avoid in the medium term

5.4.1. Non-targeted and price-distorting support measures

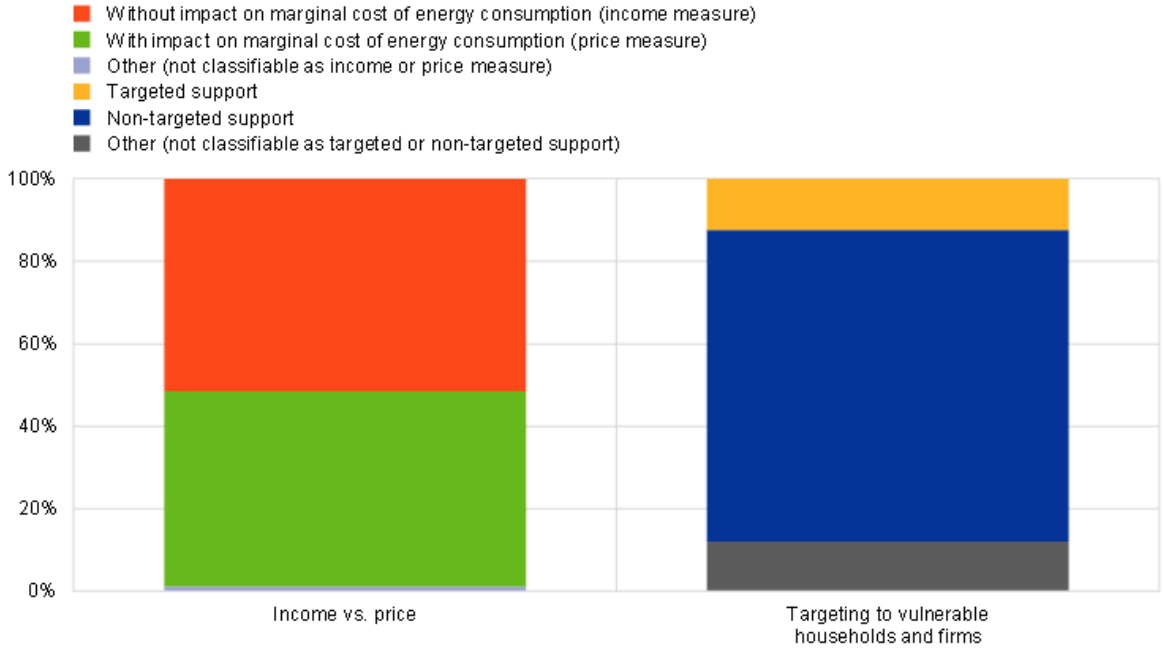
Non-targeted support measures may not be appropriate as a sustained response in times of high inflation. Such measures increase aggregate demand for goods and services, countering the efforts of central banks to lower it (see Box 1). Central banks are in turn pushed to continue increasing interest rates, which enhances the risk of driving the economy into a recession. Furthermore, indiscriminate measures imply significant windfall profits for firms that are already benefitting from high inflation because they are able to pass any cost increases on to their customers, or even increase their prices in excess of such increases. This, in turn, hurts the competitiveness of those firms that are unable to charge their clients more.

The majority of support provided by the Member States in response to the events of 2022 was non-targeted, as illustrated by the blue bar in Figure 77. **Examples of non-targeted support include price caps on electricity, gas, petrol and diesel; tax reductions on certain foods; postponing the payment of VAT, social security taxes and pandemic-related loans for all SMEs or businesses; VAT tax reductions; broad-based wage indexation, and others**. Governments opted to introduce these measures because they are quick to implement, and provided immediate relief to households and businesses when energy prices skyrocketed.

Although such measures immediately lowered inflation (by effectively reducing prices), they did not address the root causes of inflation. Worse, by lowering the price of goods of which there was a shortage, such policy actions disincentivise households and businesses from reducing their consumption of energy and raw materials that are in short supply, further fuelling inflation. As illustrated by the green bar in Figure 77, slightly less than half of all fiscal support distributed in the EU in 2022-23 affected energy prices, motivating greater energy consumption.[433] An alternative response that is more appropriate as the inflationary outlook improves is not to change prices, but to supplement incomes (for example, through one-off payments or increases in non-taxable income – but ideally targeted towards the most vulnerable groups, rather than the general population).

[433] European Central Bank (2023). Fiscal policy and high inflation. Available at: https://www.ecb.europa.eu/pub/economic-bulletin/articles/2023/html/ecb.ebart202302_01~2bd46eff8f.en.html.

Figure 77. Targeting of fiscal support over 2022-23, as a percentage of total support



Source: ECB calculations, based on the December 2022 Eurosystem staff macroeconomic projections for the euro area.434
Notes: left-hand panel: the size of the bars denotes the impact of stimulus measures on budget balance (in gross terms); 'net support' denotes the gross budget support, adjusted for discretionary financing measures (mostly taxes on windfall profits in the energy sector); 'other transfers' mostly denotes transfers to households. Right-hand panel: the shares are calculated on the basis of total policy measures in 2022 and 2023. The categories 'Other (not classifiable as income or price)' includes, for example, government purchases to fill gas storage. 'Other (not classifiable as targeted or non-targeted)' includes, in addition, equity support to gas dealers. For households, a measure is considered to be targeted if there is some form of means-testing. For firms, a measure is considered to be targeted if it applies to specific energy-intensive activities, as defined by the European Commission.

6. Conclusion

Over 2021 and 2022, the inflation experienced by businesses in the EU has risen rapidly, with the average annual rate of growth in producer prices reaching over 12 % in 2022, and year-on-year increases in consumer prices rising to 11.5 % in October 2022 (with the slight difference in rates being explained by the fact that firms experienced inflation first before passing most of it on to consumers). Inflation increased the most in the energy-intensive and energy-renewables ecosystems, driven by the sharp rise in energy costs, although it affected all industrial ecosystems. The effect on non-energy related ecosystems was driven by rises in wage costs, raw material shortages, weather conditions, supply chain disruptions, pent-up demand following the restart of the economy after the COVID-19 pandemic, and certain government policies that generated demand for materials that were already in short supply.

Growth in inflation slowed in the last quarter of 2022, in response to rising interest rates and government measures enacted across the EU. Nevertheless, the present report shows that both inflation itself and increased interest rates will negatively impact businesses in the EU, with some disproportionate effects on SMEs. The direct and indirect effects of inflation are summarised in Table 8 below, while a summary of the expected impacts of inflation in the three scenarios presented in this report is provided in Table 9.

In addition to these findings, the present report adds value in methodological terms in at least two ways. First, inflation is operationalised for each industrial ecosystem using a combination

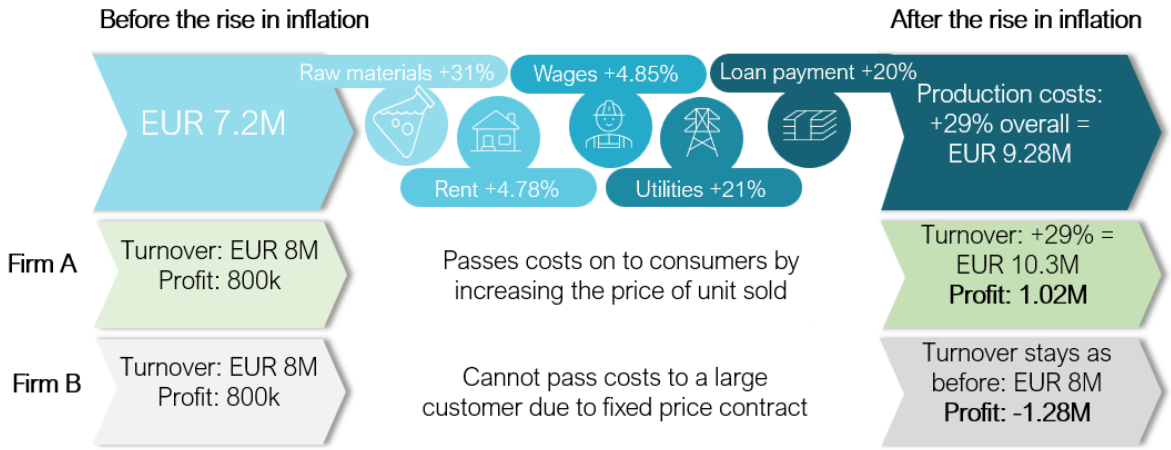
[434] *Ibid.*

of agricultural, construction, production, services, consumer and labour cost indices to provide an accurate picture of the cost increases experienced by businesses down to their various NACE two-digit sectors. When compared with traditional measures of inflation that rely solely on consumer prices, this index shows that firms experience greater inflation than consumers, suggesting that not all costs can be passed down from companies to consumers. Second, in terms of the report's analysis of the effects of inflation on public procurement, each CPV (common procurement vocabulary) code used to describe the content of public contracts is mapped to NACE codes. The need for such a mapping was identified in previous studies[435], and should be used in future research to ensure the comparability of results across different findings relevant to firms' participation in public procurement.

Overall, the estimated effects of inflation are small because they average out between those firms that have actually benefitted from the high inflation environment by charging greater markups, and those that were unable to pass cost increases on to consumers, with the latter – which are most often SMEs – finding themselves in a far more precarious situation. **From the perspective of individual SMEs, the cumulative price increases due to the various drivers of inflation (raw materials, energy, wages) and its by-products (higher interests on loans) can quickly add up**, **leading to significant losses in profitability for those firms that cannot pass the increased costs on to customers**.

To illustrate the cumulative effect of inflation on both types of businesses, consider the example in Figure 78 below, which illustrates how firms working on fixed-price contracts can see markedly reduced profits compared with those that are able to pass cost increases on to consumers. The two example firms in the figure have the same turnover and production costs prior to the rise of inflation. Both firms, experience an equal rise in the costs of raw materials, rent, wages and utilities, along with the interest on loans, so that the total production cost of the goods sold also increases (by a cumulative 29 % in the example below). To deal with these cost increases, the firm that sells to consumers (firm A) increases the price of each unit sold, thus increasing its turnover. However, firm B, which sells to another large business on a fixed-price basis, is unable to charge its client more. As a result, while firm A sees an increase in profits, the second firm experiences a loss, thus affecting its ability to pay suppliers on time, reducing its investments in digitalisation, greening and the labour force, and even putting the firm at risk of insolvency if the situation does not improve in the short term.

Figure 78. Cumulative impact of inflation on firms that can pass costs on to consumers, and those that cannot



Source: PPMI elaboration.

[435] For example, please see Cosinex (2017). Revision of CPV. Available at: https://single-market-economy.ec.europa.eu/single-market/public-procurement/digital-procurement/common-procurement-vocabulary_en.

Note: while the above exercise assumes that Firm A passes the entirety of the cost increases on to consumers, complete pass-throughs are not always common. The ability to pass on a higher proportion of costs is strongly dependent on the ecosystems in which firms operate.

Hence, the effects of an ongoing environment of elevated inflation run the risk of being underestimated, as it is the combination of effects that arrive through a multitude of channels that can push SMEs to the brink. As a result, establishing a sophisticated means of monitoring SMEs' financial health is an indispensable way to account for this complexity.

Member States have reacted to the environment of high inflation by adopting a wide range of measures. These include measures to address the key drivers of inflation – namely, increasing the security and supply of energy and raw materials to the EU. Measures to mitigate the negative impacts of inflation include creating monitoring units to improve coordination, as well as enabling enhanced access to finance for SMEs, including easier access to funds promoting the twin transition; strengthening early warning systems to detect and advise companies at risk of insolvency; and making additional efforts to reduce late payments in both government-to-business as well as business-to-business transactions.

The present study highlights additional short-term policy measures that proved effective during the peak of price increases in 2022, but which should gradually be phased out if inflation continues to fall. These include measures targeted at the most vulnerable businesses; loan extensions and loan holidays to help SMEs with short-term liquidity challenges; and the indexation of public procurement contracts to avoid contract cancellation. In addition, measures that should be avoided in the high inflationary environment are discussed. These include non-targeted support measures such as price caps on electricity, gas, petrol and diesel, applied to the whole population; tax reductions on certain foods; postponements for VAT, social security taxes and pandemic-related loans for all SMEs or businesses; and the automatic indexation of wages, among others.

Table 8. Summary of main findings

Impact	Direct effects of high inflation	Indirect effects
Late payments	Estimated increases in the collection period by roughly 1.5 days in 2022, when all other factors remain constant. The effect is greater for SMEs (1.7 days) compared with large firms (0.4 days, not statistically significant). The effect is strongest among firms in the construction ecosystem. Inflation has also increased the probability of firms experiencing problems in paying suppliers in a timely fashion, from 34 % to 35.5 % between 2021 and 2022	Estimated decreases in real GDP growth (aggregate demand) and increases in interest rates have both led to longer collection periods, by 1.6 and 0.9 days in 2022, respectively. SMEs are also less likely to seek out bank loans during periods of high inflation and, when they do so, their applications are more likely to be rejected, leading to a strain on their own resources and greater difficulties in paying suppliers, due to a lack of liquidity. As inflation increases, fixed-price contracts mean that contractors may not have enough funds to complete their works/services, which leads to them making late payments to suppliers.
Bankruptcies	Although an increase in bankruptcies was observed in 2022, this was not primarily driven by inflation, but by regulatory changes (e.g. in Spain), as well as the phasing out of pandemic-related support. The direct impact of inflation is small: for the levels of inflation observed in 2022, one would expect the solvency ratio to decrease from an average of 42.34 % in 2021 to 42.04 %, all other factors remaining constant, with the decrease being slightly greater among large firms (from 40.28 % to 39.77 %) than among SMEs (from 42.46 % to 42.23 %).	Higher profit margins provide a cushion against insolvency. Since firms achieve lower profits when aggregate demand is low, higher interest rates and lower real GDP growth – as recorded in 2022 – pose the risk that the number of bankruptcies will increase in 2023 and 2024. Longer collection periods (see above) reduce the solvency ratio (due to a lack of liquidity from missed receipts of payments) by as much as 0.21 percentage points for large firms and 0.58 percentage points for SMEs, given the expected increase in average collection periods in 2022.
Investment	Business investment increased in 2022 compared with 2021. However, the regression models do not suggest that inflation had a clear direct effect – at least, not yet – with the exception of manufacturing, where an increase of 2 percentage points is expected due to inflation, in line with recent research. This increase in investment is also most likely to be driven by the desire of large firms to use their cash reserves before they are devalued due to inflation.	Increases in interest rates to 4.50 % (as set by the ECB in September 2023) would be associated with decreases in the probability of firms expecting positive investments by 1.8 percentage points, from 31.8 % to 30.0 %. This effect would also be stronger among SMEs (falling from 31 % to 29.2 %) than among large firms (falling from 35.6 % to 34.4 %). An expected worsening of developments in access to external financing, coupled with uncertainty about the economic future, are associated with companies having lower expectations of undertaking investments.
Digital investment	The probability that SMEs will introduce innovations is around 2 percentage points lower in an environment of high (>10 %) inflation compared with an environment of low (0-5 %) inflation – 56.6 % vs 54.5 %, respectively, when all other factors remain constant. This helps explain why the share of firms introducing at least one innovation per year declined to 50 % in 2022 from 55 % in 2020, and also explains the high of 63 % in 2015. The share of SMEs adopting a digital technology jumped from 61 % in 2021 to	Worsening expectations regrading access to finance reduce companies' digitalisation efforts. However, encountering difficulties in finding skilled staff increases the probability of firms adopting digital technologies, which explains why many firms increased their automation efforts in 2022.

Impact	Direct effects of high inflation	Indirect effects
	69 % in 2022. Inflation is not found to have directly impacted the adoption of innovations, except in the industrial sector (NACE B-E), where 2022-level increases in inflation are associated with a reduced probability of introducing technological innovations from 65 % to 62.2 %.	
Green investment	Inflation has a twofold impact on green investments. Analysis using 2021 data shows that the probability of firms investing nothing in becoming more resource-efficient should have increased from 30 % in 2021 to 43 % in 2022 due inflation increases. However, analysis of 2022 data shows that increases in energy price are associated with an increased probability that firms will invest in energy efficiency measures, from 53 % to 58 %, driven primarily by SMEs rather than large firms. The effect of energy price increases is also strongest among utilities firms.	Decreases in aggregate demand (GDP growth) are associated with lower probabilities of firms investing in green practices, as this would entail slower investment pay-offs due to reduced consumer demand. Inflation has an indirect effect through turnover, decreases in which can result in lower investment in the adoption of green practices. Firms with smaller turnovers also invested less in green efficiency measures in 2022.
Public procurement	Inflation in 2022 is only expected to have reduced the number of bids submitted for public procurement contracts by approximately 1 %, suggesting that the overall effect is small. Inflation also reduces the proportion of bids submitted by SMEs by around 0.11 %, with a stronger effect in energy-intensive industries, where price increases were among the highest.	As inflation increases, fixed-price contracts mean that contractors may have insufficient funds to complete their works/services for the price initially agreed, thus posing the risk of contract cancellation. As a result, several Member States have adopted laws allowing the value of public procurement contracts to be indexed to inflation in certain sectors or under certain circumstances.
Access to skilled labour	Perceived increases in production or labour costs are associated with increases in firms' difficulties in accessing skilled labour, with the effect being greater for labour costs than for energy or material costs. The strongest effect is felt by micro firms in comparison to small and medium-sized firms. The effect does not vary significantly between sectors, probably due to the structural nature of the problem in accessing skilled labour, which predates the high-inflationary environment. The risk of a price-wage spiral in the EU remains modest, and could be avoided even in more pessimistic scenarios with persistent high inflation.	Higher interest rates are associated with firms experiencing fewer difficulties in finding skilled staff. This is because interest rate hikes will lower the expectations that inflation will continue to rise, which means that workers will feel less pressured to demand higher wages, thus making it easier for firms to hire. However, interest rates also have an adverse effect by restricting access to finance: firms with difficulty accessing external financing tend to have greater difficulty hiring staff. Labour market tightness (i.e. lower vacancy rates) is positively associated with firms' difficulties in finding skilled staff. This is because tighter labour markets can contribute to inflation by generating upward pressure on unit labour costs, thus increasing nominal wages.
Profitability	Inflation initially reduces average profit margins, but as firms pass costs down to consumers, inflation increases profit margins. This effect is also stronger among SMEs, whose profit margins are expected to have shrunk by 12 % in 2022 compared with a 3 % reduction among large firms. Factors other than inflation – such as increases in companies' turnover as they pass on costs – also impact profitability, which explains why record profits were	Increased interest rates are associated with reductions in firms' profit margins by an average of 0.35 percentage points. For 2022, this would translate to an expected decrease in profit margins by 0.9 percentage points, with the effect being stronger for SMEs (0.9) than for large firms (0.8). Reductions in aggregate demand (GDP growth), the higher prevalence of late payment practices, and worsening conditions regarding access to finance, are all associated with reductions in firms' profitability.

Impact	Direct effects of high inflation	Indirect effects
	observed at the beginning of 2023. After falling from 41.8 % in Q4 2021 to 41.5 % in Q2 2022, the gross profit share hit 42.0 % in Q1 2023. The effects across industrial ecosystems are mixed because they depend more on a firm's ability to pass down costs, which in turn is determined by its position within the value chain, how sensitive the demand for specific products is to price changes, and its types of clients. Preliminary evidence suggests that firms in certain sectors can pass down most of their costs, with food manufacturers being among those that managed to record the highest pass-through rates in 2022.	Lower turnovers are strongly associated with decreases in profit margins and lower probabilities of experiencing increased profits.

Table 9. Summary of simulated scenarios for each impact

	Scenario 1 (Baseline)	Scenario 2 (Pessimistic)	Scenario 3 (Highly adverse)
Assumptions → **Impacts ↓**	**Likelihood:** high **Interest rates:** *2023:* +25bp in July and +25bp in September; *2024:* no further increases **Annual growth in GDP:** *2023:* 0.8 %; *2024:* 1.4 % **Inflation:** *2023:* 4-7 %; *2024:* 2-3 %	**Likelihood:** medium **Interest rates:** *2023:* +25bp in July, +25bp in September, and at least one more increase of +25bp by the end of the year; *2024:* no further increases *Annual growth in GDP: 2023:* 0-0.5 %; *2024:* 0.5-1 % **Inflation:** *2023:* 7-8 %; *2024:* 3-4 %	Likelihood: low **Interest rates:** *2023:* increase by +25bp in July, 25bp in September and at least two additional increases of +25bp by the end of the year; 2024: no further increases **Annual growth in GDP:** *2023:* between -0.5 % and 0.5 %; *2024:* between -2 % and -1 % **Inflation:** *2023:* 8-12 %; *2024:* 5-10 %
Late payments	The impact of inflation on late payments is expected to be short-lived, and will amount to an additional delay in collecting payments of 1.5 days in 2022 compared with 2021. Over the subsequent two years, it is expected to increase by less as inflation decreases, with a total of 0.8 additional days of delay in 2023 compared with 2021, and no additional days in 2024.	The impact of inflation is expected to be 1.5 additional days of delay in 2022 compared with 2021. However, late payments are unlikely to return to 2021 levels, with an expected additional 1.1 days of delay in 2023, and 0.1 additional days in 2024.	The impact of inflation is expected to be 1.5 additional days of delay in 2022 compared with 2021. However, late payments are unlikely to return to 2021 levels, with an expected 2 additional days of delay in 2023, and 1 day in 2024. In this scenario, the impact is felt more strongly in the construction ecosystem, which may experience an extension to the average collection period of up to one working week over the following two years, from a total of 82 days in 2022 to 87 in 2024.
Bankruptcies	The trend in the bankruptcy declarations in the EU is expected to return to pre-pandemic levels, with annual variations ranging from 0 % to 5 %, taking into account all sectors.	The probability of bankruptcy will increase compared with the baseline scenario, but not as much as in Scenario 3.	The probability of default will increase for all firms, across all ecosystems and geographies. Businesses in those energy-intensive sectors that are less able to pass on higher energy and commodity costs to customers, including construction and the utilities market, are more exposed to the risk of bankruptcy. In the construction sector, the number of firms declaring defaults could triple from 2 to 6 out of every 1,000 firms between the end of 2023 and the end of 2024.

	Scenario 1 (Baseline)	Scenario 2 (Pessimistic)	Scenario 3 (Highly adverse)
Assumptions → **Impacts ↓**	**Likelihood:** high **Interest rates:** *2023:* +25bp in July and +25bp in September; *2024:* no further increases **Annual growth in GDP:** *2023:* 0.8 %; *2024:* 1.4 % **Inflation:** *2023:* 4-7 %; *2024:* 2-3 %	**Likelihood:** medium **Interest rates:** *2023:* +25bp in July, +25bp in September, and at least one more increase of +25bp by the end of the year; *2024:* no further increases *Annual growth in GDP: 2023:* 0-0.5 %; *2024:* 0.5-1 % **Inflation:** *2023:* 7-8 %; *2024:* 3-4 %	Likelihood: low **Interest rates:** *2023:* increase by +25bp in July, 25bp in September and at least two additional increases of +25bp by the end of the year; 2024: no further increases **Annual growth in GDP:** *2023:* between -0.5 % and 0.5 %; *2024:* between -2 % and -1 % **Inflation:** *2023:* 8-12 %; *2024:* 5-10 %
			Bankruptcy declarations could double from 7.5 to 17 firms out of every 1,000 in accommodation and related food services, and from 14 to 25 out of every 1,000 SMEs in transport. The agricultural sector, including agri-food, where fuel, fertiliser and fodder are all vital to maintaining normal levels of output, will also suffer as a consequence of the Russian war of aggression against Ukraine. Meanwhile, manufacturing SMEs could experience an increase in the risk of default due to a lack of affordable raw materials, in line with the trend predicted for the construction ecosystem.
Investment and digitalisation	The growth rate for digitalisation investments by SMEs is foreseen to be in the range of 1-3 % in 2023-2024, lower than in 2022 (when it was 4-5 %). This would correspond to an investment level of EUR 30-31 billion per year. This trend follows the general rate of growth in investments by SMEs. The direct role played by inflation on investment trends is limited. Other financial conditions and structural barriers play a more prominent role.	The evolution of digital investments among SMEs in the more pessimistic scenarios is highly uncertain, and could take two opposite directions. On the one hand, higher interest rates are likely to negatively impact financial markets and reduce consumer spending as well as investments, due to higher borrowing costs, especially for SMEs. The consequence of this is that the growth rate of investments in digitalisation is expected to be lower than that seen in the baseline scenario, or may even be negative (from -1 % to 1 %, amounting to EUR 29-31 billion per year). On the other hand, more difficult economic conditions could push SMEs to invest more in digital technologies as a way to improve their production processes as well as reinforce their resilience and competitiveness. Digitalisation enhances productivity growth, and entrepreneurs may therefore see potential opportunities resulting from digital investments, as occurred during the COVID-19 crisis. In that case, an increase in SME digitalisation might be observed, with investment growth being even higher than in the baseline scenario (3-5 %, or EUR 31.5-32 billion of investment per year), especially if supported by public interventions. Which of the two situations above will prevail is very difficult to forecast, given the large number of variables involved.	
Investment in sustainable practices	A growth rate in green investments by SMEs of between 1 % and 3 % is expected, leading to the total amount of green investments being EUR 204-208 billion per year. Inflation has only a marginal impact on investment practices. This trend follows the general investment levels for SMEs, as well as	As with investments in digitalisation, the growth rate for sustainable investments in the two most pessimistic scenarios is highly uncertain, could possibly be driven by two concurrent yet opposing forces: On the one hand, the rate of growth could be between -1 % and 1 % in a situation where the negative effects of higher interest rates (and of an economic recession, under the highly adverse scenario) prevail. In such a case, the annual volume of investments in sustainable practices would be in the range of EUR 200-204 billion . On the other hand, sustainable investment could increase by between 3 % and 5 % if the positive effects from new opportunities prevail (in	

	Scenario 1 (Baseline)	Scenario 2 (Pessimistic)	Scenario 3 (Highly adverse)
Assumptions → **Impacts ↓**	**Likelihood:** high **Interest rates:** *2023:* +25bp in July and +25bp in September; *2024:* no further increases **Annual growth in GDP:** *2023:* 0.8 %; *2024:* 1.4 % **Inflation:** *2023:* 4-7 %; *2024:* 2-3 %	**Likelihood:** medium **Interest rates:** *2023:* +25bp in July, +25bp in September, and at least one more increase of +25bp by the end of the year; *2024:* no further increases *Annual growth in GDP: 2023:* 0-0.5 %; *2024:* 0.5-1 % **Inflation:** *2023:* 7-8 %; *2024:* 3-4 %	Likelihood: low **Interest rates:** *2023:* increase by +25bp in July, 25bp in September and at least two additional increases of +25bp by the end of the year; 2024: no further increases **Annual growth in GDP:** *2023:* between -0.5 % and 0.5 %; *2024:* between -2 % and -1 % **Inflation:** *2023:* 8-12 %; *2024:* 5-10 %
	expected investments trends in digitalisation, since the green and digital transitions reinforce one another.	other words, SMEs may be more willing to make green investments in order to reinforce their resilience and cope with the effects of a crisis). In this latter case, annual green investments totalling EUR 208-212 billion would be expected.	
Participation in public procurement	The expected gradual decrease of inflation towards target levels should favour a recovery in the level of SME participation in public procurement. However, a return to pre-pandemic levels is unlikely during 2023 and 2024 because public spending is projected to fall in order to help curb inflation and improve countries' balance sheets. Participation in public procurement by SMEs in agri-food and energy-intensive industries is expected to recover more slowly than in other sectors. Conversely, the market volume in electronics is likely to be sustained by the reshoring of production and higher demand for sustainable electronics, driving up participation in public tendering. In this context, inflation will play only a marginal direct role.	Tighter monetary policy will contribute to a further slight reduction in the number of offers per CAN compared with the baseline scenario. As in the baseline scenario, participation in public procurement by SMEs in agri-food and energy-intensive industries is expected to recover more slowly than in other sectors. Conversely, participation in public tendering by SMEs in electronics will recover more quickly.	Due to tighter financial constraints and a more negative economic outlook, the recovery in participation rates will take a longer time – well beyond the time horizon covered by the simulations. Under this scenario, it is forecast that the number of offers per CAN will reach its lowest point in 2023 (an average of 2.88 across all ecosystems), rising to around 3 by the end of 2024. As in the baseline scenario, participation in public procurement by SMEs in agri-food and energy-intensive industries is expected to recover more slowly than in other sectors. Conversely, participation in public tendering by SMEs in electronics will recover mor quickly.
Access to skilled labour	Accessing skilled staff is a long-standing, structural barrier for SMEs, which is only marginally linked to the economic cycle. It is therefore also expected to remain an obstacle in the near future in each of the three scenarios considered. While SMEs' concerns regarding access to skilled labour were previously driven by exceptionally high energy	SMEs' difficulties in accessing skilled labour in the pessimistic scenario will remain close to the trend observed in the baseline scenario. Tighter monetary policy and inflation that remains at relatively high rate will negatively affect production, labour and financial costs,	In the scenario of a new energy price crisis, a negative economic outlook and a new increase in inflation rates, it is expected that exiting difficulties in accessing skilled labour will be further exacerbated. SMEs' perceived difficulty in accessing skilled labour is likely to be higher than in 2022.

	Scenario 1 (Baseline)	Scenario 2 (Pessimistic)	Scenario 3 (Highly adverse)
Assumptions → **Impacts ↓**	**Likelihood:** high **Interest rates:** *2023:* +25bp in July and +25bp in September; *2024:* no further increases **Annual growth in GDP:** *2023:* 0.8 %; *2024:* 1.4 % **Inflation:** *2023:* 4-7 %; *2024:* 2-3 %	**Likelihood:** medium **Interest rates:** *2023:* +25bp in July, +25bp in September, and at least one more increase of +25bp by the end of the year; *2024:* no further increases *Annual growth in GDP: 2023:* 0-0.5 %; *2024:* 0.5-1 % **Inflation:** *2023:* 7-8 %; *2024:* 3-4 %	Likelihood: low **Interest rates:** *2023:* increase by +25bp in July, 25bp in September and at least two additional increases of +25bp by the end of the year; 2024: no further increases **Annual growth in GDP:** *2023:* between -0.5 % and 0.5 %; *2024:* between -2 % and -1 % **Inflation:** *2023:* 8-12 %; *2024:* 5-10 %
	costs, from early 2023 onwards, they will be driven in particular by a growth in wages aimed at recouping losses in purchasing power, as well as increasing costs in relation to food processing, continuing increases in profit margins (albeit at a slower pace).	but with a limited additional impact on access to qualified labour.	
Profitability	Profit margins are expected to remain positive but lower than in 2022, due to the concurrent effects of inflation, which will continue to be relatively high, as well as rising interest rates and a slowdown in demand for goods following the post-COVID bounce-back. Profit margin will stand at around 4-5 % by the end of 2024, returning to patterns observed before the pandemic. Profit margins will remain higher in services than in manufacturing sectors. Firms in highly energy-intensive industries, construction and textiles will struggle to successfully pass on higher production costs to their consumers, with negative consequences on their profit margins. In contrast, agri-food industries will probably maintain their current profitability thanks to an inelastic demand.	Rising interest rates, in combination with lower demand, will squeeze profit margins even more than in the baseline scenario due to SMEs having weaker pricing power than large businesses and greater dependence on borrowing. Profitability is expected to remain positive, but at a rate of between 1 % and 3 % in 2023-2024. The same differences between ecosystems discussed in the baseline scenario will apply.	A slowdown in economic activity, deterioration in demand and more difficult access to finance are likely to lead to a decline in SMEs' profit margins to a value of between -1 % and -5 % in 2023-2024. The energy-intensive industries may react to the risk of unprofitability by lowering production levels. The construction ecosystem will be severely affected by the decrease in profitability, with a higher risk of bankruptcy. In contrast, the profitability of the agri-food industries is still likely to be slightly positive (thanks to inelasticity of demand), but lower than in the pessimistic and baseline scenarios.

Annex 1: Methodology

The study relies on a mix of quantitative and qualitative approaches to data collection and analysis. The data collection activities included the compilation of relevant quantitative data sources, web-scraping, literature review, and the interview programme. The collected quantitative data was then analysed using descriptive statistics, regression modelling, and simulations of future scenarios. The emerging statistical findings were corroborated by analysing qualitative data from the literature review and interviews, as well as from additional insights from case studies covering the impact of inflation on firms dealing with agri-food, construction, electronics, energy-intensive industries, and textiles. The methods are described in the following sections, along with details on how inflation was operationalised.

A.1.1. Data collection

Data collection activities consisted of a review of quantitative data sources, collection of big data, a literature review and an interview programme.

A.1.1.1. Review of quantitative data sources

To quantitatively analyse the impacts of sustained high inflation on SMEs, the research team first took stock of existing indicators to measure both inflation as well as its impacts. While the precise indicators ultimately selected for analysis of each impact are detailed in Chapter 3, the types of data sources reviewed include:

- **EU firm-level surveys** such as the Survey on the Access to Finance of Enterprises (SAFE)[436] relevant Eurobarometer Surveys; and the European Investment Bank's Investment Survey (EIBIS).[437]
- **Administrative data compiled by international organisations**, especially Eurostat, ECB and other central banks' and TED (Tenders Electronic Daily).[438]
- **Private data sources**, such as Intrum's European Payment Report (descriptive statistics only),[439] and Orbis company data.[440]

Nevertheless, it should be noted that 2022 data are limited. As a result, analyses often rely on historical inflation data to estimate the impact of inflation and extrapolate it using the levels of inflation observed in 2022.

A.1.1.2. Collection of big data

The scoping exercise described in the previous section helped with identifying key data gaps. First, little quantitative information was found to analyse the impact of sustained high inflation on public procurement. Secondly, while some data exist on insolvencies and bankruptcies, data covering the entire EU-27 was available for up to 2021 only or was available only at the country, rather than firm level. To address these data gaps, big data on public procurement from the Tenders Electronic Daily (TED) is used as well as on insolvencies from Technote.[441]

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[436] European Central Bank. (2022). *Survey on the access to finance of enterprises*. Available at: https://www.ecb.europa.eu/stats/ecb_surveys/safe/html/index.en.html.

[437] Eurobarometer. (2021). *Flash Eurobarometer 498 – SMEs, resource efficiency and green markets (wave 5)*. Available at: https://europa.eu/eurobarometer/surveys/detail/2287.

[438] See https://ted.europa.eu/TED/main/HomePage.do.

[439] Intrum. (2022). *European Payment Report 2022*. Available at: https://www.intrum.com/publications/european-payment-report/european-payment-report-2022/.

[440] See: https://login.bvdinfo.com/R0/Orbis4Europe.

[441] See: https://www.technote.ai/.

The goal of data collection through Technote was to identify companies whose websites went offline in 2022 as a proxy for bankruptcy measurement. Technote regularly (about every eight weeks) visits company websites and timestamps events when a previously active website becomes inactive. Once a previously active website goes offline, Technote pings the same website three more times over the next 30 days before determining it is inactive. The results of the Technote data analysis are presented in Section 4.2.2.

A.1.1.3. Literature review

To complement the findings from statistical analyses, the team carried out a literature review. The review focused on the various ways in which inflation might affect SMEs both during the current high inflation period as well as high inflation periods of the past. Both EU and non-EU countries were covered, whenever relevant. In total, 277 sources were reviewed. The findings from the literature review are discussed together with findings from other research streams in Chapter 3.

A.1.1.4. Interview programme

An in-depth interview programme was carried out with Member State representatives, business associations, SMEs, and experts. In total, 58 interviews were completed.

A.1.2. Data analysis

Following the acquisition of the data as described in Section 3.1, the team moved onto data analysis. The inflation indicator for each industrial ecosystem was first constructed, followed by descriptive statistics, regression modelling, and simulations for the impacts discussed in the report.

A.1.2.1. Construction of the inflation indicator

The main determinant of interest for our analyses is the annual change in inflation in those economic sectors (NACE) that are relevant for the industrial ecosystems. The inflation variable was compiled using data from Eurostat and from national statistical databanks whenever Eurostat data were found to be incomplete. Several price indices were used to operationalise inflation by ecosystem. For the agri-food ecosystem, the research team employed the output price for agricultural goods;[442] for the construction ecosystem, the output price index in construction was used;[443] the team further used the HICP for all items (CP00) in retail, and then separately for Health (CP06), and for cultural & creative industries (CP09).[444] For the remaining ecosystems, either the producer price index (PPI),[445] the service produce price index (SPPI),[446] or both were preferred, depending on the composition of each ecosystem.

[442] Price indices of agricultural products, output (2015 = 100) - annual data. Available at: https://ec.europa.eu/eurostat/databrowser/view/APRI_PI15_OUTA__custom_4418542/default/table?lang=en.
[443] Construction producer prices or costs, new residential buildings – annual data. Available at: https://ec.europa.eu/eurostat/databrowser/view/sts_copi_a/default/table?lang=en.
[444] HICP - annual data (average index and rate of change). Available at: https://ec.europa.eu/eurostat/databrowser/view/PRC_HICP_AIND/default/table?lang=en&category=prc.prc_hicp.
[445] Producer prices in industry, total - annual data. Available at: https://ec.europa.eu/eurostat/databrowser/view/sts_inpp_a/default/table?lang=en.
[446] Service producer prices - annual data. Available at: https://ec.europa.eu/eurostat/databrowser/view/sts_sepp_a/default/table?lang=en.

In particular, based on a Commission Annual Single Market Report 2021,[447] the team checked which NACE codes each ecosystem includes. In some cases, the same NACE code was present in multiple ecosystems (e.g. NACE C26 on 'Manufacture of computer, electronic and optical products' was included in the aerospace & defence, digital, and electronics ecosystems). Using calculations included in the SWD, assigned univocal NACE codes were assigned to each ecosystem, based on the weight that each NACE code apported to the ecosystems, in terms of gross value added and employment generated by that NACE sector for the whole ecosystem. As such, for instance, C26 was assigned to electronics due to its greater weight compared to the digital and aerospace & defence ecosystems.

In cases when NACE codes had the same weight for different ecosystems, some discretionary measures on matching NACE codes with the ecosystems were employed. For instance, the code J58 ('Publishing activities') was explored down to the 4-digit level in Orbis data, and corresponding companies were divided between the digital and the cultural & creative industries ecosystems. Following this univocal matching between 2-digit NACE codes and ecosystems, the team proceeded to calculate inflation for each NACE code/country/time period combination. Finally, in those cases were service producer inflation indices contained too few observations, the labour cost index (LCI) was used as a proxy for inflation – namely for the tourism, and proximity, social economy & civil security ecosystems.[448] The final breakdown is presented in the table below.

Table 10. Breakdown of inflation indicators by NACE and ecosystem

Ecosystem	NACE codes	Inflation indicators
Construction	F, C31, M71, N82	CPPI, PPI, SPPI
Agri-food	A, C10, C11, C12	API, PPI
Energy-intensive industries	C16, C17, C19, C20, C22, C23, C24	PPI
Electronics	C26, C28	PPI
Textiles	C13, C14, C15	PPI
Aerospace and defence	C25, C30, C33, N80	PPI, SPPI
Cultural and creative industries	CP09, J58 (partly)	HICP
Digital	J58 (partly), J61, J62, J63	SPPI
Tourism	H51, I	SPPI, LCI
Energy-renewables	C27, D35	PPI
Health	CP06	HICP
Mobility – transport – automotive	C29, C30, H49, H50, H52	PPI, SPPI
Proximity, social economy and civil security	L, Q, S	LCI
Retail	CP00	HICP

Source: elaborated by PPMI.
Note: PPI is Producer Price Index; SPPI is Service Producer Price Index; CPPI is Construction Producer Price Index; API is Agricultural Producer Index; HICP is Harmonised Index of Consumer Prices; LCI is Labour Cost Index.

[447] Following the guidelines in: European Commission. (2021). SWD on the Annual Single Market Report, 2021, SWD(2021) 35, final, Brussels, 5/5/2021. Available at: https://eur-lex.europa.eu/legal-content/en/TXT/?uri=CELEX%3A52021SC0351.
[448] Labour cost index by NACE Rev. 2 activity - nominal value, annual data. Available at: https://ec.europa.eu/eurostat/databrowser/view/LC_LCI_R2_A/default/table?lang=en&category=labour.lc.lci.

In those data sources where no information was available on the 2-digit NACE codes, namely SAFE and Eurobarometer surveys, the team employed different strategies. In the case of SAFE, firms were grouped into four sectors:

- Construction (NACE code F), for which CPPI was used;
- Industry (NACE codes C-E), for which the PPI was used;
- Services (NACE codes H-N), for which SPPI was used; and
- Trade (NACE code G), for which HICP (all items) was used.

In the case of Eurobarometer, the survey provided information on the ecosystem to which respondents believed they belonged. The team therefore employed an ecosystem-weighted average measure of inflation using the weights provided in the Annual Single Market Report 2021.[449]

A mixture of consumer and producer price indices was used rather than only the harmonised index of consumer prices (HICP) as is reported by Eurostat. There are two reasons for this. First, matching inflationary changes to individual economic sectors ensures more variability (e.g. inflation in energy-related sectors was higher than in the agri-food or textiles ecosystems), which is important to accurately capture the effect of inflation in regression models. Secondly, since SMEs are producers of goods and services, producer prices may have more weight on production decisions. For instance, the energy component of HICP increased by 40% in 2022 in the EU, whereas the increase was 85% when energy-related producer prices were taken into account.

Moreover, the preferred measure of inflation was the annual percentage change instead of an indexed measure of inflation because the base year for the relevant price indices is not consistent across NACE sectors (i.e. in some cases it is 2015, in others 2016, and yet in others 2010). Moreover, annual changes are able to directly measure both increases and decreases in the rate of inflation.

A.1.2.2. Descriptive statistics

The first step in data analysis was to visualise the trends of various impacts on SMEs. Depending on the data available for each impact, trends were either annual, semi-annual or quarterly. Additional break-downs by firm size, country and ecosystem (or sector) were provided whenever possible.

A.1.2.3. Regression modelling

Depending on the operationalisation of the dependent variables and the availability of the data, different regression models were tested, detailed in the table below.

Table 11. Description of dependent variables for the regression models

Impact of sustained high inflation on…	Dependent variable	Data source	Frequency	Time covered	Model
Late payments	Average number of days to collect payments	Orbis	Yearly	2013-2021	Linear regression

[449] European Commission. (2021). *SWD on the Annual Single Market Report, 2021, SWD(2021) 35, final, Brussels, 5/5/2021*. Available at: https://eur-lex.europa.eu/legal-content/en/TXT/?uri=CELEX%3A52021SC0351.

Impact of sustained high inflation on…	Dependent variable	Data source	Frequency	Time covered	Model
	Experiencing problems due to the late receipt of payments	SAFE	Yearly	2019-2022	Logistic regression
	Experiencing problems in paying suppliers as a consequence of the late receipt of payments	SAFE	Yearly	2019-2022	Logistic regression
Investment and digitalisation	Positive change in expected investment in the current financial year	EIBIS	Yearly	2016-2022	Logistic regression
	Implementation of digital technologies in parts of business or organised business around it	EIBIS	Yearly	2019-2022	Logistic regression
Investment in sustainable practices	Yearly average investment to be more resource efficient, as % of turnover over the previous two years	Eurobarometer	Cross-sectional (only one time period)	2021	Ordered logistic regression
	Turnover	Orbis	Yearly	2013-2021	Linear regression
	Investing or implementing in measures for energy efficiency to combat GHG emissions	EIBIS	Cross-sectional (only one time period)	2022	Logistic regression
Participation in public procurement	Average number of offers per contract award notice	TED	Quarterly	2018-2022	Linear regression
	Proportion of bids coming from SMEs	TED	Quarterly	2018-2022	Quasi-binomial regression
Bankruptcies	Solvency ratio (shareholder funds/total liabilities)	Orbis	Yearly	2013-2021	Linear regression
Access to skilled labour	Difficulties in accessing skilled labour	SAFE	Semi-annual	2014-2022	Linear regression
Profitability	Profit margins	Orbis	Yearly	2013-2021	Linear regression

Impact of sustained high inflation on…	Dependent variable	Data source	Frequency	Time covered	Model
	Declaring increased profits	SAFE	Semi-annual	2014-2022	Logistig regression
	Gross share of profits for non-financial corporations	Eurostat	Quarterly (but country-level only)	2017-2022	Linear regression

All models include, when feasible, controls to address unobserved factors that are specific to the country and ecosystem relevant to the impact of interest, as well as time effects (whether yearly, semi-annual, or quarterly), which can help control for common EU-wide shocks, such as the COVID-19 crisis.

A variety of firm-level characteristics (or contract notice characteristics, in the case of public procurement) were also controlled for, such as demographics (size, age), and financials (turnover, profitability, financing). Country-level controls such as real GDP growth and interest rates were also added. In the case of panel data in which the dependent variable displays temporal dependence (i.e. similar values over time within each country or ecosystem), a lagged dependent variable was added to assuage autocorrelation issues (e.g. in the case of Orbis data). In other cases, past values of inflation were also controlled for, since they may also have a delayed effect on firms (e.g. profitability).

It should also be noted that, although in most cases the unit of analysis is nested within ecosystem, countries and different time periods, single-level models were often preferred instead of multi-level models. The results provided by single- and multi-level models were nearly identical, with the former allowing for a more straightforward interpretation.

For each model, relevant statistical tests to check whether the assumptions underpinning the models hold were implemented. The detailed results of regression analyses are presented in Annex 2 and discussed in Chapter 3.

A.1.2.4. Simulations

Simulations of near-future effects of inflation are made on the basis of two sets of information:

1. **inflation projections** for the coming years based on the official releases by the European Commission and the European Central Bank (ECB);
2. the **marginal effects of inflation on the activities of interest**, as estimated in the regression models (see previous section). The marginal effect indicates the percentage change in the SME activity caused by a one percentage-point increase in the inflation growth rate.

For what concerns the first point, future inflation has been forecasted for 2023 and 2024 both at an aggregate level and at the ecosystem level and for the three scenarios described in Section3.3.

The results in the **baseline scenario** are mainly based on the European Commission's projections of the HICP at the EU-27 level released in the interim Summer Economic Forecasts released in September 2023[450] while also considering the Spring forecast released in May 2023

[450] European Commission (September 2023). European Economic Forecast – Summer 2023. Institutional Paper 255| September 2023. Available at https://economy-finance.ec.europa.eu/economic-forecast-and-surveys/economic-forecasts/summer-2023-economic-forecast-easing-growth-momentum-amid-declining-inflation-and-robust-labour_en.

.[451] They were cross-checked with the forecasts of other international organisations, including the European Central Bank, and the International Monetary Fund.[452] Projections in the **pessimistic and highly adverse scenarios** are from statistical analysis, literature review, and cross-validated with case studies especially for projections at the ecosystem level.

These official projections already take into account three main considerations:

- Firstly, the **monetary policy framework** in each country or area (e.g. the euro area), and ECB announcements about its policy interest rates during the years 2022 – 2023.
- Secondly, **fiscal policy assumptions in each country**, considering both officially announced budgets (short-term) and judgments about fiscal policies to be implemented in the medium-term.
- Thirdly, **other specific assumptions** taking on board the trend of macroeconomic indicators (GDP, exchange rate), contingency measures (energy-related support measures, pensions-related laws) and external factors (COVID-19, conflicts).

The second set of data necessary for conducting the simulations refers to the marginal effects of inflation on the activities of interest, as estimated by the regression models. It is important to note that simulations show the net impact of changes in inflation on SME activities, once isolated by other country-, sector- and firm-specific factors that might also play a role. Simulations assume that the marginal effects estimated by the regression models in the considered historical time period remain constant for 2023 and 2024.

The simulated impact of inflation on the SME activity is given by the following formula:

$$\text{Impact}_t = \text{marginal effect} * \text{future inflation}_t$$

where:

- Impact is the simulated impact on the activity of interest;
- marginal effect is the inflation impact on the activity of interest from the regression models;
- future inflation denotes the inflation projections.

Note that the simulated impact varies over time and is driven by inflation projections.

A.1.2.5. Case studies

Whenever possible, the analyses presented in this report cover firms across all the 14 industrial ecosystems established with the recent European Industrial Strategy, as shown below.[453]

[451] European Commission (2023). Spring 2023 Economic Forecast: An improved outlook amid persistent challenges. https://ec.europa.eu/commission/presscorner/detail/en/ip_23_2723.

[452] ECB May (2023). Financial stability review. Available at: https://www.ecb.europa.eu/pub/financial-stability/fsr/html/ecb.fsr202305~65f8cb74d7.en.html.
For the International Monetary Fund projections see: https://www.imf.org/external/datamapper/PCPIPCH@WEO/OEMDC.

[453] European Commission. (2022). *European Industrial Strategy*. Available at: https://commission.europa.eu/strategy-and-policy/priorities-2019-2024/europe-fit-digital-age/european-industrial-strategy_en.

Figure 79. The EU's industrial ecosystems

Source: European Commission.

However, to provide more nuance regarding differential effects across ecosystems, additional insights are explored for five ecosystems selected for in-depth analysis. These include:

1. agri-food;
2. construction;
3. energy-intensive industries;
4. electronics;
5. textiles.

The five ecosystems were chosen given the variety of different drivers of inflation they cover, as well as the various types of impacts expected to encounter when analysing them.

Annex 2: Statistical results and supplemental tables

A.2.1 Regression tables

A.2.1.1 Regression tables for late payments

Table 12. Regression models for late payment practices, 2019-2022 (SAFE)

	Problems due to late receipt of payments				Problems in paying suppliers timely			
	Logit, inflation only	Logit, full sample	Logit, interactions	Logit, 2021-22 only	Logit, inflation only	Logit, full sample	Logit, interactions	Logit, 2021-22 only
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8
(Intercept)	-0.160***				-0.578***			
	(0.010)				(0.016)			
Year-on-Year inflation change (%)	0.002+	0.003	0.003+	0.002	0.003+	0.007*	0.007*	-0.000
	(0.001)	(0.002)	(0.002)	(0.003)	(0.002)	(0.003)	(0.003)	(0.005)
Year-on-Year inflation change (%), lagged		0.001	0.001	0.003		-0.001	-0.004	0.001
		(0.004)	(0.004)	(0.004)		(0.006)	(0.007)	(0.008)
Firm Size (ref = “1-9 employees”)								
10-49 employees		0.235***	0.234***	0.226***		-0.106**	-0.106**	-0.100+
		(0.023)	(0.023)	(0.032)		(0.038)	(0.038)	(0.057)
50-249 employees		0.265***	0.265***	0.259***		-0.246***	-0.247***	-0.281**
		(0.024)	(0.024)	(0.035)		(0.040)	(0.040)	(0.062)
Firm age (ref = “2 years or younger”)								
2 years or more, but less than 5		0.213+	0.214+	0.060		-0.297	-0.300	-0.299
		(0.112)	(0.112)	(0.158)		(0.193)	(0.193)	(0.283)
5 years or more, but less than 10		0.392***	0.394***	0.279+		-0.386*	-0.388*	-0.223
		(0.105)	(0.106)	(0.150)		(0.181)	(0.181)	(0.266)
10 or more years		0.376***	0.378***	0.276+		-0.567***	-0.569***	-0.547*
		(0.101)	(0.101)	(0.143)		(0.174)	(0.174)	(0.256)
Sector (ref = “Industry”)								
Construction		0.188***	0.201***	0.159**		0.386***	0.379***	0.272*
		(0.033)	(0.043)	(0.057)		(0.052)	(0.066)	(0.092)
Services		-0.081**	-0.054+	-0.119*		-0.020	-0.025	-0.235**
		(0.028)	(0.032)	(0.060)		(0.045)	(0.052)	(0.101)
Trade		-0.095***	-0.131***	-0.116*		-0.095*	-0.089	-0.248***
		(0.030)	(0.036)	(0.058)		(0.048)	(0.059)	(0.098)
Year-on-Year Exchange Rate		-0.014	-0.013	-0.002		0.007	0.001	0.034
		(0.009)	(0.009)	(0.015)		(0.015)	(0.015)	(0.030)

	Problems due to late receipt of payments				Problems in paying suppliers timely			
	Logit, inflation only	Logit, full sample	Logit, interactions	Logit, 2021-22 only	Logit, inflation only	Logit, full sample	Logit, interactions	Logit, 2021-22 only
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8
Real GDP Growth (%)		-0.025***	-0.026***	-0.012		-0.015+	-0.016*	-0.048
		(0.005)	(0.005)	(0.018)		(0.009)	(0.009)	(0.034)
Interest rates		-0.012	-0.012	0.015		-0.013	-0.011	-0.025
		(0.011)	(0.011)	(0.019)		(0.018)	(0.017)	(0.036)
Firm is vulnerable						0.691***	0.691***	0.762***
						(0.060)	(0.060)	(0.088)
Problems with access to finance (1-10)						0.209***	0.209***	0.211***
						(0.005)	(0.005)	(0.008)
Problems with labour and production costs (1-10)						0.031***	0.031***	0.026**
						(0.007)	(0.007)	(0.011)
Problems with competitiveness (1-10)						0.004	0.004	-0.001
						(0.006)	(0.006)	(0.001)
Interactions								
Year-on-Year inflation change (%) × Construction			-0.002				0.001	
			(0.005)				(0.006)	
Year-on-Year inflation change (%) × Services			-0.008				-0.017+	
			(0.005)				(0.009)	
Year-on-Year inflation change (%) × Trade			0.010+				-0.003	
			(0.006)				(0.009)	
N	52,700	50,029	50,029	24,606	24,135	21,971	21,971	10,015
AIC	72765.5	65844.4	65841.7	32378.4	31631.1	25556	25558.2	11408.3
BIC	72783.3	66206	66229.8	32694.7	31647.3	25915.9	25942.1	11725.7
Log-Likelihood	-36,474.0	-32,881.1	-32,876.9	-16,150.2	-15,813.5	-12,733	-12,731.1	-5,660.2
Pseudo-R2	0.000	0.048	0.048	0.045	0.000	0.113	0.113	0.119
Country-FE		X	X	X		X	X	X

Note: standard errors in parentheses; + p < 0.1, * p < 0.05, ** p < 0.01, *** p < 0.001.

Table 13. Regression models for collection period, logged, 2013-2021 (Orbis)

	Log(Collection period, days)			
	OLS, inflation only	OLS, full sample	OLS, large firms	OLS,SMEs
	Model 9	Model 10	Model 11	Model 12
(Intercept)	3.770***			

	Log(Collection period, days)			
	OLS, inflation only	OLS, full sample	OLS, large firms	OLS,SMEs
	Model 9	Model 10	Model 11	Model 12
	(0.001)			
Log(Collection period, days), lagged		0.858***	0.903***	0.850***
		(0.001)	(0.003)	(0.001)
Year-on-Year inflation change (%)	-0.021***	0.002***	0.001	0.003***
	(0.000)	(0.000)	(0.000)	(0.000)
Year-on-Year inflation change (%), lagged		0.001**	-0.002**	0.001***
		(0.000)	(0.001)	(0.000)
Firm Size (ref = “Large firms”)				
Medium-sized firms		-0.017***		
		(0.003)		
Small firms		-0.052***		
		(0.004)		
Age of the firm		0.001***	0.000***	0.001***
		(0.000)	(0.000)	(0.000)
Log(Turnover)		-0.024***	-0.011***	-0.019***
		(0.001)	(0.001)	(0.001)
Profit margin (%)		-0.001***	-0.001***	-0.001***
		(0.000)	(0.000)	(0.000)
Current ratio (liquidity)		0.002***	0.000	0.002***
		(0.000)	(0.001)	(0.000)
Solvency ratio (%)		0.000***	0.000	0.000***
		(0.000)	(0.000)	(0.000)
Year-on-Year Exchange Rate		-0.003***	-0.001	-0.003***
		(0.001)	(0.002)	(0.001)
Real GDP growth (%)		-0.013***	-0.008***	-0.014***
		(0.000)	(0.001)	(0.000)
Interest rates		0.005*	0.000	0.005*
		(0.002)	(0.006)	(0.002)
Ecosystem (ref = “Energy-intensive industries”)				
Aerospace and defence		0.014***	0.018**	0.013***
		(0.002)	(0.006)	(0.002)
Agri-food		-0.035***	-0.006	-0.042***
		(0.002)	(0.005)	(0.002)
Construction		0.026***	0.032***	0.023***
		(0.002)	(0.006)	(0.002)
Cultural and creative industries		-0.166***	-0.074***	-0.181***
		(0.006)	(0.015)	(0.007)
Digital		0.016***	0.033***	0.013***
		(0.003)	(0.008)	(0.003)
Electronics		0.004	0.010	0.003
		(0.002)	(0.006)	(0.003)
Energy - renewables		0.027***	0.055***	0.014+
		(0.006)	(0.009)	(0.007)
Health		-0.029***	-0.022	-0.029***

	Log(Collection period, days)			
	OLS, inflation only	OLS, full sample	OLS, large firms	OLS,SMEs
	Model 9	Model 10	Model 11	Model 12
		(0.005)	(0.017)	(0.005)
Mobility - Transport-Automotive		-0.006**	-0.013*	-0.005*
		(0.002)	(0.006)	(0.002)
Proximity, Social Economy and Civil Security		-0.114***	-0.015**	-0.133***
		(0.003)	(0.006)	(0.003)
Retail		-0.088***	-0.038***	-0.101***
		(0.002)	(0.005)	(0.002)
Textiles		-0.018***	-0.035**	-0.016***
		(0.003)	(0.011)	(0.003)
Tourism		-0.256***	-0.082***	-0.279***
		(0.005)	(0.011)	(0.005)
N	2,034,167	1,423,736	159,514	1,264,222
R2	0.003	0.797	0.848	0.789
R2 Adj.	0.003	0.797	0.848	0.789
AIC	7037962.4	2581376.7	258133.0	2317625.1
BIC	7037987.5	2582058.2	258671.9	2318275.8
RMSE	1.36	0.60	0.54	0.61
Year-FE		X	X	X
Country-FE		X	X	X

Note: heteroscedasticity-consistent robust standard errors in parentheses; + p < 0.1, * p < 0.05, ** p < 0.01, *** p < 0.001.

Table 14. Regression models for collection period, logged, selected ecosystems, 2013-2021 (Orbis)

	Log(collection period, days)				
	Agri-food	Construction	Energy-intensive	Electronics	Textiles
	Model 5	Model 6	Model 7	Model 8	Model 9
Log(Collection period, days), lagged	0.815***	0.726***	0.845***	0.839***	0.850***
	(0.005)	(0.004)	(0.005)	(0.006)	(0.009)
Year-on-Year inflation change (%)	-0.001	0.004***	-0.001+	0.002	0.003
	(0.001)	(0.001)	(0.000)	(0.003)	(0.003)
Year-on-Year inflation change (%), lagged	0.001	0.001	-0.003***	0.001	0.004
	(0.001)	(0.001)	(0.001)	(0.002)	(0.003)
Firm Size (ref = “Large firms”)					
Medium-sized firms	-0.005	-0.077***	-0.020***	-0.029**	0.020
	(0.007)	(0.007)	(0.005)	(0.009)	(0.015)
Small firms	-0.009	-0.129***	-0.035***	-0.065***	0.019
	(0.009)	(0.009)	(0.008)	(0.013)	(0.019)
Age of the firm	0.000***	0.001***	0.001***	0.001***	0.001***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Log(Turnover)	-0.015***	-0.051***	-0.029***	-0.040***	-0.029***
	(0.003)	(0.002)	(0.002)	(0.003)	(0.005)
Profit margin (%)	-0.001***	-0.002***	0.000	0.000	-0.002***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Current ratio (liquidity)	0.001	-0.001	0.001	0.001	0.002
	(0.001)	(0.001)	(0.001)	(0.001)	(0.002)

	Log(collection period, days)				
	Agri-food	Construction	Energy-intensive	Electronics	Textiles
	Model 5	Model 6	Model 7	Model 8	Model 9
Solvency ratio (%)	0.000**	-0.001***	0.000*	-0.001***	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Year-on-Year Exchange Rate	0.004	-0.004***	-0.001	-0.005+	-0.010+
	(0.002)	(0.001)	(0.001)	(0.003)	(0.005)
Real GDP growth (%)	-0.004**	-0.014***	-0.007***	-0.011***	-0.009**
	(0.001)	(0.001)	(0.001)	(0.002)	(0.003)
Interest rates	0.032***	0.007	0.021***	-0.011	-0.021
	(0.008)	(0.006)	(0.006)	(0.012)	(0.019)
N	100,167	190,686	145,973	69,896	32,409
R2	0.722	0.631	0.781	0.750	0.768
R2 Adj.	0.722	0.631	0.781	0.750	0.767
R2 Within	0.666	0.536	0.709	0.686	0.719
R2 Within Adj.	0.666	0.536	0.709	0.686	0.718
AIC	176737.0	334013.3	200873.4	110292.1	49225.8
BIC	177146.1	334450.1	201298.8	110685.8	49578.0
RMSE	0.58	0.58	0.48	0.53	0.52
Year-FE	X	X	X	X	X
Country-FE	X	X	X	X	X

Note: robust heteroscedasticity-consistent standard errors in parentheses; + p < 0.1, * p < 0.05, ** p < 0.01, *** p < 0.001.

A.2.1.2 Regression table for bankruptcies

Table 15. Regression table for the effect of inflation on solvency ratio, 2013-2021 (Orbis)

	Solvency ratio (%)				
	OLS, inflation only	OLS, full sample w/ LDV	OLS, full sample w/ LDV, for values >-20%	OLS, w/ LDV and large firms only, for values >-20%	OLS, w/ LDV and SMEs only, for values >-20%
	Model 1	Model 2	Model 3	Model 4	Model 5
(Intercept)	39.114***				
	(0.018)				
Solvency ratio (%), lagged		0.879***	0.888***	0.898***	0.886***
		(0.001)	(0.000)	(0.001)	(0.000)
Year-on-year inflation change (%)	0.238***	-0.030***	-0.028***	-0.049***	-0.022***
	(0.006)	(0.003)	(0.003)	(0.006)	(0.003)
Age of firm		0.015***	0.014***	0.006***	0.016***
		(0.000)	(0.000)	(0.001)	(0.000)
Size of firm (ref = “large firm”)					
Medium firm		0.313***	0.351***		
		(0.035)	(0.032)		
Small firm		0.522***	0.570***		
		(0.046)	(0.042)		
Collection period, days (logged)		-0.351***	-0.379***	-0.154***	-0.413***
		(0.007)	(0.007)	(0.018)	(0.007)
Profit margin (%)		0.246***	0.213***	0.184***	0.218***
		(0.001)	(0.001)	(0.003)	(0.001)
Turnover (logged)		-0.110***	-0.091***	-0.249***	-0.116***
		(0.011)	(0.010)	(0.019)	(0.009)
Real GDP growth (%)		0.054***	0.058***	0.016	0.063***
		(0.006)	(0.006)	(0.016)	(0.006)
Interest rates (%), lagged		0.110**	0.119**	0.124	0.113**
		(0.040)	(0.037)	(0.098)	(0.040)
Ecosystem (ref = “Energy-intensive industries”)					
Aerospace and defense		-0.575***	-0.533***	-0.834***	-0.493***
		(0.035)	(0.033)	(0.100)	(0.035)
Agri-food		-0.241***	-0.251***	-0.137	-0.260***
		(0.035)	(0.033)	(0.089)	(0.035)
Construction		-1.119***	-1.065***	-1.253***	-1.025***
		(0.032)	(0.030)	(0.095)	(0.032)
Cultural and creative industries		-0.402***	-0.429***	-0.975***	-0.365***
		(0.089)	(0.077)	(0.205)	(0.083)
Digital		-0.909***	-0.864***	-1.068***	-0.823***
		(0.061)	(0.055)	(0.133)	(0.061)
Electronics		-0.453***	-0.431***	-0.647***	-0.392***
		(0.040)	(0.037)	(0.094)	(0.041)
Energy - renewables		-1.215***	-1.157***	-1.600***	-0.838***
		(0.084)	(0.077)	(0.127)	(0.098)
Health		0.075	0.032	-0.321	0.107

	Solvency ratio (%)				
	OLS, inflation only	OLS, full sample w/ LDV	OLS, full sample w/ LDV, for values >-20%	OLS, w/ LDV and large firms only, for values >-20%	OLS, w/ LDV and SMEs only, for values >-20%
	Model 1	Model 2	Model 3	Model 4	Model 5
		(0.092)	(0.084)	(0.245)	(0.089)
Mobility - Transport-Automotive		-0.978***	-0.897***	-0.967***	-0.884***
		(0.038)	(0.035)	(0.093)	(0.038)
Proximity, Social Economy and Civil Security		-0.729***	-0.681***	-0.344***	-0.855***
		(0.044)	(0.040)	(0.086)	(0.045)
Retail		-0.611***	-0.589***	-0.772***	-0.533***
		(0.028)	(0.026)	(0.073)	(0.027)
Textiles		0.029	0.031	-0.253	0.043
		(0.049)	(0.046)	(0.159)	(0.048)
Tourism		-0.596***	-0.490***	-1.118***	-0.478***
		(0.057)	(0.051)	(0.173)	(0.054)
N	2,872,861	1,572,481	1,552,416	167,229	1,385,187
R2	0.001	0.860	0.868	0.869	0.868
R2 Adj.	0.001	0.860	0.868	0.869	0.868
R2 Within		0.851	0.858	0.864	0.857
R2 Within Adj.		0.851	0.858	0.864	0.857
AIC	27212523.2	11653820.0	11243930.3	1191566.5	10049921.2
BIC	27212548.9	11654494.7	11244604.4	1192097.9	10050564.7
RMSE	27.58	9.84	9.05	8.53	9.10
Year-FE		X	X	X	X
Country-FE		X	X	X	X

Note: heteroscedasticity-consistent robust standard errors in parentheses; LDV is lagged dependent variable; + p < 0.1, * p < 0.05, ** p < 0.01, *** p < 0.001.

A.2.1.3 Regression tables for investment and digitalisation

Table 16. Regression models for having positive expectations for investment in the current financial year, 2016-2022 (EIBIS)

	Positive expectations for investment in the current financial year					
	Logit, inflation only	Logit, full sample	Logit, SMEs	Logit, large firms	Logit, 2021-2022	Logit, interactions
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Inflation change (%)	0.013***	0.004*	0.004+	0.004	0.004*	0.011**
	(0.001)	(0.002)	(0.002)	(0.005)	(0.002)	(0.003)
Firm size (ref = Large firms)						
Micro-firms		-0.147***			-0.399***	-0.149**
		(0.052)			(0.112)	(0.052)
Small firms		-0.065			-0.307***	-0.067
		(0.042)			(0.091)	(0.042)
Medium-sized firms		-0.038*			-0.160*	-0.039
		(0.032)			(0.070)	(0.032)
Age of the firm (ref = “Less than 2 years”)						
2-5 years		-0.375*	-0.397*	-0.197	-0.447	-0.377*
		(0.161)	(0.175)	(0.428)	(0.369)	(0.161)

5-10 years		-0.514***	-0.526**	-0.470	-0.592+	-0.517***
		(0.156)	(0.170)	(0.409)	(0.357)	(0.157)
10-20 years		-0.611***	-0.630***	-0.433	-0.728*	-0.613***
		(0.155)	(0.169)	(0.396)	(0.354)	(0.155)
20 years or more		-0.614***	-0.616***	-0.516	-0.729*	-0.616***
		(0.154)	(0.168)	(0.392)	(0.352)	(0.154)
Firm's turnover in latest financial year, in th EUR (logged)		0.021*	0.033***	0.037*	0.013	0.021*
		(0.009)	(0.007)	(0.017)	(0.018)	(0.008)
Profitability of the firm (ref = "Profit")						
Loss		-0.252***	-0.239***	-0.287***	-0.296***	-0.254***
		(0.031)	(0.034)	(0.074)	(0.060)	(0.031)
Break even		-0.187***	-0.174***	-0.301*	-0.122	-0.188***
		(0.038)	(0.040)	(0.120)	(0.077)	(0.038)
Major obstacles to investment						
Availability of skilled staff		0.092***	0.097***	0.087+	0.140**	0.092***
		(0.021)	(0.023)	(0.051)	(0.043)	(0.021)
Energy prices		0.023	-0.003	0.156**	0.081	0.023
		(0.024)	(0.027)	(0.059)	(0.050)	(0.025)
Digital infrastructure		0.062+	0.056	0.081	0.004	0.062+
		(0.035)	(0.038)	(0.081)	(0.072)	(0.035)
Business regulations		0.047*	0.032	0.097+	0.005	0.047*
		(0.024)	(0.026)	(0.058)	(0.051)	(0.024)
Access to finance		0.085**	0.111***	-0.058	0.097+	0.085**
		(0.026)	(0.028)	(0.068)	(0.057)	(0.026)
Uncertainty economic future		-0.237***	-0.247***	-0.180***	-0.237***	-0.237***
		(0.023)	(0.025)	(0.054)	(0.047)	(0.023)
Firm is in high-tech sector		0.013	0.026	-0.005	-0.004	0.014
		(0.029)	(0.034)	(0.060)	(0.063)	(0.030)
Expectations on external financing in the next 12 months (ref = "Improve")						
Stay the same		-0.606***	-0.631***	-0.494***	-0.743***	-0.606***
		(0.022)	(0.025)	(0.055)	(0.049)	(0.022)
Get worse		-0.696***	-0.707***	-0.656***	-0.817***	-0.696***
		(0.035)	(0.038)	(0.091)	(0.069)	(0.035)
Firm received financial support					0.101*	
					(0.043)	
Sector (ref = "Manufacturing")						
Construction						-0.251***
						(0.037)
Services						-0.119***
						(0.032)
Infrastructure						-0.136***
						(0.029)
Real GDP growth (%)		0.015*	0.017*	-0.004	-0.005	0.015*

		(0.006)	(0.006)	(0.016)	(0.020)	(0.006)
Interest rates (%)		-0.038*	-0.039*	-0.024	-0.023	-0.034*
		(0.016)	(0.017)	(0.046)	(0.022)	(0.016)
Interactions						
Inflation x Construction						-0.016*
						(0.007)
Inflation x Services						-0.018**
						(0.006)
Inflation x Infrastructure						-0.007
						(0.004)
N	70,182	51,162	42,575	8,587	11,161	51,162
AIC	88442.11	63108.1	52159.9	10969.8	14302.8	63101.52
BIC	88460.42	63620.9	52636.2	11358	14698.1	63640.93
LogLik	-44,219.1	-31,496	-26,024.9	-5,429.9	-7,097.4	-31489.8
Pseudo-R2	0.0008	0.033	0.033	0.038	0.039	0.033
Country-FE		X	X	X	X	X
Sector-FE		X	X	X	X	
Year-FE		X	X	X	X	X

Note: standard errors in parentheses; + p < 0.1, * p < 0.05, ** p < 0.01, *** p < 0.001.

Table 17. Regression tables for the introduction of innovations, 2014-2022 (SAFE)

	Introduction of an innovation			
	Logit, inflation only	**Logit, full sample**	**Logit, full sample with grouped inflation**	**Logit, full sample with interactions**
	Model 7	**Model 8**	**Model 9**	**Model 10**
(Intercept)	0.300***			
	(0.006)			
Inflation change (%)	-0.020***	-0.004+		-0.004*
	(0.001)	(0.002)		(0.002)
Inflation change (%), lagged		-0.003		-0.002
		(0.002)		(0.002)
Grouped inflation (ref = “Low inflation (0-5%)”)				
No inflation			0.046*	
			(0.022)	
Moderate inflation (5-10%)			-0.023	
			(0.031)	
High inflation (10%+)			-0.083*	
			(0.039)	
Firm size (ref = “Less than 10 employees”)				
10-49 employees		0.159***	0.158***	0.158***
		(0.016)	(0.016)	(0.016)

50-249 employees		0.178***	0.178***	0.178***
		(0.017)	(0.017)	(0.017)
Firm birth (ref = “2 years or less”)				
2 years or more, but less than 5		-0.334***	-0.291***	-0.335***
		(0.074)	(0.068)	(0.075)
5 years or more, but less than 10		-0.412***	-0.369***	-0.412***
		(0.070)	(0.022)	(0.070)
10 or more years		-0.592***	-0.549***	-0.592***
		(0.068)	(0.065)	(0.067)
Turnover trend (ref = “Decreased”)				
Increased		0.335***	0.336***	0.336**
		(0.023)	(0.022)	(0.023)
Remained unchanged		-0.113***	-0.112***	-0.112***
		(0.021)	(0.020)	(0.021)
Profit trend (ref = “Decreased”)				
Increased		0.041+	0.044*	0.041+
		(0.021)	(0.021)	(0.021)
Remained unchanged		-0.164***	-0.158***	-0.164***
		(0.018)	(0.018)	(0.018)
Labour costs trend (ref = “Decreased”)				
Increased		-0.003	0.001	-0.003
		(0.028)	(0.028)	(0.028)
Remained unchanged		-0.281***	-0.276***	-0.281***
		(0.028)	(0.027)	(0.028)
Firm is vulnerable		0.061+	0.057	0.062+
		(0.036)	(0.034)	(0.036)
Access to finance as a main problem (1-10)		0.041***		0.041***
		(0.023)		(0.023)
Competition is a main problem (1-10)		0.009**		0.009**
		(0.003)		(0.003)
Access to skilled staff is a main problem (1-10)		0.046***		0.046***
		(0.002)		(0.002)
Real GDP growth (%)		-0.000	-0.001	0.000
		(0.004)	(0.004)	(0.004)

Interest rates (%)		0.017	0.018	0.016
		(0.012)	(0.012)	(0.012)
Sector (ref = “Industry”)				
Construction		-0.798***	-0.795***	-0.836***
		(0.024)	(0.024)	(0.028)
Services		-0.360***	-0.351***	-0.377***
		(0.018)	(0.020)	(0.021)
Trade		-0.191***	-0.181***	-0.205***
		(0.020)	(0.021)	(0.023)
Interactions				
Inflation x Construction				0.010*
				(0.004)
Inflation x Services				0.009
				(0.006)
Inflation x Trade				0.006
				(0.005)
N	119,310	103,458	107,043	103,458
AIC	163186.3	133730.4	138371.6	133728.4
BIC	163205.7	134274.5	138927.3	134301.2
LogLik	-81,591.2	-66,808.2	-69,127.8	-66,804.2
Pseudo-R2	0.002	0.057	0.056	0.057
Country-FE	X	X	X	X
Year-FE	X	X	X	X

Note: standard errors in parentheses; + p < 0.1, * p < 0.05, ** p < 0.01, *** p < 0.001.

Table 18. Regression models for the adoption of digital technologies, 2019-2022 (EIBIS)

	Adoption of digital technologies					
	Logit, inflation only	Logit, full sample	Logit, SMEs	Logit, large firms	Logit, 2021-2022	Logit, interactions
	Model 11	Model 12	Model 13	Model 14	Model 15	Model 16
Inflation change (%)	0.002	0.001	0.002	-0.010	0.001	-0.004
	(0.002)	(0.002)	(0.003)	(0.007)	(0.003)	(0.005)
Inflation change (%), lagged	-0.012***	0.001	0.002	-0.002	0.003	0.002
	(0.003)	(0.004)	(0.004)	(0.014)	(0.004)	(0.005)
Firm size (ref = Large firms)						
Micro-firms		-0.730***			-0.887***	-0.893***
		(0.080)			(0.127)	(0.127)
Small firms		-0.616***			-0.726***	-0.731***
		(0.067)			(0.107)	(0.107)
Medium-sized firms		-0.401***			-0.478***	-0.478***
		(0.053)			(0.086)	(0.086)
Age of the firm (ref = “Less than 2 years”)						
2-5 years		-0.685*	-0.648*	-0.076	-0.852*	-0.845+
		(0.280)	(0.285)	(0.338)	(0.433)	(0.433)
5-10 years		-0.721**	-0.694*	-0.147	-0.827*	-0.822
		(0.272)	(0.278)	(0.236)	(0.420)	(0.420)

	Adoption of digital technologies					
	Logit, inflation only	Logit, full sample	Logit, SMEs	Logit, large firms	Logit, 2021-2022	Logit, interactions
	Model 11	Model 12	Model 13	Model 14	Model 15	Model 16
10-20 years		-0.774**	-0.731**	-0.176	-0.952*	-0.945*
		(0.270)	(0.276)	(0.126)	(0.417)	(0.417)
20 years or more		-0.850**	-0.808**	(omitted)	-1.006*	-1.000*
		(0.270)	(0.275)		(0.421)	(0.415)
Firm's turnover in latest financial year, in th EUR (logged)		0.166***	0.219***	0.250***	0.155***	0.155***
		(0.013)	(0.010)	(0.034)	(0.021)	(0.021)
Profitability of the firm (ref = "Profit")						
Loss		0.021	0.069	-0.149	0.062	0.063
		(0.044)	(0.047)	(0.126)	(0.067)	(0.067)
Break even		-0.073	-0.053	-0.342	-0.008	-0.008
		(0.055)	(0.057)	(0.206)	(0.083)	(0.083)
Major obstacles to investment						
Availability of skilled staff		0.107***	0.115***	0.130	0.091+	0.089+
		(0.031)	(0.033)	(0.093)	(0.048)	(0.048)
Energy prices		0.054	0.041	0.250*	0.048	0.049
		(0.036)	(0.039)	(0.105)	(0.055)	(0.055)
Digital infrastructure		0.090+	0.093+	0.042	0.048	0.049
		(0.051)	(0.054)	(0.150)	(0.080)	(0.080)
Business regulations		0.057	0.085*	-0.254*	0.059	0.059
		(0.035)	(0.038)	(0.106)	(0.056)	(0.056)
Access to finance		-0.009	-0.002	-0.144	-0.024	-0.025
		(0.039)	(0.041)	(0.123)	(0.063)	(0.063)
Uncertainty economic future		-0.017	-0.029	0.070	0.005	0.005
		(0.033)	(0.035)	(0.095)	(0.052)	(0.052)
Firm is in high-tech sector		0.624***	0.681*	0.238+	0.636*	0.666*
		(0.053)	(0.058)	(0.129)	(0.086)	(0.088)
Expectations on external financing in the next 12 months (ref = "Improve")						
Stay the same		-0.188***	-0.188***	-0.226*	-0.163**	-0.165**
		(0.036)	(0.039)	(0.110)	(0.057)	(0.056)
Get worse		-0.094*	-0.113*	-0.014	-0.010	-0.098
		(0.047)	(0.050)	(0.153)	(0.076)	(0.076)
Firm received financial support					0.095*	0.094*
					(0.048)	(0.047)
Sector (ref = "Manufacturing")						
Construction						-0.133+
						(0.120)
Services						0.362*
						(0.089)
Infrastructure						0.614*
						(0.094)
Real GDP growth (%)		0.002	0.002	-0.004	0.023	0.026
		(0.007)	(0.008)	(0.023)	(0.023)	(0.023)

	Adoption of digital technologies					
	Logit, inflation only	Logit, full sample	Logit, SMEs	Logit, large firms	Logit, 2021-2022	Logit, interactions
	Model 11	Model 12	Model 13	Model 14	Model 15	Model 16
Interest rates (%)		0.016	0.016	0.013	-0.003	-0.007
		(0.017)	(0.018)	(0.060)	(0.022)	(0.023)
Interactions						
Inflation x Construction						-0.022
						(0.013)
Inflation x Services						0.004
						(0.011)
Inflation x Infrastructure						0.010
						(0.006)
N	30,618	22,829	19,442	3,380	9,322	9,322
AIC	42384.8	28743.8	25146.7	3620.7	11746	11743.859
BIC	42409.8	29193.9	25563.1	3939.3	12138.8	12157.987
LogLik	-21,189.4	-14,315.9	-12,520.4	-1,758.4	-5,818	-5813.9296
Pseudo-R2	.0005	.096	.075	.074	.096	.095
Country-FE		X	X	X	X	X
Sector-FE		X	X	X	X	
Year-FE		X	X	X	X	X

Note: standard errors in parentheses; + p < 0.1, * p < 0.05, ** p < 0.01, *** p < 0.001.

A.2.1.4 Regression table for sustainability investments

Table 19. Regression models for investment in green practices as a percentage of turnover, 2021 (Eurobarometer)

	Investment in green practices as a percentage of turnover			
	Ordered logit, inflation only	Ordered logit, full sample	Ordered logit, 2021 inflation only	Ordered logit, full sample with 2021 inflation
	Model 1	Model 2	Model 3	Model 4
Average ecosystem inflation in 2019	-0.063** (0.026)	-0.094*** (0.030)		
Average ecosystem inflation in 2021			0.011*** (0.004)	0.000 (0.005)
Nothing|Less than 1% of annual turnover	-1.271*** (0.060)	0.376 (0.491)	-1.275*** (0.031)	0.167 (0.320)
Less than 1% of annual turnover|1-5% of annual turnover	0.025 (0.056)	1.756 (0.493) ***	-0.015 (0.027)	1.500 (0.321) ***
1-5% of annual turnover|6-10% of annual turnover	1.762*** (0.066)	3.608*** (0.496)	1.693*** (0.034)	3.286*** (0.322)
6-10% of annual turnover|11-30% of annual turnover	2.909*** (0.092)	4.757*** (0.500)	2.841*** (0.050)	4.447*** (0.325)
11-30% of annual turnover|More than 30% of annual turnover	4.120*** (0.150)	5.944*** (0.515)	4.091*** (0.086)	5.681*** (0.333)
Ecosystem (ref = “Aerospace and defence”)				
Agri-food		0.512 (0.452)		0.369 (0.284)
Construction				0.070 (0.264)
Cultural and creative industries		0.360 (0.411)		0.047 (0.282)

	Investment in green practices as a percentage of turnover			
	Ordered logit, inflation only	Ordered logit, full sample	Ordered logit, 2021 inflation only	Ordered logit, full sample with 2021 inflation
	Model 1	Model 2	Model 3	Model 4
Electronics		-0.213 (0.418)		-0.256 (0.275)
Energy-intensive industries		0.446 (0.446)		0.352 (0.290)
Energy – renewables		0.294 (0.454)		0.005 (0.310)
Health		0.601 (0.413)		0.271 (0.284)
Mobility - Transport-Automotive		0.415 (0.544)		0.004 (0.330)
Proximity, Social Economy and Civil Security				0.244 (0.267)
Retail		0.124 (0.399)		-0.234 (0.265)
Textiles		0.038 (0.447)		-0.046 (0.298)
Tourism		0.781 (1.214)		0.728* (0.433)
Turnover change (ref = “Decreased“)				
Remained unchanged		0.220** (0.090)		0.133** (0.057)
Increased		0.351*** (0.080)		0.284*** (0.052)
Company age (ref = “Before 1 January 2014“)				
Between 1 January 2014 and 31 December 2016		-0.222* (0.121)		-0.098 (0.076)
Between 1 January 2017 and 1 January 2021		0.236* (0.127)		0.158** (0.078)
After 1 January 2021		-0.332 (0.686)		-0.041 (0.378)
Company size (ref = “1 to 9 employees“)				
10 to 49 employees		0.273*** (0.078)		0.310*** (0.050)
50 to 249 employees		0.548*** (0.100)		0.452*** (0.062)
250 to 499 employees		0.661*** (0.152)		0.722*** (0.097)
500 or more employees				1.081 (2.079)
Real GDP growth (%)		0.047*** (0.013)		0.046*** (0.008)
Contribution to climate objective, as per RRF		0.721 (0.562)		0.851** (0.343)
Number of actions to be taken to be more resource efficient		0.134*** (0.012)		0.119*** (0.008)
N	3,398	3,048	8,245	7,459
Log Likelihood	-4933.642	-4287.320	-12243.278	-10814.274
Deviance	9867.285	8574.641	24486.556	21628.547

	Investment in green practices as a percentage of turnover			
	Ordered logit, inflation only	Ordered logit, full sample	Ordered logit, 2021 inflation only	Ordered logit, full sample with 2021 inflation
	Model 1	Model 2	Model 3	Model 4
AIC	9879.285	8628.641	24498.556	21688.547
BIC	9916.070	8791.241	24540.661	21896.062
Country-FE		X		X

Note: standard errors in parentheses; + p < 0.1, * p < 0.05, ** p < 0.01, *** p < 0.001.

Table 20. Regression models for investment in energy efficiency measures to combat GHG, 2022 (EIBIS)

	Investing in energy efficiency measures to combat GHG emissions in 2022				
	Logit, inflation only	Logit, full sample	Logit,SMEs	Logit, large firms	Logit, interaction
	Model 5	Model 6	Model 7	Model 8	Model 9
Inflation change (%)	0.013***	0.013*	0.010+	0.039+	0.014
	(0.004)	(0.005)	(0.005)	(0.021)	(0.010)
Firm size (ref = Large firms)					
Micro-firms					
		-0.445+			-0.445+
Small firms		(0.246)			(0.246)
		-0.621**			-0.616**
Medium-sized firms		(0.206)			(0.207)
		-0.428*			-0.423*
		(0.172)			(0.172)
Age of the firm (ref = “Less than 2 years”)					
2-5 years		-0.370	-0.434	(empty)	-0.335
		(0.703)	(0.706)		(0.704)
5-10 years		-0.359	-0.356	-0.562	-0.348
		(0.659)	(0.661)	(0.626)	(0.659)
10-20 years		-0.390	-0.422	-0.428	-0.372
		(0.649)	(0.650)	(0.483)	(0.650)
20 years or more		-0.106	-0.121	(omitted)	-0.088
		(0.644)	(0.645)		(0.644)
Firm’s turnover in latest financial year, in th EUR (logged)		0.191***	0.194***	0.277*	0.191***
		(0.040)	(0.032)	(0.118)	(0.041)
Profitability of the firm (ref = “Profit”)					
Loss		0.098	0.020	1.158+	0.085
		(0.154)	(0.163)	(0.673)	(0.155)
Break even		0.298	0.317	-0.382	0.296
		(0.182)	(0.190)	(0.647)	(0.182)
Major obstacles to investment					
Availability of skilled staff		0.115	0.186+	-0.281	0.115
		(0.097)	(0.102)	(0.308)	(0.096)
Energy prices		0.227*	0.203+	0.494	0.224*
		(0.100)	(0.106)	(0.309)	(0.101)
Digital infrastructure		-0.043	0.088	-0.348	-0.006
		(0.165)	(0.178)	(0.433)	(0.165)

	Investing in energy efficiency measures to combat GHG emissions in 2022				
	Logit, inflation only	Logit, full sample	Logit,SMEs	Logit, large firms	Logit, interaction
	Model 5	Model 6	Model 7	Model 8	Model 9
Business regulations		0.027	-0.001	0.130	0.030
		(0.114)	(0.122)	(0.359)	(0.114)
Access to finance		-0.076	-0.076	0.030	-0.067
		(0.132)	(0.140)	(0.416)	(0.132)
Uncertainty economic future		-0.075	-0.110	0.446	-0.074
		(0.100)	(0.107)	(0.300)	(0.100)
Firm is in high-tech sector		0.140	0.258	-0.227	0.135
		(0.171)	(0.188)	(0.434)	(0.179)
Expectations on external financing in the next 12 months (ref = “Improve”)					
Stay the same		-0.023	-0.048	0.311	-0.017
		(0.130)	(0.137)	(0.404)	(0.129)
Get worse		0.071	0.092	0.063	0.076
		(0.149)	(0.157)	(0.469)	(0.149)
Firm received financial support		0.047	0.034	0.274	0.048
		(0.095)	(0.101)	(0.290)	(0.095)
Sector (ref = “Manufacturing”)					
Construction					0.687
					(0.880)
Services					-0.342
					(0.253)
Infrastructure					-0.254
					(0.234)
Real GDP growth (%)		0.008	0.007	-0.003	0.006
		(0.020)	(0.020)	(0.082)	(0.020)
Interest rates (%)		0.043*	0.047**	0.023	0.044**
		(0.017)	(0.018)	(0.066)	(0.018)
Interactions					
Inflation x Construction					-0.083
					(0.056)
Inflation x Services					-0.008
					(0.021)
Inflation x Infrastructure					-0.002
					(0.011)
N	2,924	2,162	1,831	328	2162
AIC	4013.7292	2830.6	2493.3446	365.8	2834.2527
BIC	4025.6906	2984	2680.7922	449.3	3004.6163
LogLik	-2,004.9	-1,388.3	-1,217.7	-160.9	-1387.1263
Country-FE		X	X	X	X
Sector-FE		X	X	X	

Note: standard errors in parentheses; + p < 0.1, * p < 0.05, ** p < 0.01, *** p < 0.001.

A.2.1.5 Regression tables for turnover

Table 21. Regression models for the effect of inflation on turnover, 2013-2021 (Orbis)

	OLS, inflation only	OLS, full sample with lagged inflation
	Model 1	Model 5
(Intercept)	8.772***	
	(0.001)	
Yearly inflation changes (%)	-0.005***	0.000
	(0.000)	(0.000)
Yearly inflation changes (%), lagged		-0.002***
		(0.000)
Size of the firm (ref = “Large firm”)		
Medium-sized firm		-1.821***
		(0.003)
Small firm		-3.123***
		(0.003)
Age of the firm		0.004***
		(0.000)
Profit margin (%)		0.007***
		(0.000)
Collection period, in days		-0.019***
		(0.000)
Current ratio of liquidity		-0.015***
		(0.000)
Ecosystem (ref = “Energy-intensive industries”)		
Aerospace and defense		-0.313***
		(0.003)
Agri-food		-0.042***
		(0.003)
Construction		-0.293***
		(0.002)
Cultural and creative industries		-0.401***
		(0.006)
Digital		-0.313***
		(0.004)
Electronics		-0.081***
		(0.003)
Energy – renewables		0.355***
		(0.010)
Health		-0.204***
		(0.007)
Mobility - Transport-Automotive		-0.146***
		(0.004)
Proximity, Social Economy and Civil Security		-0.748***
		(0.003)
Retail		0321***
		(0.002)
Textiles		-0.225***
		(0.004)
Tourism		-0.730***
		(0.004)
Real GDP growth (%)		0.004***
		(0.000)
Interest rates (%)		0.012***
		(0.003)
N	2,359,936	1,599,598
R2	0.000	0.693
R2 Adj.	0.000	0.625
AIC	8749406	3741726

BIC	8749431	3742401
RMSE	1.54	0.78
Country-FE		X
Year-FE		X

Note: heteroscedasticity-consistent robust standard errors in parentheses; + p < 0.1, * p < 0.05, ** p < 0.01, *** p < 0.001.

A.2.1.6 Regression tables for participation in public procurement

Table 22. Regression models for the average number of offers per CAN, changes in inflation compared to the same quarter in the previous year, 2018-2022 (TED)

	Log(Average offers per contract award notice)							
	Inflation only	OLS, full sample	OLS, full sample with staggered inflation	OLS, Agri-food	OLS, Construction	OLS, Energy-intensive industries	OLS, Electronics	OLS, Textiles
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8
(Intercept)	0.835***							
	(0.002)							
Inflation change compared to the same quarter in the previous period. (%)	0.000**	-0.003***		-0.002*	0.002***	0.000	0.015***	0.001
	(0.000)	(0.000)		(0.001)	(0.001)	(0.000)	(0.001)	(0.005)
Inflation, segmented (ref = “Low inflation”, 0-5%)								
No inflation, 0% or lower			-0.021***					
			(0.004)					
Moderate inflation, 5-10%			-0.058***					
			(0.004)					
High inflation, 10-20%			-0.048***					
			(0.005)					
Very high inflation, over 20%			-0.161***					
			(0.007)					
Value procurement (EUR), logged		-0.182***	-0.183***	0.095***	-0.051***	0.052	-0.275***	-0.299***
		(0.008)	(0.008)	(0.033)	(0.014)	(0.033)	(0.020)	(0.082)
Value procurement (EUR) squared, logged		0.008***	0.008***	-0.003+	0.003***	-0.001	0.012***	0.012***
		(0.000)	(0.000)	(0.001)	(0.001)	(0.001)	(0.001)	(0.003)

	Log(Average offers per contract award notice)							
	Inflation only	OLS, full sample	OLS, full sample with staggered inflation	OLS, Agri-food	OLS, Construction	OLS, Energy-intensive industries	OLS, Electronics	OLS, Textiles
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8
Open procedure		0.351***	0.351***	0.449***	0.409***	0.235***	0.238***	0.282***
		(0.003)	(0.003)	(0.014)	(0.006)	(0.016)	(0.009)	(0.042)
Division into lots		0.116***	0.122***	0.145***	0.047***	0.139***	0.177***	0.260***
		(0.005)	(0.005)	(0.016)	(0.014)	(0.022)	(0.013)	(0.046)
Interest rates		0.005***	0.008***	0.002	0.009**	-0.011*	0.026***	-0.001
		(0.001)	(0.001)	(0.005)	(0.003)	(0.005)	(0.003)	(0.012)
Quarterly GDP growth (%)		0.000	0.000	0.000	0.000	0.000	0.000	-0.002
		(0.000)	(0.000)	(0.001)	(0.000)	(0.001)	(0.001)	(0.002)
Ecosystem (ref = “Energy-intensive industries”)								
Aerospace and defense		-0.093***	-0.100***					
		(0.007)	(0.007)					
Agri-food		0.064***	0.075***					
		(0.007)	(0.007)					
Construction		0.363***	0.358***					
		(0.006)	(0.006)					
Cultural and creative industries		-0.048***	-0.054***					
		(0.013)	(0.013)					
Digital		-0.192***	-0.201***					
		(0.007)	(0.008)					
Electronics		-0.102***	-0.106***					
		(0.006)	(0.007)					
Energy - renewables		0.158***	0.143***					
		(0.008)	(0.008)					
Health		-0.091***	-0.104***					
		(0.006)	(0.007)					
Mobility - Transport-Automotive		-0.141***	-0.149***					
		(0.007)	(0.007)					

	Log(Average offers per contract award notice)							
	Inflation only	OLS, full sample	OLS, full sample with staggered inflation	OLS, Agri-food	OLS, Construction	OLS, Energy-intensive industries	OLS, Electronics	OLS, Textiles
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8
Proximity, Social Economy and Civil Security		-0.125***	-0.125***					
		(0.011)	(0.011)					
Retail		-0.046	-0.052					
		(0.101)	(0.101)					
Textiles		0.091***	0.084***					
		(0.013)	(0.013)					
Tourism		0.056***	0.065***					
		(0.014)	(0.014)					
N	324,603	324,579	324,579	24,244	93,735	13,344	40,852	4,220
R2	0.000	0.176	0.176	0.194	0.110	0.099	0.082	0.233
R2 Adj.	0.000	0.176	0.176	0.192	0.110	0.096	0.081	0.224
R2 Within		0.105	0.106	0.074	0.060	0.038	0.033	0.066
R2 Within Adj.		0.105	0.106	0.073	0.059	0.037	0.032	0.061
AIC	752556.9	689870.7	689804.5	47667.1	202273.6	24120.9	78961.4	9427.5
BIC	752578.3	690554.9	690520.8	48080.0	202755.4	24488.3	79375.1	9738.6
RMSE	0.77	0.70	0.70	0.65	0.71	0.60	0.64	0.73

Notes: heteroscedasticity-consistent robust standard errors in parentheses; + p < 0.1, * p < 0.05, ** p < 0.01, *** p < 0.001. All models except the minimal one include time- and country-fixed effects.

Table 23. Regression models for the average number of offers per CAN, quarterly changes in inflation, 2018-2022 (TED)

	Log(Average offers per contract award notice)							
	Inflation only	OLS, full sample	OLS, full sample with staggered inflation	OLS, Agri-food	OLS, Construction	OLS, Energy-intensive industries	OLS, Electronics	OLS, Textiles
	Model 9	Model 10	Model 11	Model 12	Model 13	Model 14	Model 15	Model 16
(Intercept)	0.831***							
	(0.001)							
Quarter-on-quarter inflation change (%)	0.001**	-0.001*		-0.003+	0.001	0.003**	0.013*	-0.022
	(0.000)	(0.000)		(0.002)	(0.003)	(0.001)	(0.005)	(0.014)
Quarter-on-quarter inflation change (%), lagged		-0.002***		0.000	0.001	0.000	0.012*	0.009
		(0.000)		(0.001)	(0.003)	(0.001)	(0.005)	(0.013)
Inflation, segmented (ref = “Low inflation”, 0-5%)								
No inflation, 0% or lower			-0.007					
			(0.009)					
Moderate inflation, 5-10%			-0.010					
			(0.011)					
High inflation, 10-20%			-0.047**					
			(0.017)					
Very high inflation, over 20%			-0.057**					
			(0.022)					
Inflation, segmented (ref = “Low inflation”, 0-5%), lagged								
No inflation, 0% or lower			0.003					
			(0.009)					
Moderate inflation, 5-10%			-0.004					
			(0.011)					
High inflation, 10-20%			0.020					
			(0.017)					
Very high inflation, over 20%			-0.142***					
			(0.021)					

	Log(Average offers per contract award notice)							
	Inflation only	OLS, full sample	OLS, full sample with staggered inflation	OLS, Agri-food	OLS, Construction	OLS, Energy-intensive industries	OLS, Electronics	OLS, Textiles
	Model 9	Model 10	Model 11	Model 12	Model 13	Model 14	Model 15	Model 16
Value procurement (EUR), logged		-0.177***	-0.177***	0.097***	-0.039**	0.055+	-0.270***	-0.250**
		(0.007)	(0.007)	(0.031)	(0.013)	(0.032)	(0.019)	(0.079)
Value procurement (EUR) squared, logged		0.008***	0.008***	-0.003*	0.002***	-0.001	0.011***	0.010**
		(0.000)	(0.000)	(0.001)	(0.000)	(0.001)	(0.001)	(0.003)
Open procedure		0.342***	0.341***	0.451***	0.395***	0.239***	0.229***	0.282***
		(0.003)	(0.003)	(0.013)	(0.006)	(0.015)	(0.008)	(0.039)
Division into lots		0.123***	0.122***	0.161***	0.052***	0.144***	0.182***	0.261***
		(0.005)	(0.005)	(0.016)	(0.014)	(0.022)	(0.013)	(0.046)
Interest rates		0.005***	0.005***	0.004	0.009***	-0.012*	0.025***	0.002
		(0.001)	(0.001)	(0.004)	(0.003)	(0.005)	(0.003)	(0.011)
Quarterly GDP growth (%)		0.000	0.000	0.001	0.000	0.000	0.000	-0.002
		(0.000)	(0.000)	(0.001)	(0.000)	(0.001)	(0.000)	(0.002)
Ecosystem (ref = “Energy-intensive industries”)								
Aerospace and defense		-0.073***	-0.081***					
		(0.007)	(0.007)					
Agri-food		0.078***	0.071***					
		(0.007)	(0.007)					
Construction		0.369***	0.358***					
		(0.006)	(0.006)					
Cultural and creative industries		-0.015	-0.023+					
		(0.012)	(0.012)					
Digital		-0.170***	-0.177***					
		(0.007)	(0.007)					
Electronics		-0.078***	-0.086***					
		(0.006)	(0.006)					
Energy - renewables		0.152***	0.147***					
		(0.008)	(0.008)					

	Log(Average offers per contract award notice)							
	Inflation only	OLS, full sample	OLS, full sample with staggered inflation	OLS, Agri-food	OLS, Construction	OLS, Energy-intensive industries	OLS, Electronics	OLS, Textiles
	Model 9	Model 10	Model 11	Model 12	Model 13	Model 14	Model 15	Model 16
Health		-0.068***	-0.077***					
		(0.006)	(0.006)					
Mobility - Transport-Automotive		-0.117***	-0.125***					
		(0.007)	(0.007)					
Proximity, Social Economy and Civil Security		-0.116***	-0.116***					
		(0.010)	(0.010)					
Retail		-0.015	-0.026					
		(0.130)	(0.130)					
Textiles		0.094***	0.086***					
		(0.013)	(0.013)					
Tourism		0.123***	0.124***					
		(0.013)	(0.013)					
N	358,700	356,166	356,166	26,846	103,312	14,455	45,527	4,507
R2	0.000	0.174	0.174	0.189	0.108	0.103	0.079	0.232
R2 Adj.		0.101	0.102	0.070	0.058	0.039	0.030	0.067
R2 Within		0.101	0.102	0.069	0.057	0.038	0.029	0.061
R2 Within Adj.	830085.5	756232.3	756145.0	52901.3	222797.6	26159.8	87998.2	9945.2
AIC	830107.1	756965.6	756943.0	53352.2	223322.7	26561.4	88452.0	10285.1
BIC	0.77	0.70	0.70	0.65	0.71	0.60	0.64	0.72
RMSE	0.000	0.174	0.174	0.189	0.108	0.103	0.079	0.232

Note: heteroscedasticity-consistent robust standard errors in parentheses; + p < 0.1, * p < 0.05, ** p < 0.01, *** p < 0.001. All models except the minimal one include time- and country-fixed effects.

Table 24. Regression models for the proportion of SME offers per CAN, changes in inflation compared to the same quarter in the previous period, 2018-2022 (TED)

	Share of bids submitted by SMEs per contract award notice							
	Inflation only	Quasi-binomial, full sample	Quasi-binomial, full sample with factor inflation	Quasi-binomial, Agri-food	Quasi-binomial, Construction	Quasi-binomial, Energy-intensive industries	Quasi-binomial, Electronics	Quasi-binomial, Textiles
	Model 17	Model 18	Model 19	Model 20	Model 21	Model 22	Model 23	Model 24
(Intercept)	1.035***							
	(0.004)							
Inflation change compared to the same quarter in the previous year (%)	-0.004***	-0.007***		0.013***	-0.001	-0.013***	-0.009+	0.024
	(0.000)	(0.000)		(0.003)	(0.001)	(0.001)	(0.005)	(0.025)
Inflation, segmented (ref = “Low inflation”, 0-5%)								
No inflation, 0% or lower			-0.138***					
			(0.013)					
Moderate inflation, 5-10%			-0.100***					
			(0.011)					
High inflation, 10-20%			0.098***					
			(0.016)					
Very high inflation, over 20%			-0.258***					
			(0.021)					
Value procurement (EUR), logged		0.396***	0.392***	1.204***	0.678***	0.467***	-0.191*	0.048
		(0.023)	(0.023)	(0.084)	(0.043)	(0.116)	(0.076)	(0.227)
Value procurement (EUR) squared, logged		-0.022***	-0.022***	-0.047***	-0.035***	-0.027***	-0.001	-0.003
		(0.001)	(0.001)	(0.003)	(0.002)	(0.004)	(0.003)	(0.009)
Open procedure		0.490***	0.493***	1.189***	-0.029	0.585***	0.791***	1.437***
		(0.011)	(0.011)	(0.053)	(0.021)	(0.055)	(0.032)	(0.112)
Division into lots		0.250***	0.282***	0.443***	0.297***	0.488***	0.327***	0.358*
		(0.016)	(0.016)	(0.061)	(0.043)	(0.070)	(0.049)	(0.152)

	Share of bids submitted by SMEs per contract award notice							
	Inflation only	Quasi-binomial, full sample	Quasi-binomial, full sample with factor inflation	Quasi-binomial, Agri-food	Quasi-binomial, Construction	Quasi-binomial, Energy-intensive industries	Quasi-binomial, Electronics	Quasi-binomial, Textiles
	Model 17	Model 18	Model 19	Model 20	Model 21	Model 22	Model 23	Model 24
Interest rates		-0.027***	-0.019***	-0.023	0.000	-0.001	-0.018	-0.139***
		(0.004)	(0.004)	(0.019)	(0.008)	(0.017)	(0.011)	(0.043)
Quarterly GDP growth (%)		-0.001	-0.001	-0.005*	-0.006***	0.005*	0.001	-0.011*
		(0.001)	(0.001)	(0.002)	(0.001)	(0.002)	(0.002)	(0.005)
Ecosystem (ref = “Energy-intensive industries”)								
Aerospace and defense		0.451***	0.465***					
		(0.021)	(0.021)					
Agri-food		0.863***	0.885***					
		(0.022)	(0.022)					
Construction		1.079***	1.052***					
		(0.019)	(0.019)					
Cultural and creative industries		0.744***	0.782***					
		(0.036)	(0.036)					
Digital		0.323***	0.345***					
		(0.023)	(0.023)					
Electronics		0.541***	0.577***					
		(0.021)	(0.020)					
Energy - renewables		-0.122***	-0.157***					
		(0.024)	(0.024)					
Health		0.111***	0.120***					
		(0.019)	(0.020)					
Mobility - Transport-Automotive		0.403***	0.421***					
		(0.023)	(0.023)					
Proximity, Social Economy and Civil Security		0.482***	0.491***					
		(0.029)	(0.029)					
Retail		0.611	0.599					
		(0.375)	(0.378)					
Textiles		0.996***	1.021***					
		(0.041)	(0.041)					
Tourism		0.339***	0.368***					
		(0.037)	(0.037)					
N	322,099	322,075	322,075	23,820	93,349	13,206	40,607	4,118
RMSE	0.39	0.36	0.36	0.28	0.31	0.40	0.34	0.28

Note: heteroscedasticity-consistent robust standard errors in parentheses; + p < 0.1, * p < 0.05, ** p < 0.01, *** p < 0.001. All models except the minimal one include time- and country-fixed effects.

Table 25. Regression models for the proportion of SME offers per CAN, quarter-on-quarter inflation changes, 2018-2022 (TED)

	Share of bids submitted by SMEs per contract award notice							
	Inflation only	Quasi-binomial, full sample	Quasi-binomial, full sample with factor inflation	Quasi-binomial, Agri-food	Quasi-binomial, Construction	Quasi-binomial, Energy-intensive industries	Quasi-binomial, Electronics	Quasi-binomial, Textiles
	Model 25	Model 26	Model 27	Model 28	Model 29	Model 30	Model 31	Model 32
(Intercept)	1.028***							
	(0.004)							
Quarter-on-quarter inflation change (%)	-0.003***	-0.007***		-0.010*	0.002	-0.019***	-0.021	0.010
	(0.001)	(0.001)		(0.005)	(0.007)	(0.003)	(0.019)	(0.058)
Quarter-on-quarter inflation change (%), lagged		-0.003+		0.004	-0.001	-0.003	0.036+	0.068
		(0.001)		(0.005)	(0.007)	(0.003)	(0.019)	(0.057)
Inflation, segmented (ref = “Low inflation”, 0-5%)								
No inflation, 0% or lower			-0.008					
			(0.027)					
Moderate inflation, 5-10%			-0.010					
			(0.033)					
High inflation, 10-20%			-0.162**					
			(0.051)					
Very high inflation, over 20%			-0.330***					
			(0.064)					
Inflation, segmented (ref = “Low inflation”, 0-5%), lagged								
No inflation, 0% or lower			-0.068**					
			(0.027)					
Moderate inflation, 5-10%			0.008					
			(0.032)					
High inflation, 10-20%			-0.055					
			(0.051)					
Very high inflation, over 20%			-0.270***					
			(0.064)					
Value procurement		0.392***	0.391***	1.122***	0.704***	0.417***	-0.162*	0.067

	Share of bids submitted by SMEs per contract award notice							
	Inflation only	Quasi-binomial, full sample	Quasi-binomial, full sample with factor inflation	Quasi-binomial, Agri-food	Quasi-binomial, Construction	Quasi-binomial, Energy-intensive industries	Quasi-binomial, Electronics	Quasi-binomial, Textiles
	Model 25	Model 26	Model 27	Model 28	Model 29	Model 30	Model 31	Model 32
(EUR), logged								
		(0.022)	(0.022)	(0.080)	(0.041)	(0.111)	(0.072)	(0.221)
Value procurement (EUR) squared, logged		-0.022***	-0.022***	-0.044***	-0.036***	-0.025***	-0.002	-0.004
		(0.001)	(0.001)	(0.003)	(0.002)	(0.004)	(0.003)	(0.009)
Open procedure		0.456***	0.451***	0.985***	-0.043*	0.545***	0.786***	1.377***
		(0.010)	(0.010)	(0.049)	(0.020)	(0.052)	(0.030)	(0.109)
Division into lots		0.270***	0.266***	0.440***	0.310***	0.591***	0.328***	0.375*
		(0.016)	(0.016)	(0.061)	(0.043)	(0.071)	(0.048)	(0.151)
Interest rates		-0.030***	-0.028***	0.006	-0.001	-0.022	-0.017	-0.131**
		(0.004)	(0.004)	(0.018)	(0.008)	(0.017)	(0.011)	(0.042)
Quarterly GDP growth (%)		0.000	-0.001	-0.002	-0.004***	0.004+	0.001	-0.009*
		(0.001)	(0.001)	(0.002)	(0.001)	(0.002)	(0.002)	(0.005)
Ecosystem (ref = “Energy-intensive industries”)								
Aerospace and defense		0.493***	0.449***					
		(0.020)	(0.020)					
Agri-food		0.885***	0.859***					
		(0.021)	(0.021)					
Construction		1.090***	1.030***					
		(0.018)	(0.018)					
Cultural and creative industries		0.772***	0.733***					
		(0.034)	(0.034)					
Digital		0.374***	0.336***					
		(0.022)	(0.022)					
Electronics		0.593***	0.556***					
		(0.019)	(0.019)					
Energy - renewables		-0.109***	-0.135***					
		(0.023)	(0.023)					
Health		0.167***	0.107***					
		(0.018)	(0.018)					
Mobility - Transport-Automotive		0.467***	0.421***					

	Share of bids submitted by SMEs per contract award notice							
	Inflation only	Quasi-binomial, full sample	Quasi-binomial, full sample with factor inflation	Quasi-binomial, Agri-food	Quasi-binomial, Construction	Quasi-binomial, Energy-intensive industries	Quasi-binomial, Electronics	Quasi-binomial, Textiles
	Model 25	Model 26	Model 27	Model 28	Model 29	Model 30	Model 31	Model 32
		(0.022)	(0.022)					
Proximity, Social Economy and Civil Security		0.540***	0.548***					
		(0.028)	(0.028)					
Retail		0.329	0.263					
		(0.427)	(0.428)					
Textiles		1.041***	0.992***					
		(0.039)	(0.039)					
Tourism		0.464***	0.463***					
		(0.035)	(0.035)					
Num.Obs.	356,169	353,638	353,638	26,417	102,913	14,317	45,279	4,410
RMSE	0.39	0.36	0.36	0.28	0.31	0.40	0.33	0.28

Note: heteroscedasticity-consistent robust standard errors in parentheses; + p < 0.1, * p < 0.05, ** p < 0.01, *** p < 0.001. All models except the minimal one include time- and country-fixed effects.

A.2.1.7 Regression tables for access to skilled labour

Table 26. Regression models estimating the effect of inflation and wage growth on difficulty to access skilled labour, 2014-2022, SAFE

	Respondents' perceptions on the difficulty in accessing skilled labour					
	OLS, minimal model	OLS, production or labour costs	OLS, production or labour costs, interaction with sector	OLS, production or labour costs, interaction with firm size	OLS, labour costs	OLS, other costs
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
(Intercept)	3.544***					
	(0.017)					
Production or labour costs as main problem (1-10)	0.443***	0.385***	0.367***	0.399***		
	(0.003)	(0.003)	(0.006)	(0.005)		
Trends in labour costs (ref = "Decreased")						
Increased					0.611***	
					(0.031)	
Remained unchanged					-0.067*	
					(0.030)	
Trends in other costs (ref = "Decreased")						
Increased						0.425***
						(0.031)
Remained unchanged						0.042
						(0.031)
Firm size (ref = "1-9 employees")						
10-49 employees		0.485***	0.485***	0.641***	0.568***	0.614***
		(0.017)	(0.017)	(0.048)	(0.018)	(0.018)
50-249 employees		0.553***	0.554***	0.706***	0.669***	0.726***
		(0.017)	(0.017)	(0.048)	(0.018)	(0.018)
Firm age (ref = "2 years or less")						
10 or more years		0.012	0.012	-0.001	-0.047	-0.012
		(0.074)	(0.74)	(0.075)	(0.079)	(0.079)
5 years or more, but less than 10		0.109	0.108	0.114	0.061	0.103
		(0.077)	(0.077)	(0.083)	(0.087)	(0.087)
2 years or more, but less than 5		0.109	0.109	0.094	0.047	0.096
		(0.074)	(0.082)	(0.078)	(0.081)	(0.082)
Trends in turnover (ref = "Decreased")						
Increased		0.480***	0.481***	0.480***	0.359***	0.474***
		(0.022)	(0.022)	(0.022)	(0.023)	(0.023)
Remained unchanged		0.222***	0.222***	0.220***	0.168***	0.181***
		(0.020)	(0.020)	(0.020)	(0.022)	(0.022)
Trends in profit (ref = "Decreased")						
Increased		0.143***	0.136***	0.144***	-0.016	-0.043+
		(0.021)	(0.015)	(0.021)	(0.022)	(0.022)

	Respondents' perceptions on the difficulty in accessing skilled labour					
	OLS, minimal model	OLS, production or labour costs	OLS, production or labour costs, interaction with sector	OLS, production or labour costs, interaction with firm size	OLS, labour costs	OLS, other costs
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Remained unchanged		0.020	0.020	0.020	-0.066***	-0.115***
		(0.019)	(0.019)	(0.019)	(0.020)	(0.020)
Access to finance as main problem (1-10)		0.062***	0.061***	0.062***	0.138***	0.137***
		(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
Competition as main problem (1-10)		0.097***	0.099***	0.099***	0.192***	0.194***
		(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
Real GDP growth rate (%)		0.006+	0.004	0.004	0.001	-0.004
		(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
Interest rates (%)		-0.090***	-0.090***	-0.090***	-0.099***	-0.098***
		(0.011)	(0.011)	(0.011)	(0.012)	(0.012)
Vacancy rates (%)		0.126***	0.126***	0.126***	0.085***	0.070**
		(0.017)	(0.017)	(0.017)	(0.018)	(0.018)
Sector (ref = "Industry")						
Construction		0.295***	0.235**	0.317***	0.250***	0.264***
		(0.025)	(0.076)	(0.024)	(0.025)	(0.025)
Services		0.053***	-0.085	0.078***	-0.017	0.020
		(0.019)	(0.055)	(0.018)	(0.019)	(0.019)
Trade		-0.315***	-0.474**	-0.302***	-0.508***	-0.496***
		(0.020)	(0.059)	(0.020)	(0.021)	(0.021)
Interaction effects						
Production or labour costs as main problem (1-10) × Construction			0.012			
			(0.010)			
Production or labour costs as main problem (1-10) × Services			0.025**			
			(0.008)			
Production or labour costs as main problem (1-10) × Trade			0.027**			
			(0.008)			
Production or labour costs as main problem (1-				-0.025**		

	Respondents' perceptions on the difficulty in accessing skilled labour					
	OLS, minimal model	OLS, production or labour costs	OLS, production or labour costs, interaction with sector	OLS, production or labour costs, interaction with firm size	OLS, labour costs	OLS, other costs
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
10) × 10-49 employees						
				(0.007)		
Production or labour costs as main problem (1-10) × 50-249 employees				-0.026**		
				(0.007)		
N	212,612	146,108	146, 108	146, 108	146,342	146,313
R2	0.152	0.235	0.239	0.239	0.165	0.157
R2 Adj.	0.152	0.235	0.239	0.239	0.164	0.157
AIC	1020948	685309.3	685300.3	685290.4	700129.9	701398.2
BIC	1020968.6	685883	6585903.7	685883.9	700713.6	701981.9
RMSE	2.67	2.52	2.52	2.52	2.65	2.66
Wave-FE		X	X	X	X	X
Country-FE		X	X	X	X	X

Note: heteroscedasticity-consistent robust standard errors in parentheses; + p < 0.1, * p < 0.05, ** p < 0.01, *** p < 0.001

A.2.1.8 Regression tables for profitability

Table 27. Regression models for profitability, 2013-2021 (Orbis)

	Profit margins (%)				ROE	ROCE
	OLS, profit margin, minimal model	OLS, profit margin, full sample	OLS, profit margin, large firms only	OLS, profit margin, SMEs only	OLS, full sample	OLS, full sample
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
(Intercept)	4.447***					
	(0.009)					
Inflation rate (%)	0.112***	-0.058***	-0.017*	-0.069***	-0.069***	-0.042***
	(0.004)	(0.004)	(0.007)	(0.004)	(0.009)	(0.007)
Inflation rate (%), lagged		0.050***	-0.001	0.061***	0.088***	0.056***
		(0.005)	(0.010)	(0.005)	(0.012)	(0.008)
Profit margins (%), lagged		0.586***	0.647***	0.580***		
		(0.002)	(0.006)	(0.002)		
ROE, lagged					0.497***	
					(0.002)	
ROCE, lagged						0.558***
						(0.002)
Firm age		-0.001	0.007***	-0.003***	-0.068***	-0.039***
		(0.000)	(0.001)	(0.000)	(0.001)	(0.001)
Firm size (ref = "Large firm")						

	Profit margins (%)				ROE	ROCE
	OLS, profit margin, minimal model	OLS, profit margin, full sample	OLS, profit margin, large firms only	OLS, profit margin, SMEs only	OLS, full sample	OLS, full sample
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Medium-sized firm		1.509***			6.230***	4.547***
		(0.030)			(0.112)	(0.074)
Small firm		2.763***			11.394***	8.087***
		(0.040)			(0.145)	(0.098)
Collection period in days (logged)		-0.155***	-0.180***	-0.153***	-0.894***	-0.535***
		(0.007)	(0.018)	(0.007)	(0.024)	(0.016)
Turnover (logged)		0.781***	0.248***	0.484***	3.113***	2.266***
		(0.011)	(0.018)	(0.010)	(0.036)	(0.024)
Current ratio		0.207***	0.158***	0.215***	-0.075***	-0.064***
		(0.004)	(0.010)	(0.004)	(0.005)	(0.004)
Real GDP growth (%)		0.223***	0.172***	0.232***	0.506***	0.404***
		(0.006)	(0.018)	(0.006)	(0.020)	(0.014)
Interest rates		-0.350***	-0.311***	-0.346***	-1.109***	-0.182*
		(0.031)	(0.087)	(0.033)	(0.108)	(0.086)
Ecosystem (ref = “Energy intensive industries”)						
Aerospace and defense		0.229***	-0.331***	0.272***		
		(0.028)	(0.090)	(0.030)		
Agri-food		-0.525***	-0.452***	-0.504***	-4.010***	-2.467***
		(0.032)	(0.071)	(0.036)	(0.119)	(0.074)
Construction		0.175***	-0.153+	0.240***	2.040***	1.445***
		(0.027)	(0.092)	(0.029)	(0.114)	(0.077)
Cultural and creative industries		-1.187***	-0.762**	-1.367***	-4.368***	-2.709***
		(0.095)	(0.268)	(0.102)	(0.290)	(0.197)
Digital		1.133***	0.447***	1.180***	4.429***	2.731***
		(0.052)	(0.123)	(0.057)	(0.194)	(0.146)
Electronics		0.146***	-0.243**	0.204***	-1.747***	-0.765***
		(0.036)	(0.091)	(0.039)	(0.142)	(0.089)
Energy - renewables		1.141***	1.106***	1.182***	-4.760***	-3.433***
		(0.099)	(0.162)	(0.126)	(0.262)	(0.168)
Health		0.286***	0.792**	0.168+	-1.553***	-0.536**
		(0.084)	(0.249)	(0.089)	(0.272)	(0.176)
Mobility - Transport-Automotive		-0.534***	-0.991***	-0.451***	-1.428***	-1.305***
		(0.030)	(0.088)	(0.032)	(0.135)	(0.085)
Proximity, Social Economy and Civil Security		0.840***	0.001	0.760***	-1.745***	-1.075***
		(0.046)	(0.101)	(0.051)	(0.148)	(0.096)
Retail		-1.164***	-0.951***	-0.927***	-1.659***	-0.739***
		(0.022)	(0.062)	(0.023)	(0.099)	(0.064)
Textiles		-0.435***	-0.408**	-0.518***	-1.970***	-0.731***
		(0.042)	(0.131)	(0.045)	(0.169)	(0.105)
Tourism		-0.879***	-1.596***	-0.989***	-3.787***	-2.335***

	Profit margins (%)				ROE	ROCE
	OLS, profit margin, minimal model	OLS, profit margin, full sample	OLS, profit margin, large firms only	OLS, profit margin, SMEs only	OLS, full sample	OLS, full sample
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
		(0.072)	(0.241)	(0.076)	(0.195)	(0.115)
Num.Obs.	2,193,715	1,543,328	165,682	1,377,646	1,483,174	1,277,891
R2	0.001	0.395	0.442	0.389	0.315	0.388
R2 Adj.	0.001	0.395	0.441	0.389	0.315	0.388
R2 Within		0.389	0.435	0.382	0.301	0.372
R2 Within Adj.		0.389	0.435	0.382	0.301	0.372
AIC	17151749.4	10979466.8	1165671.8	9815422.9	14320917.0	11113210.4
BIC	17151774.6	10980152.7	1166212.8	9816078.2	14321600.7	11113885.8
RMSE	12.07	8.48	8.15	8.53	30.23	18.71
Year-FE		X	X	X	X	X
Country-FE		X	X	X	X	X

Note: heteroscedasticity-consistent robust standard errors in parentheses; + p < 0.1, * p < 0.05, ** p < 0.01, *** p < 0.001

Table 28. Regression models for profitability, 2015-2022 (SAFE)

	Profits increased				Profits decreased, increased, or remained unchanged
	Logit, minimal model	Logit, full sample	Logit, interactions with firm size	Logit, interactions with sector	Ordered logit, full sample
	Model 7	Model 8	Model 9	Model 10	Model 11
(Intercept)	-0.456***				
	(0.012)				
Decreased|Increased					0.739***
					(0.064)
Increased|Remained unchanged					2.287***
					(0.064)
Importance of production or labour costs as a problem (1-10)	-0.066***	-0.068***	-0.060***	-0.088***	-0.062***
	(0.002)	(0.006)	(0.004)	(0.006)	(0.002)
Firm size (ref = “1-9 employees”)					
10-49 employees		0.116***	0.201***	0.114***	-0.026*
		(0.017)	(0.043)	(0.016)	(0.012)
50-249 employees		0.308***	0.394***	0.308***	-0.058***
		(0.057)	(0.044)	(0.017)	(0.013)
Firm age (ref = “Less than 2 years”)					
2 years or more, but less than 5		-0.026	-0.022	-0.022	-0.136**
		(0.072)	(0.064)	(0.064)	(0.048)
5 years or more, but less than 10		0.082	0.084	0.084	-0.158**
		(0.082)	(0.071)	(0.071)	(0.053)
10 or more years		0.069	0.073	0.072	-0.137**
		(0.074)	(0.067)	(0.067)	(0.050)
Trends in turnover (ref = “Decreased”)					
Increased		3.326***	3.326***	3.326***	2.266***

	Profits increased				Profits decreased, increased, or remained unchanged
	Logit, minimal model	Logit, full sample	Logit, interactions with firm size	Logit, interactions with sector	Ordered logit, full sample
	Model 7	Model 8	Model 9	Model 10	Model 11
		(0.128)	(0.024)	(0.023)	(0.015)
Remained unchanged		0.783***	0.783***	0.783***	2.996***
		(0.105)	(0.026)	(0.026)	(0.016)
Importance of access to finance as a problem (1-10)		-0.024***	-0.024***	-0.024***	-0.024***
		(0.003)	(0.002)	(0.002)	(0.002)
Importance of competition as a problem (1-10)		-0.016***	-0.016***	-0.016***	-0.018***
		(0.004)	(0.003)	(0.003)	(0.002)
Importance of regulation as a problem (1-10)		-0.002**	-0.002**	-0.002**	0.000
		(0.001)	(0.001)	(0.001)	(0.000)
Real GDP growth rate (%, semi-annual)		0.017***	0.015***	0.015***	0.011***
		(0.003)	(0.003)	(0.002)	(0.002)
Interest rates (semi-annual)		-0.015+	-0.016	-0.016	-0.023**
		(0.009)	(0.012)	(0.012)	(0.008)
Sector (ref = ‘’Industry’)					
Construction		-0.097***	-0.098***	-0.254***	0.044*
		(0.028)	(0.024)	(0.067)	(0.017)
Services		0.062***	0.061***	-0.113*	-0.015
		(0.029)	(0.018)	(0.049)	(0.013)
Trade		0.027	0.026	-0.112*	-0.038**
		(0.043)	(0.020)	(0.053)	(0.014)
Interactions					
Importance of production or labour costs as a problem (1-10) × 10-49 employees			-0.014*		
			(0.006)		
Importance of production or labour costs as a problem (1-10) × 50-249 employees			-0.014*		
			(0.006)		
Importance of production or labour costs as a problem (1-10) × Construction				0.024*	
				(0.010)	
Importance of production or labour costs as a problem (1-10) × Services				0.027***	
				(0.007)	
Importance of production or labour				0.022*	

	Profits increased				Profits decreased, increased, or remained unchanged
	Logit, minimal model	Logit, full sample	Logit, interactions with firm size	Logit, interactions with sector	Ordered logit, full sample
	Model 7	Model 8	Model 9	Model 10	Model 11
costs as a problem (1-10) × Trade					
				(0.008)	
Num.Obs.	209,792	175,245	175,245	175,245	175,245
AIC	253332.8	147500.4	147485.9	147479.5	325978.6
BIC	253353.3	148004.1	148090.3	148094	
LogLik	-126,664.4	-73,700.2	-73,682.9	-73,678.7	
Pseudo-R2	0.004	0.301	0.302	0.302	
Wave-FE		X	X	X	X
Country-FE		X	X	X	X

Note: standard errors in parentheses; + p < 0.1, * p < 0.05, ** p < 0.01, *** p < 0.001+ p < 0.1, * p < 0.05, ** p < 0.01, *** p < 0.001

Table 29. Regression models for profitability, by ecosystem, 2013-2021 (Orbis)

	Profit margins (%)				
	OLS, Agri-food	OLS, Construction	OLS, Electronics	OLS, Energy-intensive industries	OLS, Textiles
	Model 12	Model 13	Model 14	Model 15	Model 16
Profit margins (%), lagged	0.602***	0.501***	0.626***	0.625***	0.632***
	(0.007)	(0.005)	(0.008)	(0.006)	(0.012)
Inflation rate (%)	0.128***	-0.106***	-0.050	0.027***	0.026
	(0.014)	(0.014)	(0.033)	(0.005)	(0.030)
Inflation rate (%), lagged	0.030+	0.020	-0.017	-0.010	0.003
	(0.016)	(0.015)	(0.030)	(0.008)	(0.025)
Firm age	-0.001	-0.009***	-0.005**	-0.003*	-0.008***
	(0.001)	(0.001)	(0.002)	(0.001)	(0.002)
Firm size (ref = “Large firm”)					
Medium-sized firm	1.232***	1.624***	2.001***	1.298***	1.756***
	(0.101)	(0.105)	(0.143)	(0.078)	(0.170)
Small firm	2.552***	3.095***	3.727***	2.405***	2.867***
	(0.144)	(0.131)	(0.205)	(0.107)	(0.222)
Collection period in days (logged)	-0.352***	-0.455***	-0.129**	-0.129***	-0.164***
	(0.034)	(0.031)	(0.041)	(0.027)	(0.047)
Turnover (logged)	0.822***	0.845***	1.104***	0.755***	1.003***
	(0.045)	(0.034)	(0.057)	(0.029)	(0.062)
Current ratio	0.189***	0.254***	0.220***	0.204***	0.201***
	(0.012)	(0.015)	(0.018)	(0.011)	(0.024)

	Profit margins (%)				
	OLS, Agri-food	OLS, Construction	OLS, Electronics	OLS, Energy-intensive industries	OLS, Textiles
	Model 12	Model 13	Model 14	Model 15	Model 16
Real GDP growth (%)	0.084***	0.156***	0.083**	0.062***	0.191***
	(0.021)	(0.014)	(0.029)	(0.015)	(0.044)
Interest rates	-0.531***	-0.075	-0.573***	-0.455***	-1.422***
	(0.108)	(0.092)	(0.164)	(0.084)	(0.251)
N	108,687	206,945	73,483	155,688	38,738
R2	0.408	0.309	0.442	0.453	0.443
R2 Adj.	0.408	0.309	0.442	0.452	0.443
R2 Within	0.394	0.296	0.436	0.446	0.430
R2 Within Adj.	0.394	0.296	0.436	0.446	0.430
AIC	781146.5	1477375.4	519682.3	1055090.6	264942.7
BIC	781559.2	1477815.7	520078.1	1055518.7	265302.4
RMSE	8.80	8.59	8.30	7.17	7.39
Year-FE		X	X	X	X
Country-FE		X	X	X	X
RMSE	11.95	8.28	8.03	8.31	31.26

Note: heteroscedasticity-consistent robust standard errors in parentheses; + p < 0.1, * p < 0.05, ** p < 0.01, *** p < 0.001.

Table 30. Eurostat/ECB-based regression models for profitability, macro-level variables only, 2017-2022

Gross share of profits of non-financial corporations (%)	
	OLS, LDV and country- and time-fixed effects
	Model 17
Gross share of profits, lagged	-0.233 **
	(0.074)
HICP lagged by two quarters (%)	0.334*
	(0.163)
Real GDP growth rate quarter-on-quarter (%)	0.233 ***
	(0.067)
Interest rates	0.301
	(0.256)
N	253
Country-fixed effects	X
Time-fixed effects	X
Adj. R^2	0.880
RMSE	3.25

Note: LDV is lagged dependent variable; heteroscedasticity-consistent robust standard errors in parentheses; + p < 0.1, * p < 0.05, ** p < 0.01, *** p < 0.001

A.2.1.9 CPV to NACE conversion table

Table 31. CPV to NACE conversion table

CPV CATEGORY	CPV CODE	NACE CODE	NACE CATEGORY	ECOSYSTEM
Agricultural, farming, fishing, forestry and related products	03x	A	Agriculture, forestry and fishing	Agri-food

CPV CATEGORY	CPV CODE	NACE CODE	NACE CATEGORY	ECOSYSTEM
Petroleum products, fuel, electricity and other sources of energy	09x	C19, D35	Manufacture of coke and refined petroleum products ; Electricity, gas, steam and air conditioning supply	Energy intensive, Energy-renewables
Mining, basic metals and related products	14x	B, C24, C23, E38	Mining and quarrying ; Manufacture of basic metals; Manufacture of glass and glass products ; Waste collection, treatment and disposal activities; materials recovery	Energy intensive
Food, beverages, tobacco and related products	15x	C10-C12	Manufacture of food products; Manufacture of beverages; Manufacture of tobacco products	Agri-food
Agricultural machinery	16x	C28	Manufacture of machinery and equipment n.e.c.	Electronics
Clothing, footwear, luggage articles and accessories	18x	C14	Manufacture of wearing apparel	Textiles
Leather and textile fabrics, plastic and rubber materials	19x	C15, C13, C22	Manufacture of leather and related products; Manufacture of textile; Manufacture of rubber and plastic products	Textiles, Energy-intensive
Printed matter and related products	22x	C18	Printing and reproduction of recorded media	Cultural and creative industries
Chemical products	24x	C20	Manufacture of chemicals and chemical products	-
Office and computing machinery, equipment and supplies except furniture and software packages	30x	C28	Manufacture of machinery and equipment n.e.c.	Electronics
Electrical machinery, apparatus, equipment and consumables; Lighting	31x	C27	Manufacture of electrical equipment	Energy - renewables
Radio, television, communication, telecommunication and related equipment	32x	C26	Manufacture of computer, electronic and optical products	Electronics
Medical equipments, pharmaceuticals and personal care products	33x	C21	Manufacture of basic pharmaceutical products and pharmaceutical preparations	Health
Transport equipment and auxiliary products to transportation	34x	C29-C30	Manufacture of motor vehicles, trailers and semi-trailers; Manufacture of other transport equipment	Mobility - Transport-Automotive, Aerospace and defence
Security, fire-fighting, police and defence equipment	35x	C25, C26, C30	Manufacture of fabricated metal products, except machinery and equipment; Manufacture of computer, electronic and optical products; Manufacture of other transport equipment	Aerospace and defence, Electronics
Musical instruments, sport goods, games, toys, handicraft, art materials and accessories	37x	C32	Other manufacturing	Cultural and creative industries

CPV CATEGORY	CPV CODE	NACE CODE	NACE CATEGORY	ECOSYSTEM
Laboratory, optical and precision equipments (excl. glasses)	38x	C26	Manufacture of computer, electronic and optical products	Electronics
Furniture (incl. office furniture), furnishings, domestic appliances (excl. lighting) and cleaning products	39x	C31	Manufacture of furniture	Construction
Collected and purified water	41x	E36	Water collection, treatment and supply	Horizontal
Industrial machinery	42x	C28	Manufacture of machinery and equipment n.e.c.	Electronics
Machinery for mining, quarrying, construction equipment	43x	C28	Manufacture of machinery and equipment n.e.c.	Electronics
Construction structures and materials; auxiliary products to construction (excepts electric apparatus)	44x	C23	Manufacture of other non-metallic mineral products	Energy intensive
Construction work	45x	F	Construction	Construction
Software package and information systems	48x	J58.2	Publishing activities (Software publishing)	Digital
Repair and maintenance services	50x	C33, S95	Repair and installation of machinery and equipment; Repair of computers and personal and household goods	Aerospace and defence, Proximity, Social Economy and Civil Security
Installation services (except software)	51x	C33	Repair and installation of machinery and equipment	Aerospace and defence
Hotel, restaurant and retail trade services	55x	I, G	Accommodation and food service activities; Wholesale and retail trade; repair of motor vehicles and motorcycles	Proximity, Social Economy and Civil Security, Retail
Transport services (excl. Waste transport)	60x	H49, H50, H51	Land transport and transport via pipelines; Water transport; Air transport	Mobility - Transport-Automotive (H49, H50), Tourism (H51)
Supporting and auxiliary transport services; travel agencies services	63x	H52, N79	Warehousing and support activities for transportation; Travel agency, tour operator and other reservation service and related activities	Mobility - Transport-Automotive, Tourism
Postal and telecommunications services	64x	H53	Postal and courier activities	-
Public utilities	65x	E36, D35	Water collection, treatment and supply; Electricity, gas, steam and air conditioning supply	Horizontal, Energy - renewables
Financial and insurance services	66x	K	Financial and insurance activities	-

CPV CATEGORY	CPV CODE	NACE CODE	NACE CATEGORY	ECOSYSTEM
Real estate services	70x	L	Real estate activities	Proximity, Social Economy and Civil Security
Architectural, construction, engineering and inspection services	71x	M71	Architectural and engineering activities; technical testing and analysis	Construction
IT services: consulting, software development, Internet and support	72x	J62, J63	Computer programming, consultancy and related activities; Information service activities	Digital
Research and development services and related consultancy services	73x	M72	Scientific research and development	Horizontal
Administration, defence and social security services	75x	O	Public administration and defence; compulsory social security	-
Services related to the oil and gas industry	76x	B	Mining and quarrying	-
Agricultural, forestry, horticultural, aquacultural and apicultural services	77x	A	Agriculture, forestry and fishing	Agri-food
Business services: law, marketing, consulting, recruitment, printing and security	79x	M69, M73, M70, N82, N78, N80, M74	Legal and accounting activities; Advertising and market research; Activities of head offices; management consultancy activities; Office administrative, office support and other business support activities; Employment activities; Security and investigation activities; Other professional, scientific and technical activities	Horizontal (M69), NA (M73), Horizontal (M70), Proximity, Social Economy and Civil Security (N82), Horizontal (N78), Aerospace and defence (N80), NA (M74)
Education and training services	80x	P	Education	-
Health and social work services	85x	Q	Human health and social work activities	Health, Cultural and creative industries, Proximity, Social Economy and Civil Security
Sewage-, refuse-, cleaning-, and environmental services	90x	E37-E39	Sewerage; Waste collection, treatment and disposal activities; materials recovery; Remediation activities and other waste management services	Horizontal
Recreational, cultural and sporting services	92x	R	Arts, entertainment and recreation	Cultural and creative industries

CPV CATEGORY	CPV CODE	NACE CODE	NACE CATEGORY	ECOSYSTEM
Other community, social and personal services	98x	S96	Other personal service activities	Proximity, Social Economy and Civil Security

Source: elaborated by PPMI.

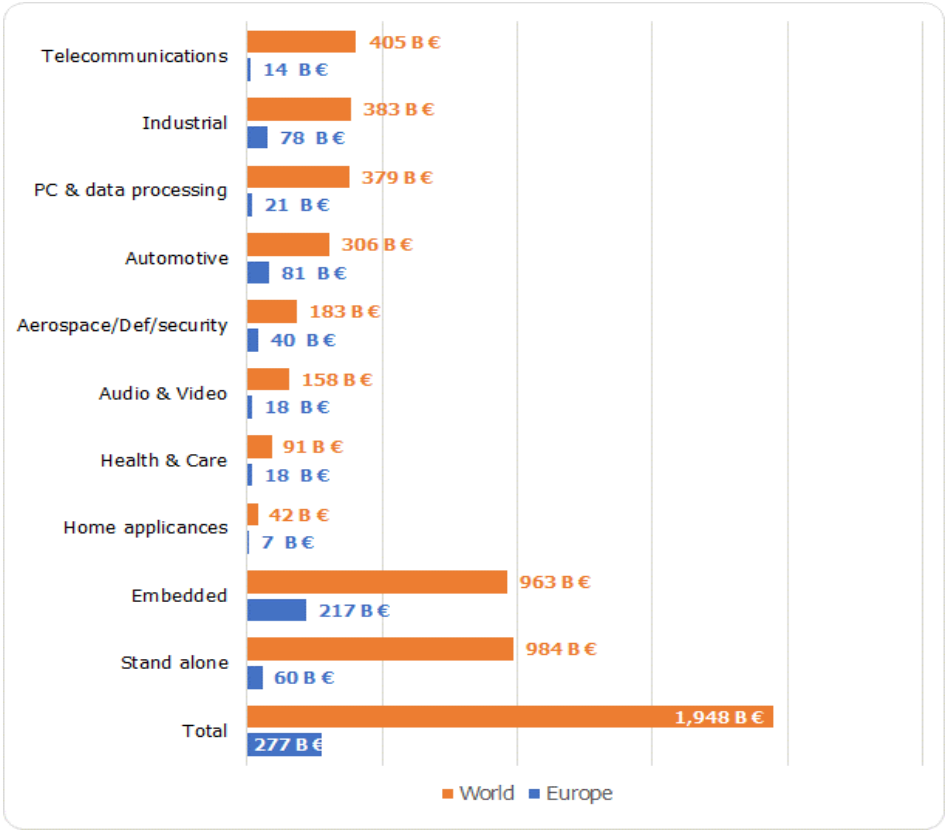
Annex 3: Case studies

A.3.1 Electronics case study

A.3.1.1. Ecosystem background

The electronics industry value-chain in Europe consists of manufacturers of electronics (including SMEs), end-user electronic equipment & systems, electronic components, materials and tools. The electronics and semiconductors sectors make an important contribution to European industry more widely as their outputs provide important inputs to many different end-user sectors, such as the aerospace and defence, automotive, domestic appliances manufacturing, healthcare and medical manufacturing, telecommunications sectors, etc. Electronics are used in a vast array of individual products, such as vehicles, robots and industrial machinery (Figure 80).[454] A number of countries globally dominate the electronics and semiconductor production sectors, especially those in East Asia, such as South Korea, Japan, China and Taiwan. European manufacturers operate in sectoral niches, such as producers of specialist chips in the automotive industry.

Figure 80. Electronic equipment /systems production by segment in 2017 in billion EUR



Source: DECISION Etudes & Conseil, Study on the Electronics Ecosystem: Overview, Developments and Europe's Position in the World.

Among the key value chain actors in electronics manufacturing are: original equipment manufacturers (OEMs), contract electronics manufacturers (CEMs), Original Design

[454] European Commission (2020). *Study on the electronics ecosystem: overview, developments and Europe's position in the world: final report*. Luxembourg: Publications Office of the European Union.

Manufacturer (ODM) similar to a contract electronics manufacturer, but typically own IP for products, and electronics manufacturing services (EMS) providers.

Regarding the spatial distribution of the sector, it can be noted that whereas a lot of electronics production and assembly takes place in China, in recent years, some production takes places in Central and Eastern Europe, which 'has become a base for greenfield investment in electronics assembly.'[455] In terms of areas of the market where Europe has a strong market position, there are two types of semiconductor products: advanced chips that use advanced technologies e.g. the chips needed for mobiles and computers (Intel, TSMC in Taiwan), and semiconductors that are less advanced but more specialist used in the automotive, machinery and health sectors and in the manufacturing of domestic appliances.

In the semiconductor ecosystem,[456] key stakeholders include: producers of semi-conductors (mainly niche, specialist producers in the EU, as most big producers are Asian or US firms, as well as users of semiconductors across many different downstream industry sectors (e.g. electronics, domestic appliances, automotive, mobile phone production).

A.3.1.2. Key drivers of inflation within the ecosystem

Some of the inflation drivers within the European electronics ecosystem are similar to those in other sectors i.e. cost-push factors, such as rising global energy costs, raw material prices due to inputs used in the production of electronic products (e.g. the cost of copper). However, **shortages of semiconductors and electronics components have led to significant increases in prices**. An interviewee in France that has invested in 15 different micro-electronics firms stated that some components and chips prices have increased by 10-20 times due to major shortages in components. A further problem is that SMEs cannot access components easily, as **the market is highly concentrated among a few global players** in the electronics industry that are able to dominate the market and have purchasing power. SMEs are faced with a very costly situation whereby they **have to place minimum volume** orders which do not correspond to their needs, for instance, purchasing more than 100,000 components instead of the 20,000 units they actually need in order to secure an order which they need for production.

It was noted by an interviewee that whereas many other sectors of the European economy have been affected by inflationary pressures due to increased energy costs, raw materials prices etc., price inflation in the electronics sector has been driven by shortages and bottlenecks in access to specialised components and chips. This has had an outsized impact compared with other increased costs, including labour costs. Feedback received was that whereas 5-10% inflation in the general economy is easily absorbable, paying multiple times the price for specialist chips and other electronic components and receiving these months late was detrimental to competitiveness.

Demand-pull factors, such as increased demand for electronics and semi-conductors, have occurred both during and after the pandemic, exacerbated by shortages in such components due to ongoing supply-side challenges in the aftermath of the COVID-19 pandemic, pent-up demand and further supply chain disruptions due to lockdowns in China as its 'zero tolerance' policy pushed up electronic component prices. This problem has therefore persisted between 2020 and 2023. There have been production shortages and supply chain bottlenecks in electronics components and semi-conductors globally. As many industry sectors are

[455] Rutvica A., Drahokoupil, J. and Sacchetto, D. (2020). Flexible workforces and low profit margins: electronics assembly between Europe and China, *The European Trade Union Institute*. Available at: https://www.etui.org/publications/books/flexible-workforces-and-low-profit-margins-electronics-assembly-between-europe-and-china.

[456] Accenture (2022). *Harnessing the power of the semiconductor value chain*. Available at: https://www.accenture.com/us-en/insights/high-tech/semi-value-chain

dependent on chips and micro controllers, there have been significant economic and business competitiveness impacts of such shortages.

Inflationary drivers specific to electronics (and especially semi-conductors) extend beyond these factors to include the war in Ukraine:

> *The conflict and multiple international sanctions against Russia have disrupted global food, energy, and chipmaking raw material supply chains. For months now, manufacturers have struggled with shortages and extreme cost volatility for various noble gases, palladium, nickel, platinum, and aluminium. In some cases, OEMs have found alternate suppliers outside of Eastern Europe. But quickly establishing new supply relationships is an expensive and challenging endeavour*. [457]

Geo-political factors, restrictions in the supply of semi-conductors due to national security considerations, and trade wars, are also further having an influence on the costs of electronics. For instance, the U.S. is no longer supplying many chips to China.

A study on the Global Sentiment of the Electronics Supply Chain Report (June 2022)[458] found that 9 in 10 electronics manufacturers surveyed are currently experiencing rising material costs, while 86 percent of electronics manufacturers are concerned about inflation. The three main problems identified facing the electronics manufacturing industry were similar to those found in interviews: geopolitical uncertainties due to the prolonged Russia-Ukraine war and US-led export control measures on China,[459] inflationary pressures due to production bottlenecks and supply chain disruptions in China due to extended lockdowns. The study found that 8 in 10 electronics manufacturers are concerned about extended supply chain disruptions due to a prolonged Russia-Ukraine war.

A.3.1.3. Key impacts of inflation on the ecosystem

High inflation of components used in the electronics manufacturing ecosystem has a number of significant adverse impacts:

- For European SMEs in the electronics sector that need components and chips to produce value added products and devices using these inputs, uncertainty regarding the reliability of the supply of components and chips due to lack of security of supply.
- Knock-on uncertainty in many other industry sectors, as chips are a key production component. As per an analysis by the Federal Reserves in St Louis, although chips accounts of a small percentage of total input costs, their scarcity can halt production because they have no close substitutes and chip production capacity is very costly to increase.[460]
- Longer lead times – it takes months extra for chips and components to arrive, partly as a result of higher costs, but mainly linked to supply chain bottlenecks.

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[457] McKellop, M. (2022). Inflation's Impact on the electronics components supply chain. Available at: https://www.supplychain247.com/article/inflations_impact_on_the_electronics_components_supply_chain/sourcengine.

[458] IPC.(June 2022). *Global Sentiment of the Electronics Supply Chain* Report. Available at: https://emails.ipc.org/links/060822IPC-EconomicReport.pdf

[459] Bloomberg (2023). ASML Says Chip Controls Will Push China to Create Own Technology. Available at: https://www.bloomberg.com/news/articles/2023-01-25/asml-says-chip-controls-will-push-china-to-create-own-technology#xj4y7vzkg.

[460] Federal St Louis (2022). *Did the Computer Chip Shortage Affect Inflation?* Available at: https://www.stlouisfed.org/on-the-economy/2022/may/did-computer-chip-shortage-affect-inflation.

- Volatility in pricing of components and chips, which means SMEs may have to stockpile, which they can ill afford. This makes it difficult for final end users to know much in advance what the final pricing of components will be.

A further impact of inflation in electronics but also the related issue of lack of security of supply due to supply chain disruptions (due to COVID-19, geopolitical factors) is that larger final manufacturers are seeking to **diversify their country sources of production** such that they strengthen supply chain resilience. Manufacturers in sectors that are major users of electronics are taking broader steps to avoid shortfall-related disruptions, beyond diversifying their supplier base of electronic components, for instance **stockpiling chips in advance and factoring in longer lead-times**, such as to avoid shortfalls. OEMs, CMs, and EMS providers have been seeking to mitigate the impact of volatility on their operations, for instance, by fixing the prices of components, by agreeing fixed prices in advance for particular raw materials, etc.

A.3.1.4. Detailed impacts of inflation on SMEs

Payment practices and propensity to make payments late

Regarding late payments affecting the electronics industry, the issue is not new, as there have been examples of late payment practices going back 20 years.[461] This was confirmed in interviews when it was stated that late payments are a cultural norm in many EU countries and SMEs are especially adversely affected. However, in common with other industry ecosystems, during the current period, firms in the European electronics industry have experienced challenges around late payments. For instance, an interviewee mentioned that there are ongoing challenges for **SMEs in getting payment from suppliers, a problem compounded by the fact it takes a lot longer to produce in the first place, given lead times have lengthened to obtain components and chips.**

Participation in public procurement

Large firms are more easily able to access procurement contests. A lot of innovation and disruptive technologies stem from SMEs, but they lack the structural support necessary to develop new products and to create value derived from these innovations. When the public sector does procure equipment that contains electronics and chips, evidently, inflationary pressures mean that firms offering electronic equipment containing electronic components **risk making a much lower margin** if they participate in contests to supply goods, such as electrical equipment, with greater pricing uncertainties between the moment of bidding for the contract and having to provide the equipment, during which time component prices may go up, or certain components, especially semiconductors, could become unavailable temporarily leading to a risk of delivering equipment late to public sector clients. These factors may deter firms from participating in procurement processes.

Adoption of sustainable practices

Implementing innovative green technologies in electronics manufacturing may be delayed by inflationary pressures due to the capital-intensive nature of the industry, especially for semiconductor manufacturing. Moreover, with the exception of specialist manufacturers, most semiconductor manufacturing takes place in the US and in Asia.

[461] Wells, A. (2001) Late payments continue in electronics sector despite law change. *EETimes*. Available at: https ://www.eetimes.com/late-payments-continue-in-electronics-sector-despite-law-change/.

Adoption of new technologies

The issues are similar to those in relation to green technologies outlined in the previous response. Implementing innovative technologies in electronics manufacturing may be delayed by inflationary pressures due to the capital-intensive nature of the industry, especially semiconductor manufacturing, which mainly takes place in the US and in Asia. Whilst investment in new technologies may make production more efficient by realizing operational cost efficiencies, it is difficult for electronics manufacturers to invest, especially SMEs, during a period of high inflation, given slimmer profit margins, and uncertainty regarding potential return on investment in new technologies during a period of higher cost inflation and margin pressures.

However, this is not the case for large firms, some of whom were able to invest in new technologies, including thanks to EU R&I funding.

Profitability and turnover

The increase in inflation has impacted on the profitability of the global electronics industry. High-cost inflation means that prices increased for end-users of electronics, but only a proportion of these costs can be passed on. An interviewee observed that in the production of micro controllers, there was very limited scope to pass on any increased costs from SMEs to their large firm customers within the value chain. Large clients did not allow these costs to be passed up the value chain on the basis that the market expected the final prices of goods to remain stable.

This has led to higher production costs for electronics manufacturers and suppliers to intermediate users in other industries and has negatively impacted profitability and turnover. An interviewee mentioned that SME profitability in the electronics sector has been considerably impacted by supply chain shortages, and that it was more about surviving than making a profit.

However, despite the above-mentioned challenges for the industry, profits in the electronics industry have actually increased in some countries. According to estimates provided in a statement by trade unions on collective bargaining and wage negotiations in Austria: 'The cumulative annual profit of the companies more than doubled in 2021 (+116%) and was also 88% higher than in the pre-crisis year 2019'. [462]

There is some evidence that in the semiconductor industry, whilst there are productivity gains through investment in automation and efficiency improvements **productivity gains in [production foundries] fabs are not keeping up with rising manufacturing capacity and fab costs**. [463] However, there are some positive benefits for the semiconductor industry of inflation, with short-term downsides but potential longer-term gains as new business models emerge and as high inflation forces the industry to shift towards ever-growing miniaturisation, and progress towards 450mm wafers. Another article points to the potential efficiency savings:

> *A 450mm wafer has 2.25 times the area of a 300mm wafer. If you build 450mm wafer fabs with the same wpm output as 300mm fabs you need approximately 2.25 times fewer fabs (even less due lower edge die losses), 25 memory fabs becomes 11 memory fabs and 100 logic or other fabs becomes 44 fabs. These are much more manageable numbers of fabs to build. If you look at people required to run a fab, the*

[462] Schneller, M. (2023). PRO-GE and GPA demand a 12.9% pay increase. *IndustriAll Trade Union - electrical/electronics industry report*. Available at: https://news.industriall-europe.eu/documents/upload/2023/3/638143767781081012_AT_-_Demands_2023.pdf.

[463] Hutcheson, G. D. (2022). Inflation – why it's good for semiconductors. *TechInsights.* Available at: https://www.techinsights.com/blog/inflation-why-its-good-semiconductors.

number of people required is largely based on the number of wafers, by running fewer-bigger wafers the number of people required is reduced.[464]

Hence, in the longer term, increased costs are pushing semi-conductor foundries to invest in increasing manufacturing efficiencies and in R&D&I, as otherwise manufacturing costs would become prohibitive. This should in turn ultimately boost economic competitiveness.

Wage growth rate

As with other industries, there has been a high impact on some manufacturers which may raise worker salaries in line with inflation. Inflation has remained high. For instance, according to trade unions in Austria, the average inflation rate of wages in the electronics sector from March 2022 to February 2023 was 9.5%. In the electrical/electronics industry, some workers have been campaigning for above-inflationary increases.[465]

An international survey in the study 'Global Sentiment of the Electronics Supply Chain Report (June 2022)' found that **rising labour costs appear most acute in North America where 86 percent of manufacturers report labour costs are currently rising. Only 58 percent of European manufacturers are experiencing an increase.**[466]

In France, an interviewee stated that in comparison with increases in the costs of components and chips, SMEs were less concerned about inflationary wage rises. SMEs can control the cost of labour quite well as often their employees are motivated by factors other than salary levels. In the microcontrollers sector, for example, staff are often interested in the technologies themselves and in the entrepreneurial spirit present in a micro firm or SME.

Access to skilled labour

Challenges in ensuring adequate access to skilled labour is a problem that has affected many industry sectors, including the electronics and semi-conductor industries. Before considering the impact on access to skilled labour during the current high-inflationary period specifically in electronics, it is important to observe earlier trends as this forms part of the backdrop. The shift in high-volume semiconductor manufacturing from Europe and the US to Asia in the 1990s and 2000s meant that those working in semiconductor production in the EU were part of a highly specialised and ageing workforce. This has led to ongoing challenges in accessing skilled labour. An empirical study from the UK[467] found that some companies were struggling to recruit. For instance, **NXP Semiconductors was running approximately 10% below headcount, despite a major recruitment drive (almost 20% of current employees had started in 2022).** There was seen to be a gap in the numbers of staff or potential recruits with relevant skills available.

Interviewees commented on the challenge that SMEs face in recruiting staff with **specific expertise in AI**. Often, AI specialists are moving to work for large companies in Europe or the US where employment packages are more generous. There is also a problem around a general lack of new talent entering the European electronics sector leading to medium to longer term recruitment problems.

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[464] Jones, S. (2022), The lost opportunity for 450mm semiconductor wafers. *Semiwiki.* Available at: https://semiwiki.com/semiconductor-services/ic-knowledge/311026-the-lost-opportunity-for-450mm/.

[465] Schneller, M. (2023). PRO-GE and GPA demand a 12.9% pay increase. IndustriAll Trade Union - electrical/electronics industry report. Available at: https://news.industriall-europe.eu/documents/upload/2023/3/638143767781081012_AT_-_Demands_2023.pdf.

[466] Dubravac, S. (2022), Global Sentiment of the Electronics Supply Chain Report. *IPC Report*. Available at: https://emails.ipc.org/links/060822IPC-EconomicReport.pdf.

[467] House of Commons. (2022). The semiconductors industry in the UK. *Energy and Industrial Strategy Committee, Fifth Report of Session 2022–23*.

Bankruptcies and insolvencies

In France, an interviewee who manages an investment fund with a portfolio of 15 micro firms in the electronics sectors noted that 3 had already entered into bankruptcy, and 5 were in a difficult situation, equivalent to 50% of the portfolio either going bust or finding it difficult to raise finance.

Among the reasons for firms experiencing financial difficulties leading to bankruptcies cited were price inflation in chips and components, significantly **increased lead times** in chips and components arriving in Europe from Asia, meaning that final products such as micro-controllers cannot be produced, the inability to pass on costs to either major customers or to final consumers purchasing the end device. General inflationary pressures around wages were seen as less of a cause of financial problems.

It can also be noted that bankruptcies in these sectors also have a global dimension. For instance, in China, there have been a series of bankruptcies among chip producers.[468] However, data is skewed by the fact that large government subsidies were available for firms in this sector. According to a recent report,[469] 3,409 chip-related companies in China have gone bust this year, but this is part of China's efforts to develop its domestic semiconductor industry. China offered large sums to chip companies such that 22,000 new chip companies were registered in 2020 and 15,700 founded between January and May 2021.

Access to finance and capacity to repay loans

Access to finance was seen as a general problem for SMEs in the European electronics sector given cost pressures and the inflation of chips and components caused by supply shortages. The inability to pass on these extra costs has led to margins being squeezed and therefore, financial problems, both cashflow and difficulties in accessing finance. According to an interviewee, since the 2023 bankruptcy of Silicon Valley Bank (SVB) in the US and runs on regional banks, this has led to greater caution in the European banking sector in lending to higher-risk technology-driven firms, with greater difficulties in accessing finance. Many SMEs in electronics are trying to raise funds but are not succeeding due to dislocations in financial markets and a reluctance to invest given the circumstances of massive inflationary pressures and delays in delivery lead times explained below. Several firms within the portfolio of 15 firms managed by an investor in the French micro-electronics sector were facing ongoing funding difficulties for several months with no easy solutions to gain access to new finance.

Cashflow is a real challenge for SMEs in the electronics sector as producing goods takes much longer due to much longer lead times in obtaining components and chips. For instance, the pre-pandemic usual lead times for micro controllers was 6–8 weeks, but during the pandemic since 2020 and subsequently even post-pandemic, due to supply chain shortages, delivery times have increased to as long as 12-18 months. Moreover, the requirement to purchase in much greater volume than necessary or otherwise fail to secure a supplier of chips/ components adversely impacts SMEs' cashflow. The lack of a diversified supplier base makes it more difficult to reduce dependency on Asia, especially China, for imports, a problem that the European Chips Act is seeking to address.

Start-up and scale-up activity

As micro and small firms have been struggling with finance, this has evidently deterred businesspeople from starting up in the electronics sector. As chips production is capital-

[468] Manners, D. (2022) Mass Bankruptcies in China Chip Industry.. *Electronics Weekly*. Available at: https://www.electronicsweekly.com/blogs/mannerisms/delusions/mass-bankruptcies-in-china-chip-industry-2022-09/.
[469] *Ibid.*

intensive, the A2F problems mentioned earlier have also reduced start-up activity in the EU. However, no data was available in this regard on the specific impact of inflation. Nonetheless, interviewees noted that if existing SMEs are struggling to survive with long lead times in securing components and chips, this will deter others.

International competitiveness

It should be noted that the international competitiveness of the European electronics and semiconductors industries has been affected by a complex range of factors, of which inflation rates is only one factor. For instance, whereas the EU has recently sought to strengthen the competitiveness of the European semiconductors industry through the European Chips Act, this was preceded by the US CHIPS Act, and efforts by the U.S. to entice very large semiconductor producers in Taiwan to make significant inward investments. This has meant it has become more difficult to attract very large-scale semiconductor inward investments to Europe. Inflation has played a role in making it more difficult to be competitive for European industry, however, as this is a global phenomenon, there has been no worse an effect in Europe than elsewhere as all global producers and other actors in the supply chain are also affected. Of more relevance, however, is the growing importance of security of supply and of national security interests in semiconductors, which has restricted supply and therefore pushed up prices.

An interviewee commented in relation to market trends that there are two types of semiconductor products: chips that use advanced technologies needed for smartphones and computers (produced by firms such as Intel, TSMC in Taiwan), and semiconductors that are less advanced but specialised. Europe has more competitive strengths in the latter type of production of semiconductors. These are used for instance in the automotive and machinery sectors, the health sector, in the production of domestic appliances, etc. To strengthen the EU's competitiveness, in their view, there is less a need for factories to produce cutting-edge semiconductors, and more a need to strengthen production capacity of microcontrollers.

Energy production and energy consumption

The industry has in common with many other industry sectors been impacted by higher energy production prices, a problem that preceded the Ukraine war, and was linked to COVID recovery in pent-up demand, but which has got worse as a result of this conflict and ongoing energy price increases.

A.3.1.5. Passing costs onto consumers

Overall, there is a lack of data on what percentage of these costs has been passed on to consumers as opposed to be being absorbed by producers themselves. In some sub-sectors, higher levels costs have been pushed to consumers via price increases, as seen in higher electronic components and chip prices leading to higher costs of electronic products that include such components. For instance, the US Commerce Secretary[470] stated that inflation has a direct correlation with America's chip shortage, with automobile sector being a major cause of inflation in 2021. The prices for new vehicles increased by 11.8% and the prices of used cars rose 37.3% between December 2020 and December 2021. This increase stemmed largely from a decline in production because car companies could not get their hands on enough chips.

[470] Werschkul, B. (2022). Inflation has 'direct correlation' with America's chip shortage: Commerce Secretary. *Yahoo Finance.* Available at: https://finance.yahoo.com/news/inflation-chip-shortage-commerce-secretary-122005269.html.

However, in the production of micro controllers, another important sub-sector within electronics, there was no scope to pass on costs. One of the most significant problems affecting SMEs that produce micro controllers, according to an interviewee, is that they are unable to pass on increased costs. Large firms have a fixed price for the prices of final devices sold to professional users and consumers. The market determines the maximum price point they are willing to pay. Therefore, SMEs are obliged to absorb costs even if this poses a threat to their continued financial survival.

A.3.1.6. Future outlook

Whilst there are some commonalities with other sectors in that inflation is expected to persist during 2023 but to decline subsequently, there are some specific factors that suggest that **inflation will remain high in the semiconductor sector**, namely: shortages of supply, and the high capital-intensive nature of setting up manufacturing foundries to produce semiconductors. Moreover, one of the most significant problems has nothing to do with inflation, namely geopolitical tensions and export controls on chips that may lead to retaliatory measures and greater uncertainty regarding security of supply. For instance, the US and Japan have restricted sales of advanced chips to China through the introduction of export controls, due to their potential dual use nature in the context of the Ukraine war. This means that countries such as China may continue to provide some chips and components, but may be reluctant to export semiconductors if there are shortages and they need them for domestic needs. These challenges are significant and therefore, the EU adopted the European Chips Act recently and will provide ongoing EU investment in R&I into chips, which should help to continue to boost the sector and to strengthen strategic autonomy, even if inflation is likely to persist.

Interviewees mentioned that they do not see any changes in the cost of chips and components in the short-medium term due to supply chain bottlenecks. The current lack of production capacity in Europe and seeming inability of upstream producers to upscale production, and strong dependence on suppliers in Asia and especially China for European SMEs in the electronics sector are problems that do not appear to be resolved any time soon.

There are however different views as to how far high inflation will persist, as a potential economic downturn could lead to reduced demand and alleviate supply chain bottlenecks. For instance, an article in the *Financial Times* from April 2023 suggests that the chip industry slowdown will last longer than expected.[471] Manufacturers warn that there is weakening demand for automotive components due to PC and smartphone sales being reduced. Whilst sales of electronics increased significantly during the Covid-19 pandemic leading to widespread component shortages, industry stockpiles of chips have been building up since last summer, with global industry sales falling by 20.7% in February 2023 compared to the same month in 2022, the sixth consecutive month of declines. This points to bottlenecks eventually resolving, as demand weakens.

In conclusion, due to the economic slowdown and risk of recession in Europe and globally, supply-demand imbalances may balance out, leading to reduced inflation in components. **However, this is not yet being reported by many European SMEs, who are experiencing ongoing bottlenecks and shortages with high inflation in those components as a result.**

[471] Financial Times. (2023), Chip industry slowdown will last longer than expected. Available at: https://www.ft.com/content/6973aa75-0e25-49b8-b59d-5e8d38faa6b2

A.3.1.7. Existing ecosystem-specific policy measures to help SMEs

The main measures benefiting the electronic and semiconductor sectors are public subsidies to support these sectors to address the problem that the EU needs to achieve strategic autonomy such as to reduce over-dependency on Asia and thereby to enhance security of supply. Therefore, there is significant ongoing investment to strengthen technical and R&D&I capacity in these sectors through EU research and innovation funding for joint public-private investments in R&D&I. These actions go through the ECSEL joint undertaking funded through the RTD framework programmes in 2014-2024 and through the new R&I programme set up to implement the European Chips Act. This has partially offset the negative impacts of inflation on these sectors. However, an ongoing challenge is that production within the EU is limited and increasingly specialised in sectors where the EU has competitive strengths (e.g. semiconductors for the automotive sector, cybersecure chips), whereas there is a need to import a significant volume of semiconductors. Demand has recently increased compared with the past, in line with the global trend,[472] both due to digitalisation and an increased need to electrify (e.g. in the automotive, wider transport and energy sectors) due to the green transition, which also requires a major increase in semiconductors and electronic components.

There appear to be few national measures within the EU-27 aimed at tackling inflation in the chip production and electronics sectors. Rather, there is a focus on supporting measures aimed at industry overall.

Nonetheless, at EU level, there have been various initiatives to address supply chain disruptions and bottlenecks linked to the aftermath of the COVID-19 pandemic. For instance, there are measures that aim to tackle the problem of the EU's overdependence on Asian suppliers of chips and semiconductors. Through the EU Chips Act, a new strategy has been put in place to improve security of supply and access to semiconductors, and to strengthen capacity through R&I investment in developing Europe's own independent semi-conductor capacity. This should help to reduce dependency on Asian producers. Measures to support these sectors are not as simple as tackling inflation in isolation, rather, the aim is to tackle some of the underlying structural problems in the market (over-dependence on Asian and US producers) that make European intermediate and final users of semiconductors dependent on non-EU producers.

A.3.1.8. Possible additional measures that would help SMEs

1. **Clusters of SMEs should work together to maintain their competitiveness.** They should also harness additional work based on their innovative potential. An interviewee mentioned that SMEs are often more advanced than larger competitors in some areas of microcontrollers. Policy makers should be less concerned with firm size when making subsidies.
2. **Supply chain shortages should be better anticipated, planned for and managed by SMEs and large firms in the electronics and chips industries**. There are natural economic cycles in the semiconductor industry. However, the current supply chain shortages that persisted in the 2020-2023 period are due to a combination of the cyclical nature of the industry and the impact of the COVID-19 pandemic. These shortages are of a big magnitude as there is huge demand, but weak production capacity has led to considerable shortages affecting intermediate users and producers downstream within the value chain. National authorities and

[472] McKinsey & Company (2022). What's driving the semiconductor market. Available at: https://www.mckinsey.com/featured-insights/sustainable-inclusive-growth/chart-of-the-day/whats-driving-the-semiconductor-market.

the EU should play a role in supporting the industry to engage in planning and proactive management of demand-supply imbalances.

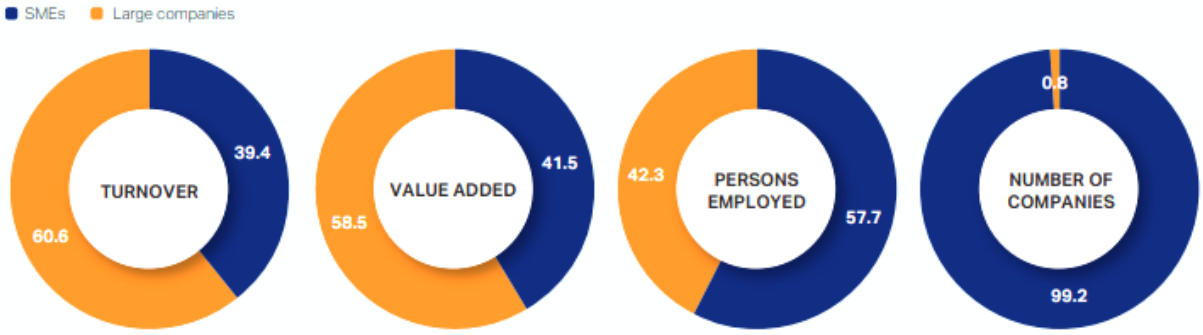
3. **Address the lack of support from national public authorities for SMEs.** Interviewees pointed to EU financial support appears to mainly benefit large semiconductor producers, and not SMEs, who are not generally involved in chip production but are further downstream in the value chain, and produce products using chips and components. The whole value chain should be considered, not only the largest semiconductor manufacturers in the market.
4. **Recognise strategic importance of chips and translate this into action.** The EU Chips Act has already recognised that semiconductors are a critical production input for industry generally but especially in facilitating the green transition. **However, practical support is needed to ensure that European SMEs have easier access to chips and components.**
5. **Promote diversification of supply chains through dedicated initiatives.** European SMEs that need chips and components from Asia are struggling to diversify their supplier base on their own as they lack the resources to explore new suppliers in other countries outside China.
6. **Support SMEs to consider joint procurement of chips and components** such as to avoid them having to purchase in far bigger quantity than they need, which impacts cashflow and profitability.

A.3.2. Agri-food case study

A.3.2.1. Ecosystem background

The European agri-food ecosystem is large in size and covers a wide range of supply chains, including agriculture, forestry and fishing, manufacturing, wholesale and retail trade, transportation and storage, as well as accommodation and food service activities. The EU agri-food sector includes around 11 million farms, 300,000 food processors and 2.8 million enterprises within the food distribution and food service industry. The food and drink industry is the EU's largest manufacturing sector, with half of EU Member States recording it as the biggest manufacturing employer.[473] According to provisional figures from Eurostat, in 2021 nearly 4.2 million persons were employed in the food manufacturing sector, which generated over EUR 1 trillion.[474] According to the trade association FoodDrinkEurope, the EU food and drink industry is comprised of over 290,000 SMEs, or 99% of the industry. SMEs account for EUR 442 billion (39.4%) of food and drink turnover and employ 2.7 million persons (57.7%) compared to large companies. The figure below illustrates the respective shares of SMEs and large companies in turnover, value added, employees and companies.

Figure 81. Contribution of SMEs and large companies to the EU food and drink industry (2019, %)



Source: FoodDrinkEurope (2022). Data & Trends 2022: EU Food and Drink Industry.[475]

The data in Figure 81 demonstrates not only the importance of SMEs to the EU agri-food ecosystem but also its diversity in terms of company size. France (EUR 212.2 billion), Germany (EUR 185 billion), Italy (EUR 143.8 billion) and Spain (EUR 127.5 billion) were the largest EU food and drink producers by turnover in 2020. The number of companies per Member State ranged from 134 in Luxembourg to 56,750 in Italy. Generally, the number of companies corresponded to Member State size, with more located in larger Member States such as France, Spain and Italy. However, some Member States with a strong tradition of agri-food, whose economies are reliant on the sector, such as Greece (16,243), Czechia (11,516) and Portugal (10,850), reported a proportionately higher number of companies. Of the 23 Member States who provided information,[476] 17 reported that the food and drink sector was ranked either first or second in terms of employment in manufacturing.[477] Further, according to the European Commission, the farming and food sectors combined provide nearly 40 million jobs in the EU,

[473] Interreg Europe Policy Learning Platform on SME competitiveness (2022). Policy brief on: Supporting the agrifood sector. Available at: https://www.interregeurope.eu/find-policy-solutions/policy-briefs/supporting-the-agrifood-sector.
[474] Eurostat Structural Business Statistics (SBS). NACE classification: Manufacture of food products. 2021 statistics based on 27 Member States.
[475] FoodDrinkEurope (2022). Data & Trends 2022: EU Food and Drink Industry. Available at: https://www.fooddrinkeurope.eu/wp-content/uploads/2023/01/FoodDrinkEurope-Data-Trends-2022-digital.pdf.
[476] No data was available for Cyprus, Latvia, Lithuania and Malta.
[477] FoodDrinkEurope (2022). Data & Trends 2022: EU Food and Drink Industry. Available at: https://www.fooddrinkeurope.eu/wp-content/uploads/2023/01/FoodDrinkEurope-Data-Trends-2022-digital.pdf.

approximately a quarter of all employment in the bloc. The EU generates EUR 156 billion in food and drink exports and is the world's top agri-food exporter.[478] The agri-food ecosystem is, therefore, highly important to the EU, playing a major role in national economies.

A.3.2.2. Key drivers of inflation within the ecosystem

The agri-food ecosystem has witnessed a significant increase in prices and costs over the last couple of years, a phenomenon observed more widely across the EU economy in other sectors. The key drivers of inflation include supply constraints caused by the COVID-19 pandemic, extreme weather conditions caused by climate change, rising energy costs, the Russian invasion of Ukraine in early 2022 and increasing global demand due to population growth in Asia and Africa.[479]

The easing of COVID-19 restrictions saw a surge in energy prices in the EU in summer 2021, impacting European farmers directly and also the industries providing the inputs they rely on, such as **animal feed** and **fertiliser**, which account for the highest input cost for farmers. **Agricultural production and food processing is very energy intensive**, with the production of crops relying heavily on **fuel for machinery**, while the increase in natural gas prices raised fertiliser prices as a key component to its production, which are exacerbated by **increasing transportation costs**.[480]

The Russian war of aggression against Ukraine has aggravated inflation in the agri-food ecosystem, increasing inflation even further and placing global food security at risk. The consequences of the war have had a detrimental impact on European **nitrogen fertiliser companies. Soaring natural gas prices resulted in them cutting their output by over two-thirds in 2022, while the war has disrupted the supply of fertiliser from Russia, the world's largest exporter**.[481] Further, Ukraine and Russia are two of the world's leading producers of agricultural products. Previously, exports from both countries had accounted for 34% of the global total for wheat, 27% for barley and 56% for sunflower oil. Additionally, Ukraine had exported 15% of all maize, with 11 million tonnes exported to the EU annually, and 61% of sunflower cake, critical inputs in animal feed.[482] Interview feedback affirmed that the cost of raw materials, energy prices and subsidies through the Common Agricultural Policy (CAP), which have led to vendors of machinery and equipment increasing their prices, have all been key drivers of inflation.

Another key driver of inflation in the ecosystem was the **extreme weather** experienced in Europe in 2022. Severe drought resulted in pasture failures and a reduction of approximately 16% in maize, 15% in soybean and 12% in sunflower crops, which are all important to animal nutrition. The livestock sector in particular was impacted, with reduced meat and dairy output. The combined impact of these key drivers of inflation increased the annual inflation rate for food and non-alcoholic beverages to an average of 11.9% across the EU in 2022, behind only

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[478] *Ibid*.

[479] Interreg Europe Policy Learning Platform on SME competitiveness (2022). Policy brief on: Supporting the agrifood sector. Available at: https://www.interregeurope.eu/find-policy-solutions/policy-briefs/supporting-the-agrifood-sector. European Parliament (2023). At a Glance. Question time: Food price inflation in Europe. Available at: https://www.europarl.europa.eu/thinktank/en/document/EPRS_ATA(2023)739298.

[480] Bodnár, K., & Schuler, T. (2022). The surge in euro area food inflation and the impact of the Russia-Ukraine war. *ECB Economic Bulletin, Issue 4/2022*. Available at: https://www.ecb.europa.eu/pub/economic-bulletin/focus/2022/html/ecb.ebbox202204_06~4e32074619.en.html.

[481] Saleh, H. (2023). Ukraine war fallout benefits one of world's biggest fertiliser groups, Financial Times, 8 February. Available at: https://www.ft.com/content/850d8c0a-a853-4b0e-aba3-d63d18ab0c93.

[482] European Parliament (2023). At a Glance. Question time: Food price inflation in Europe. Available at: https://www.europarl.europa.eu/thinktank/en/document/EPRS_ATA(2023)739298 .

housing, water, electricity and gas, accounted for in one main heading by Eurostat, and transport.[483]

A.3.2.3. Key impacts of inflation on the ecosystem

EU Member States are not at risk of food shortages due to well-established agricultural policy and high agri-food commodity prices **preventing a significant decrease in production** (though input prices are expected to remain well above the average).[484] However, high inflation has impacted **food affordability**, particularly for low-income households and vulnerable groups, which has a wider impact on other sectors of the economy as consumers consider their budgets. Further, high food inflation has impacted **food choices** among consumers, who tend to opt for more basic, cheaper food items, such as poultry over beef and pigmeat. Such choices could be an important factor shaping EU demand in 2023,[485] and impact those sectors within the ecosystem which have cheaper alternatives.

High inflation has also had a detrimental impact on the **international competitiveness** of EU agri-food products, exacerbated by the weaker euro (as trade on most international markets is in US dollars). Sugar, for example, has been particularly impacted. Sugar refining costs have increased because of the hike in natural gas prices, while the EU experienced a smaller sugar beet harvest caused by adverse weather conditions. Consequently, the EU witnessed a significant sugar price increase of 51% in autumn and winter of 2022 and 2023, higher than world market prices, with estimations suggesting that EU sugar imports could rise by 34%, with exports falling by 31% amid lower EU competitiveness in global markets.[486]

A.3.2.4. Detailed impacts of inflation on SMEs

Payment practices and propensity to make payments late

The issue of late payments in the agri-food ecosystem is a long-standing one and has been regulated at the EU level, with a ban on payments later than 30 days for perishable agricultural and food products and later than 60 days for other agri-food products.[487] This piece of legislation aims to protect smaller firms from unfair practices undertaken by larger companies, meaning that SMEs are protected from late payments by larger buyers, and micro enterprises are protected against SME buyers. The recent levels of high inflation have led to an increase in late payments for SMEs, including those in the agri-food sector, which is comprised of vast supply chains and extensive B2B transactions. An interviewee from a trade association mentioned that many of its members have had challenges in paying energy providers on time, with the purchase of livestock feed and medicine a higher priority. As such, many have delayed energy bill payments.

Participation in public procurement

According to the statistical analysis undertaken for this study, inflation appears to decrease the average number of offers per contract award notice in agri-food ecosystem. The effect in agri-food might be explained in particular by the spike in the number of offers during the height of the COVID-19 crisis, when inflation was actually low.

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[483] Eurostat (2023). Annual inflation more than tripled in the EU in 2022. Available at: https://ec.europa.eu/eurostat/web/products-eurostat-news/w/ddn-20230309-2.
[484] European Commission (2023). Short-term outlook for EU agricultural markets, Spring 2023, p. 6. *DG Agriculture and Rural Development*. Available at: https://agriculture.ec.europa.eu/system/files/2023-04/short-term-outlook-spring-2023_en.pdf.
[485] *Ibid*, p. 3.
[486] *Ibid*, p. 6.
[487] Commission Directive 2019/633 of 17 April 2019 on unfair trading practices in business-to-business relationships in the agricultural and food supply chain, O.J. L 111/59.

Adoption of sustainable practices

The adoption of sustainable practices by SMEs in the agri-food ecosystem appears to have been hampered by high inflation, with SMEs reluctant to invest due to uncertainty and lower financial capacities. Data from the Flash Eurobarometer 498 survey conducted in 2021, as further discussed in Section 4.4 of the study, illustrated that nearly a third of businesses in the agri-food ecosystem (31%) invested nothing in sustainable practices over the previous two years, while over a quarter (26%) spent less than 1% of annual turnover. 43% of businesses invest more than 1% in sustainable practices, with 2% spending more than 30%. High inflation is likely to have further weakened investment in sustainable practices in an ecosystem where more than half of businesses consider such investment to be a low priority. **An interviewee from a trade association confirmed that inflation has stalled the adoption of sustainable practices, adding that it can reduce crop yield**. An organic farm, for example, may need four years to produce significant yield, while the costs associated with precision farming often outweigh the benefits derived. Therefore, high costs, as well as the length of time to produce the yield, disincentivise SMEs from adopting sustainable practices. **An agri-food SME mentioned that the share of investment provided by state funds for sustainable practices often amounts to 50% and is insufficient for SMEs to invest in such practices.**

Adoption of new technology

The adoption of new technology by SMEs is similar to the adoption of sustainable practices (as highlighted by interviewees), with the two issues interlinked and SMEs having faced challenges due to inflation. SMEs appear to be reluctant to invest due to uncertainty and financial constraints, while for many the adoption of new technology appears to be a low priority. **A recent survey showed that 48% of farmers in Europe cited high costs as the biggest challenge to the adoption of agricultural technology, while 32% were concerned about complexities in setup and use as an additional barrier to adoption**.[488] **To provide a comparison, in a survey conducted on food and drink businesses in the UK, one in six, or 16%, said that inflation had stifled their business growth in terms of technological progress, preventing them from implementing digitisation projects and marketing functions**.[489] The results from the UK demonstrate the impact of inflation on limiting the adoption of new technology, a trend which is being observed further afield. An interviewee from a trade association mentioned that the adoption of sustainable practices and new technology are a victim of inflation.

Profitability and turnover

The high level of inflation has impacted the turnover and profitability of agri-food SMEs at all stages of the supply chain. Food retailers in Europe, who benefit from 70% of all spending on food, have been driving most of the price increases, passing on most, but not all, of their costs onto consumers. In 2022, food retailers increased their prices by around 12%, year on year. By contrast, food producers increased their prices by 17%,[490] which could suggest that retailers are concerned about their customer base and reputation. The European food sector was particularly impacted by high costs during the second quarter of 2022. According to research by Refinitiv and Allianz Research, their total cost index for the sector grew by 6.7% while turnover only increased by 0.8% during the second quarter of 2022, impacting profitability.

[488] McKinsey & Company (2023). Agtech: Breaking down the farmer adoption dilemma. Available at: https://www.mckinsey.com/industries/agriculture/our-insights/agtech-breaking-down-the-farmer-adoption-dilemma.
[489] New Food (2023). Inflation stifles one in six food and drink companies tech advances. Available at: https://www.newfoodmagazine.com/news/189000/inflation-stifles-one-in-six-food-and-drink-companies-tech-advances/.
[490] Allianz SE (2023). European food inflation – hungry for profits?. Available at: https://www.allianz.com/en/economic_research/publications/specials_fmo/europe-food-inflation.html.

However, turnover has been outgrowing costs since then, which could perhaps be attributed to firms increasing prices to compensate for the challenges faced between March and June 2022,[491] shortly after the Russian war of aggression against Ukraine started. An interviewee from a trade association pointed out that the impact on profitability and turnover depends on the sector. For example, the dairy sector has benefitted from price increases because it is not impacted by diseases and products can be stored, such as pasteurised milk and milk powder. However, the egg and poultry sectors have faced specific challenges with avian influenza, the need for investment to improve sustainability, energy prices, and animal feed. With food prices expected to remain high and only decline later this year, and other costs, such as energy, falling, firms will likely experience a further increase in profits. The Economist Intelligence Unit has suggested that the passing of costs to customers will help food producers, wholesalers and retailers to maintain and even **increase sales values and margins even if overall volumes decline**.[492]

Wage growth rate

The level of inflation has put pressure on SMEs to increase wages to contribute towards mitigating the cost-of-living crisis, as is the case in many other ecosystems. An SME stated that it had increased wages, but only to a small extent. Within the agri-food ecosystem, the increased cost of imports from Ukraine and Russia have undermined the case for big pay increases from food producers, [493] which can have a knock-on effect for other actors in the ecosystem, such as retailers.

Access to skilled labour

SMEs have faced challenges in accessing skilled labour in recent times, partly caused by the level of inflation increasing recruitment costs, but also due to other factors such as the COVID-19 pandemic, an ageing workforce, rural locations, as well as structural and technological changes, which have led to increased demand for highly skilled labour in agricultural production.[494] This issue was discussed in the high-level roundtable on skills for the agri-food ecosystem in February 2021, where there was unanimous agreement that the needs of farmers and SMEs necessitated addressing immediately. The roundtable highlighted a key challenge for the ecosystem, namely increasing its attractiveness and improving its ability to motivate people to work in the ecosystem, particularly in rural areas where SMEs are a prominent economic and industrial driver.[495]

Bankruptcies and insolvencies

The increase in inflation has heightened the risk of bankruptcy and insolvency among Europe's agri-food SMEs. The hike in prices for natural gas, electricity, fertilisers, transport fuel, packaging and external labour have all impacted the sector's production costs. In a joint statement issued by Copa-Cogeca, the Primary Food Processors (PFP) and FoodDrinkEurope in September 2022, the agri-food associations asserted that many of the sector's operators were struggling to maintain business, with some companies faced with the choice of stopping

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[491] Allianz SE (2023). European food inflation – hungry for profits?. Available at: https://www.allianz.com/en/economic_research/publications/specials_fmo/europe-food-inflation.html.
[492] *Ibid*.
[493] Arnold, M., Vladkov, A., & Romei, V. (2022). Europe's workers face bigger squeeze from real wage cuts. *Financial Times*. Available at: https://www.ft.com/content/ed477fe9-46fa-43d0-b315-4170763261c2.
[494] Ryan, M. (2023). Labour and skills shortages in the agro-food sector., p. 7. *OECD Food, Agriculture and Fisheries Papers, No. 189*. Available at: https://www.oecd-ilibrary.org/docserver/ed758aab-en.pdf?expires=1681829106&id=id&accname=guest&checksum=7575E99865BD2CEC3A6F42B2C7BCAAA9.
[495] European Commission (2021). Report from the roundtable: Pact for Skills Roundtable with Commissioners Schmit and Breton for the Agri-food Ecosystem. Available at: https://ec.europa.eu/social/BlobServlet?docId=23768&langId=en.

production, laying off staff or going out of business.[496] SMEs were the first to be impacted, particularly those in more energy-intensive sectors such as bakery, vegetable processing and dairy. In September 2022, according to FoodDrinkEurope, as many as 4 out of 10 food companies in Belgium risked bankruptcy if the crisis worsened.[497] However, a research challenge has been collecting the exact number of bankruptcies and insolvencies among SMEs in the agri-food ecosystem in the EU. A trade association representative confirmed that there is a lack of data at the EU level.

Access to finance and capacity to repay loans

An interviewee from a trade association mentioned that banks are now more reluctant to invest in the agriculture sector because of the impact of climate change, whereby farming is not considered a safe investment. An SME added that small businesses face challenges in obtaining finance from banks, with larger businesses tending to have more success.

A study published by fi-compass in 2020 considered why young farmers in particular were three times more likely than their older peers to have their loan applications rejected by banks. It found that young farmers are considered too risky, lack collateral and prepare inadequate business plans,[498] while there is a lack of expertise on the agriculture sector within banking. The agriculture sector often faces higher interest rates than other economic sectors,[499] exacerbated during the current inflationary crisis with interest rates hiked.

Start-up and scale-up activity

This issue is related to the previous response regarding access to finance by agri-food SMEs. Significant financial investment is usually required for start-up and scale-up activity, and access to finance can be a challenge for SMEs in the agri-food ecosystem. The high level of inflation experienced recently would have provided an additional barrier to such activity across the ecosystem. Additionally, although not directly related to inflation, as mentioned earlier, there is a need for the ecosystem to increase its attractiveness to encourage workers to the sector, including skilled labour involved in start-up and scale-up activity.

International competitiveness

High inflation has had a negative impact on the international competitiveness of EU agri-food products, exacerbated by adverse weather conditions, which highlighted the impact on Europe's sugar industry. However, the impact on SMEs can depend on the specific products sold. For example, one SME mentioned that it can compete on foreign markets due to the quality of its products.

In May 2023, the European Commission announced restrictions on the imports of Ukrainian wheat, maize, rapeseed and sunflower seed to Poland, Hungary, Romania, Slovakia and Bulgaria, to protect farmers amid concerns that local markets have faced increased competition. For example, in 2022, Poland imported 579,315 tonnes of wheat compared to 3,033 tonnes in the previous year. A steep drop in prices, increased transport costs due to large volumes of supplies from Ukraine being moved, and droughts in Central Europe last year have impacted farmers and reduced the competitiveness of local produce. The measures

[496] Copa-Cogeca, PFP and FoodDrinkEurope (2022). Alarm bells ringing for EU agri-food sector as energy crisis bites. Available at: https://www.pfp-eu.org/wp-content/uploads/2022/09/220907-Extraordinary-Energy-Council-9-9-Agri-Food-Chain-Final.pdf.
[497] Foote, N. (2022). EU food companies face closure as they buckle under strain of energy crisis. *EURACTIV*. Available at: https://www.euractiv.com/section/agriculture-food/news/eu-food-companies-face-closure-as-they-buckle-under-strain-of-energy-crisis/.
[498] fi-compass (2020). *Financial needs in the agriculture and agri-food sectors in the European Union*, p. 59. Available at: https://www.fi-compass.eu/sites/default/files/publications/financial_needs_agriculture_agrifood_sectors_eu_summary.pdf.
[499] Ibid, p. 9.

adopted by the Commission, intended to support local markets in these five Member States, expired on 5 June.[500]

Energy production and energy consumption

Agricultural production and food processing is energy intensive. The production of crops requires significant amounts of fuel for machinery, while the bakery, vegetable processing and dairy sectors are particularly energy-intensive. According to interview feedback, some farms have had to stop machines to reduce their energy costs, and payments to energy providers have been delayed.

A.3.2.5. Passing costs onto consumers

Food retailers have passed on most, if not all, of the costs to consumers. In 2022 they increased their prices by approximately 12% year on year, with food producers increasing prices by 17%. However, the level of food inflation varies across Europe: in France (7.3%), Italy (9.3%) and Spain (11.6%) it was under the 2022 European average (11.9%); Germany (12.6%), Poland (14.5%) and Slovakia (18.6%) experienced above-average levels of food inflation.[501]

Interview feedback confirmed that the cost of food production has been passed on to consumers to a certain extent, as the retail sector considered it had to make a gesture of goodwill to primary food producers to cover costs, if only partially. One trade association mentioned that roughly **60% of the SMEs it represents are price-takers** and there have not been any ways to decrease costs for consumers, while another highlighted that small businesses cannot absorb price increases and have to pass costs on to consumers. However, a prominent view in the farming sector holds that the current economic and social conditions impede consumers' possibilities to pay more for food. Farmers are aware that they produce food for everyone in society and need to consider that the price they are setting is socially acceptable to consumers. The trade association added that they are taking a socialistic view, knowing that they are delivering a good to the public.

Although consumer price inflation is now starting to subside, it appears that food inflation in Europe has largely been unaffected by the general slowdown. For example, consumer price inflation in Germany increased by 7.4% in March 2023 year on year, decreasing from 8.7% in February.[502] France is expected to follow suit, with higher interest rates impacting consumption habits. However, food, beverages and tobacco rose by 22.3% year on year in Germany in March, with similar growth in the first two months of the year. Poland and other eastern EU Member States have experienced even higher levels recently.[503] **There has been an increase in food prices despite the global prices of food commodities falling, suggesting that food producers, wholesalers and retailers are passing on costs to consumers, having initially bore the burden of higher commodity prices**.[504] Food prices are expected to remain high for consumers and only decline later this year.

[500] Reuters (2023). Explainer: Why the EU is restricting grain imports from Ukraine. Available at: https://www.reuters.com/markets/commodities/why-eu-is-restricting-grain-imports-ukraine-2023-05-09/.
[501] Allianz SE (2023). European food inflation – hungry for profits. Available at: https://www.allianz.com/en/economic_research/publications/specials_fmo/europe-food-inflation.html.
[502] Economist Intelligence Unit (2023). Rising cost of food defies inflation slowdown. Available at: https://www.eiu.com/n/rising-cost-of-food-defies-inflation-slowdown/.
[503] *Ibid*.
[504] *Ibid*.

A.3.2.6. Future outlook

Food prices are likely to remain high and only decline later in 2023, despite overall inflation beginning to decline. The Economist Intelligence Unit has suggested that the passing of costs to customers will help food producers, wholesalers and retailers to maintain and even increase sales values and margins even if overall volumes decline.[505] While the article does not refer specifically to SMEs, they comprise a significant proportion of operators in the ecosystem.

This view, however, contrasts with interview feedback, which paints a starker picture for producers over the next couple of years. An interviewee from a trade association, for example, hinted that farmers might need to decrease or even stop their activities as a response to the immediate shock, adding that farmers in Slovenia have needed to take an additional part-time job to supplement their income. In addition, the interviewee mentioned that any young farmers taking over farms will have to contribute significant financial amounts to upgrade them due to **a lack of previous investments both during and prior to the recent period of high inflation**. Another interviewee from an SME pointed out that the outlook is bleak for SMEs and there is a sense of insecurity, since they are merely surviving and not generating high profits. More positively, however, for this SME, its situation is likely to improve through large, permanent contracts with stores.

Therefore, it appears that inflation will affect agri-food SMEs differently over the next couple of years, depending on their specific role in the ecosystem and the structure of their specific sector. While some retailers and producers are likely to benefit from continued food inflation, other entities could be more negatively impacted by recent and continued high levels of inflation. Determining the exact impact of inflation on SMEs over the next couple of years would benefit from a future evaluation on the topic.

A.3.2.7. Existing ecosystem-specific policy measures to help SMEs

A number of policy measures have been put in place at the EU and national levels to help SMEs in the agri-food ecosystem tackle high levels of food inflation and food security challenges. In March 2022, the European Commission launched a number of actions to enhance global food security and support EU farmers and consumers in light of increasing food prices and input costs.[506] The measures included: a support package of EUR 500 million to support the producers most impacted by the consequences of the Russian war of aggression against Ukraine; more advances of direct payments to farmers as of October 2022; market safety net measures for the pigmeat sector; an exceptional and temporary derogation to allow the production of any crops for food and feed purposes on fallow land; and use of the flexibilities to import requirements on animal feed to tackle shortages. The Commission also adopted the Temporary Crisis Framework for State Aid measures to support the economy following the aggression against Ukraine by Russia,[507] covering farmers, fertiliser producers and the fisheries sector. It allows state aid to those affected by significant increases in input costs.

An additional measure proposed by the Commission in May 2022 came in the form of an exceptional measure funded by the European Agricultural Fund for Rural Development (EAFRD).[508] This measure enabled Member States to use up to 5% of their EAFRD budget in

[505] *Ibid*.
[506] European Commission (2022). Commission acts for global food security and for supporting EU farmers and consumers. Available at: https://ec.europa.eu/commission/presscorner/detail/en/ip_22_1963.
[507] Communication from the Commission 2022/C 426/01 of 9 November 2022. Temporary Crisis Framework for State Aid measures to support the economy following the aggression against Ukraine by Russia.
[508] European Commission (2022). Increased support for EU farmers through rural development funds. Available at: https://ec.europa.eu/commission/presscorner/detail/en/IP_22_3170.

2021 and 2022 for direct income support for farmers and SMEs active in the processing, marketing or development of agricultural products, potentially equating to EUR 1.4 billion. Farmers could receive up to EUR 15,000 and SMEs up to EUR 100,000, with payments made by October 2023.

At the national level, a number of regulatory actions and measures to promote domestic consumption have been taken to support SMEs, according to written feedback provided by Member State representatives. VAT has been reduced on certain items pertinent to SMEs in the agri-food ecosystem. In Bulgaria, for example, VAT has been cut to 0% on bread and flour. Similarly in Slovakia, VAT was cut to 10% on food and beverages served by restaurants and catering service establishments, provided they are consumed immediately. In Poland, VAT of 0% was placed on the following items until the end of 2022: basic foodstuffs (extended until 31 December 2023); soil improvers; plant biostimulants; some growing media; fertilisers; and plant protection products normally intended for agricultural production. In Poland, the 'Buy consciously' campaign was introduced in 2019 by the Ministry of Agriculture and Rural Development and the National Centre for Agricultural Support to support domestic consumption and thereby SMEs that produce food. The activities aim to encourage consumers to purchase local, traditional products with both the national 'Polish Product' and EU markings.

A.3.2.8. Possible additional measures that would help SMEs

Any potential new measures that could be introduced to support SMEs in the agri-food ecosystem should seek to build synergies with and complement those already implemented as high costs are likely to endure even with inflation levels falling over the coming months.

Continued access to finance would benefit SMEs and help them to tackle the long-term impacts of recent high inflation, for example through grants, guarantees and vouchers dedicated to the ecosystem. The ALTER'NA fund, launched by the French region Nouvelle Aquitaine to support organic farmers and SMEs improve the production and marketing of organic and sustainable produce, is a particularly good example which could serve as a model for other regions. The fund is a EUR 30 million loan guarantee instrument provided by regional funds and the European Investment Fund (EIF) which reduces the personal guarantees and interest rates required by banks.[509]

An interviewee from a trade association agreed that the use of financial instruments to support investment capacity after the high levels of inflation could be helpful, adding that the European Investment Bank (EIB) could help facilitate SMEs' access to credit and investment. From a financial perspective, the interviewee also mentioned that the use of state aid during the recent period of high inflation should be evaluated due to imbalances emerging between Member States, with certain farms receiving less support than others. Although farmers have welcomed the financial support as it helps with cash flow, feedback suggested that **it does not necessarily provide them with the much-needed investment to upgrade their farms**. Further, an interviewee from an agri-food SME mentioned that **advance payments** for investment projects could be useful since businesses currently have to take out loans which tend to be repaid over a long period.

An interviewee from a trade association suggested that the principal eligibility criteria for financial support should be to distinguish between price-takers and companies that can more easily pass on higher input prices to their customers. Further, support should be considered for farmers who are reluctant to pass on high costs, preferring instead to set prices acceptable to consumers since food is an essential good for everyone in society. An agri-food SME highlighted the importance of **evaluating a company's history and business**

[509] Interreg Europe Policy Learning Platform on SME competitiveness (2022). Policy brief on: Supporting the agrifood sector. Available at: https://www.interregeurope.eu/find-policy-solutions/policy-briefs/supporting-the-agrifood-sector.

plans when considering eligibility for support, adding that there should be an understanding that the results and impacts of any support can take time to come to fruition.

Measures to support skills and training in the ecosystem could also benefit SMEs who have faced challenges in accessing skilled labour in recent times. For example, in Navarre, Spain, the Agroecology and Rural Development Training Course advises producers and processors on how to transition to organic production. Companies and farmers share their experiences, while university lecturers provide a broader context. The aim of the course is to improve local SMEs' competitiveness and boost the region's agri-food industry.[510] Similarly, the Weihenstephan-Triesdorf University of Applied Science in Germany is leading the Food Startup Incubator Weihenstephan (FSIWS), which encourages students to set up new businesses and supports existing food start-ups. In particular, FSIWS provides: infrastructure for food production and co-working spaces; teaching and training in food technology, entrepreneurship, business administration and finance; financing instruments for the start-up, growth and scaling phase; and a network consisting of start-ups, food technology and entrepreneurship experts, business angels, investors and retailers.[511] Similar initiatives could be launched in other areas of Europe to support the growth of local agri-food SMEs, boost regional economies, and encourage more people to work in the agri-food ecosystem.

More generally, the agri-food ecosystem would benefit from being recognised as one of strategic importance to the EU and its Member States, as recommended by FoodDrinkEurope.[512] Given the essential role of food and drink, it is important that the whole agri-food supply chain and related sectors, such as packaging, have priority access to energy. For example, they should be exempted from trade restrictions such as export or import bans, access dedicated cross-border flows in times of crisis, and obtain emergency funding and assistance for those companies in need.

[510] Interreg Europe Policy Learning Platform on SME competitiveness (2022). Policy brief on: Supporting the agrifood sector. Available at: https://www.interregeurope.eu/find-policy-solutions/policy-briefs/supporting-the-agrifood-sector.
[511] *Ibid*.
[512] FoodDrinkEurope (2022). FoodDrinkEurope recommendations for building resilience and sustainability for Europe's food and drink systems. Available at: https://www.fooddrinkeurope.eu/wp-content/uploads/2022/09/FoodDrinkEurope-Recommendations-for-Building-EU-Food-and-Drink-Sector-Resilience.pdf.

A.3.3. Construction case study

A.3.3.1. Ecosystem background

The construction ecosystem represents the second largest industrial ecosystem in economic terms in the European Union,[513] following the retail sector. It employs approximately 24.9 million people in the EU, generating a value-added of EUR 1,158 billion, accounting for 9.6% of the EU's total value-added.[514] This large ecosystem offers enormous potential to contribute to European Green Deal[515] and the Digital Decade.[516] However, it also faces numerous challenges, including current crises such as the aftermath of the COVID-19 pandemic and the Russian invasion of Ukraine, along with structural issues such as the climate emergency, rapid digital transformation, and the shift from a linear to a circular economy.

The construction value chain is very long. As described in the Annual Single Market Report 2021,[517] the construction ecosystem includes activities carried out during the whole lifecycle of buildings and infrastructures, including design, construction, maintenance, refurbishment, and demolition. Furthermore, the definition of ecosystems includes a share of manufacturing activities or services categorised as 'horizontal sectors', common to all ecosystems. The construction market covers two main sectors: i) residential and non-residential building and ii) civil engineering (for transport, energy, water and waste, and communication networks). On top of that are construction services (architecture, engineering, and technical consultancies), which may be more or less specialised in buildings rather than civil engineering, or on both.[518] An overview of the construction ecosystem is presented in Figure 82.

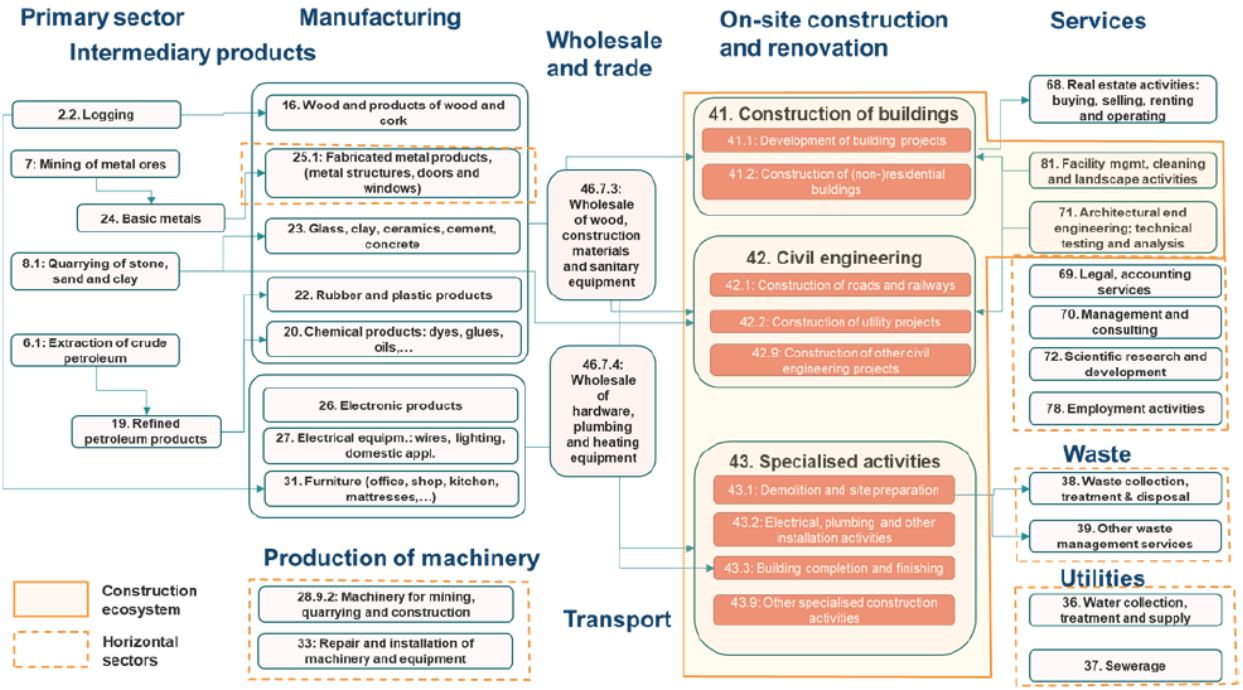
The supply chains are generally complex as they rely on inputs and services from various sources. In fact, the construction ecosystem depends largely on other ecosystems, with the energy-intensive industries being a major provider of essential construction products, such as steel, glass, aluminium, mineral products, chemical products, and clay products. Additionally, the ecosystem indirectly depends on specific raw materials, often obtained through international trade. This interdependence highlights the significance of other ecosystems and the availability of raw materials in sustaining the construction industry.[519]

The ecosystem is dominated by micro and small enterprises. With a total of 5.3 million firms, 99.9% of companies in the ecosystem are SMEs, which represent 90% of employment and 83% of the total value added. As highlighted in the interviews, the largest area of activity for SMEs is the construction and renovation of the residential market. The fragmentation of the ecosystem is accentuated by the fact that around 90% of the companies are microenterprises, accounting for 45% of employment and 32% of the total value added.[520] In addition, there are wide differences in terms of firm size of enterprises between Member States. According to a study[521] for the European Commission, which looked specifically at a portion of the construction ecosystem (namely, NACE F 41.2 – Construction of residential and non-residential buildings)

[513] European Commission (2023). Transition pathway for Construction, p. 5. Available at: https://ec.europa.eu/docsroom/documents/53854.
[514] European Commission (2023). Transition pathway for Construction, p. 9.
[515] COM/2019/640 final.
[516] Decision (EU) 2022/2481 of the European Parliament and of the Council of 14 December 2022 establishing the Digital Decade Policy Programme 2030.
[517] European Commission (2021). Annual Single Market Report 2021. Commission Staff Working document.
[518] European Commission (2019). Internationalisation of SMEs from the European construction sector in third markets, p.19.
[519] European Commission (2023). Transition pathway for Construction, p. 12.
[520] European Commission (2021). Scenarios for a transition pathway for a resilient, greener and more digital construction ecosystem, p. 4. Available at: https://ec.europa.eu/docsroom/documents/47996.
[521] Centre for Strategy and Evaluation Services (2015). Cost of the Cumulative Effects of Compliance with EU Law for SMEs (2015), Directorate-General for Internal Market, Industry, Entrepreneurship and SMEs pp.48-62.

in selected Member States,[522] 63% of enterprises in the sector in Germany having 1-9 employees, whereas in Italy, Spain, and Slovakia the percentage is between 93-97%. At the other end of the SME scale, 3.7% of enterprises in Germany have 50-249 employees, whereas in Italy and Spain the percentages are some 0.3% to 0.4%.[523]

Figure 82. Overview of the construction ecosystem within the construction value chain



Source: European Commission (2021). [524]

A.3.3.2. Key drivers of inflation within the ecosystem

The construction ecosystem has witnessed a significant increase in prices and costs in recent years. The key drivers of inflation include supply shortage of raw materials and building equipment started during the COVID-19 pandemic, scarcity of labour, rising energy costs as a consequence of the Russian invasion of Ukraine in early 2022, and a spike in demand for construction activities in specific countries and segment of the market.

The main driver of inflation was the lack of input supply and the increases in the prices of raw and building materials that started during the COVID pandemic. Several factors help explain this trend:

- **Bottlenecks along the construction supply chain** emerged during COVID-19 and worsened after the Russian war of aggression against Ukraine. Shortages of raw materials and increased prices of building material has concerned steel, copper, aluminium, wood, and, more recently, clay materials (e.g., bricks, tiles), mineral products (gravel, cement, and concrete), glass and certain chemical products.[525] The causes were several: i) some supply chains have been disrupted because of problems with mining and logging all over the world during the pandemic; ii) disruption in the typical flows of trucks and containers; iii) sudden and strong demand driven by national

[522] Estonia, Germany, Ireland, Italy, Poland, Spain, Slovakia, Slovenia, and Sweden.
[523] European Commission (2019). Internationalisation of SMEs from the European construction sector in third markets, p.20.
[524] European Commission (2021). Scenarios for a transition pathway for a resilient, greener and more digital construction ecosystem, p. 4. Available at: https://ec.europa.eu/docsroom/documents/47996.
[525] European Commission (2023). Transition pathway for Construction, p. 11.

recovery plans, such as the one that led to the increase of US imports of building materials from Europe.[526]

- **Financial speculations** on raw and building material prices, such as practices of speculative inventories, have further exacerbated the situation, as assessed by an interviewed trade association. Despite the presence of lower energy prices, speculation on prices continues contributing to an inflation level that does not accurately reflect the actual level of supply and energy prices.
- An interview with a business association mentioned that **concurrent demand for specific raw materials adopted in construction**, such as copper for electrification, reduced their availability and increased their prices.

The scarcity of skilled labour affects the entire value chain,[527] from highly skilled engineers and architects to technicians and blue-collar workers. This shortage might result in higher salaries[528], the hiring of under-skilled and less efficient professionals, or understaffed operations. **These outcomes translate into less competition, higher operational costs, and ultimately more wage costs.** While supply challenges for material and equipment were particularly severe in the manufacturing segments of the ecosystem, such as the production of building products, service activities (builders, engineering and architectural firms) were mainly affected by the shortage of labour. [529] Additionally, country-specific factors such as a sudden drop in labour supply or policy-driven salary rise increase labour costs. For instance, in Poland, many male workers come from Ukraine, and when the war started, they had to return to Ukraine to fight against the Russian invasion, leading to a sudden drop in the labour supply. In Belgium, there is a law-driven salary indexation that raises salaries, contributing to higher labour costs.

The Russian war of aggression against Ukraine in early 2022 and the consequent rise in energy prices added inflationary pressure to the ecosystem both directly and indirectly, exacerbating the costs of raw materials and building equipment. Indeed, the increasing prices of fuels such as diesel, gasoline and natural gas rose exorbitantly the transport costs as well as the prices of timber, aluminium, copper, plastics, iron, nickel, titanium, bitumen and their subsequent construction products. Additionally, manufacturers of construction products in energy-intensive industries had to temporarily or permanently downsize their output, thus posing additional pressure on prices.[530]

Policy-driven demand for construction activities has exacerbated inflationary pressures in specific segments of the ecosystem and in certain Member States. For example, the European climate policy, which includes the Green Deal and targets climate neutrality by 2050, has propelled demand for building renovations. Yet, limited supply due to input shortages has resulted in a spike in prices and inflation. Similarly, in Italy, the implementation of the tax relief initiative, the so-called Superbonus,[531] generated exceptional demand, which stimulated the country's construction industry and fuelled internal inflation.

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[526] European Commission (2021). Scenarios for a transition pathway for a resilient, greener and more digital construction ecosystem, p. 7.
[527] Eures (2023). *Report on Labour shortages and surpluses.* Luxembourg: Publications Office of the European Union.
[528] Eurostat (2023). Annual increase in labour costs at 5.7% in euro area. Euroindicators 32/2023, p.7.
[529] European Commission (2021). Annual Single Market Report 2021. Commission Staff Working document.
[530] European Commission (2023). Transition pathway for Construction, p. 22.
[531] The Superbonus is the tax relief governed by Article 119 of Decree-Law No. 34/2020 (Relaunch Decree), which consists of a 110% deduction of the expenses incurred from 1 July 2020 for the implementation of specific interventions aimed at energy efficiency and static consolidation or reduction of seismic risk of buildings. See: https://www.agenziaentrate.gov.it/portale/superbonus-110%25#:~:text=Il%20Superbonus%20%C3%A8%20l'agevolazione,energetica%20e%20al%20consolidamento%20statico.

A.3.3.3. Key impacts of inflation on the ecosystem

High inflation has been exacerbating the structural problems of the construction ecosystem, such as access to skilled labour and late payments, and creating increasing challenges in the daily activities of construction companies. As mentioned above, the construction ecosystem is strongly dominated by SMEs. Compared to large companies, **SMEs are more vulnerable to the impacts of inflation** due to their limited bargaining power, reduced ability to substitute suppliers and sources, and greater exposure to risks resulting from their less differentiated activities. As a result, many SMEs are being forced to limit or stop their activity in construction sites and are discouraged from accepting new or renewing contracts. They are pressured by suppliers to make quicker and higher payments, are losing clients who are worried about the impact of inflation on the cost of their projects and are unable to respond to procurement bids as rising costs are not properly taken into account by public authorities.[532]

Inflation has indirect repercussions on the construction sector through its impact on interest rates and purchasing power, which subsequently influence investment patterns and the demand for construction activities and products. The rise in interest rates negatively affects the financial standing of construction companies, limiting their access to credit and reducing their propensity to invest. At the same time, potential customers also face challenges in accessing credit, particularly in the residential sector. Within the framework of the Renovation Wave, [533] the European Commission's strategy aimed at renovating 35 million buildings in the coming decade. Limited availability of credit for residential customers has accelerated the shift in emphasis from new constructions to renovations. The focus on energy-efficient interventions becomes more pronounced as consumers' purchasing power diminishes. Thus, cost-effective and energy-saving measures and products, such as insulation elements like doors and windows, take precedence over investing in decorative elements like parquet flooring.

A.3.3.4. Detailed impacts of inflation on SMEs

Payment practices and propensity to make payments late

The construction industry has been identified as the sector most adversely affected by late payments.[534] The Intrum survey on late payments revealed that, in 2020, 42% of construction companies stated that late payment has a high impact on the threat to the survival of their business, the same level reported by energy and mining companies and 1 to 11 percentage points more than all the other sectors.[535] According to a study released by the European Commission in 2018, the construction sector experiences the longest payment duration among all sectors, taking an average of 72 days to receive payment (in 2016), and only approximately 15% of these payments are made on time.[536] This is one of the structural problems that is placing pressure on the daily activities of the various actors within the construction ecosystem, particularly SMEs. Several independent studies have revealed that delayed payments significantly harm construction SMEs and may lead to bankruptcy or default due to the debilitating effect of late payments on liquidity.[537] This is especially concerning for micro and small construction enterprises, as they have limited time and human resources, and are

[532] EBC (2022). *EBC letter to the European Commission on the need of supporting measures for construction SMEs facing fuel* and materials price increases. Available at https://www.ebc-construction.eu/2022/05/12/ebc-letter-to-ec-on-measures-to-support-construction-smes-facing-price-increases/.
[533] COM/2020/662 final. Available at: https://eur-lex.europa.eu/legal-content/EN/TXT/?qid=1603122220757&uri=CELEX:52020DC0662.
[534] European Commission (2022). Annual Single Market Report 2021. Commission Staff Working document, p.17.
[535] Intrum (2020). Real estate and construction firms are hit the hardest by late payment. https://www.intrum.com/press/news-stories/real-estateand-construction-firms-are-hit-the-hardest-by-late-payments/.
[536] European Commission (2018). *Business-to-business transactions: a comparative analysis of legal measures vs. soft-law instruments for improving payment behavior*, Luxembourg: Publications Office of the European Union.
[537] EBC (2023). EBC position on the revision of Directive 2011/7/EU on combating late payment in commercial transactions, p.2.

impeded in their investment efforts and financial stability, potentially leading to business closure.

The COVID-19 pandemic has deepened the impact of late payments on SMEs in several sectors, particularly in construction.[538] The repercussions of delayed payments manifest in existential factors such as a suffocating liquidity shortage, as highlighted in the most recent European Payment Report 2021 by Intrum.[539] **Inflation adds pressure to this structural problem**, which has a snowball effect along the supply chain that is notably very long. Late payments also create a sense of uncertainty and reduce the capacity and willingness of companies to make investment plans, hire personnel, and participate in public tenders, among other things. Consequently, as also confirmed by interviews, SMEs, which are not direct economic actors but rely on larger players to operate, are pushed out of public tenders, partnerships with larger companies, and eventually out of the market.

According to an interview with a sectoral expert, **the rise of interest rates is another factor that is affecting late payment in the construction ecosystem**. It has already led to an increase in the cost of financing and caused delays in payments. When the price of the construction work has to be renegotiated, it delays the work and, eventually, the payments. This pattern has a disproportionate effect on SMEs. It is worth noting that the issue of late payments is often passed on to subcontractors, who are primarily composed of small and medium-sized companies.

Participation in public procurement

In the current inflationary context, the lack of flexibility in adjusting contract terms has been a significant issue, putting economic pressure on companies operating in the construction ecosystem. According to interviews with two representative business organisations, public authorities have been unable to provide the necessary flexibility to companies required to deliver at prices lower than the actual costs, leading to cash flow issues and, ultimately, potential bankruptcy. However, the problem of price and cost uncertainty resulting from inflation varies in magnitude among Member States. In some countries, as in Belgium, the authority reviews the contract terms according to inflation, while companies often sign agreements with their suppliers as soon as the tender is won, and potential increases in labour costs are indexed and already included in the tender terms.

The impact of inflation adds pressure to a structural problem of the construction ecosystem, largely dominated by SMEs. In fact, although SMEs comprise approximately 99.8% of all enterprises in the European Union, they only participate in about 45% of the value of public contracts,[540] either directly, as a joint bidder or subcontractor, which results in a secondary role for them in public procurement in comparison to large enterprises. Specifically, SMEs often lack the capacity to participate in public tenders, especially for large projects, due to the high administrative costs, complex processes, stringent requirements for references, and inability to meet the financial criteria demanded by the tender. These factors make it difficult for SMEs to compete with larger companies for public procurement opportunities.

Adoption of sustainable practices

The construction industry has been identified as a significant contributor to global carbon emissions. In Europe, the construction sector generates the largest share of waste, representing 37.5% of the total mass produced in 2020. Moreover, buildings account for about

[538] EBC (2023). EBC position on the revision of Directive 2011/7/EU on combating late payment in commercial transactions, p.1.
[539] Intrum, European Payment Report 2021, 2022.
[540] European Commission (n.d.). Public Procurement Strategy. Available at: https://ec.europa.eu/growth/single-market/public-procurement/strategy_en.

40% of Europe's energy consumption, but the ageing building stock has a low renovation rate of only around 1% per year.[541] According to the Boston Consulting Group, 81% of CO2 emissions in construction are generated upstream (by materials and products manufacturers, machinery producers, etc.), with only a small share generated by the construction process itself. [542] Manufacturers of construction products have shown a keen interest in developing carbon neutrality roadmaps. [543]

The impact of inflation on green investments may vary depending on the position along the construction supply chain. According to interviews, firms with high energy intensity, such as building material manufacturers, stand to gain the most from incentives for energy-efficient investments. On the other hand, in wood-based sectors, such as parquet manufacturing, which is classified as inherently greener and more sustainable by the EU Taxonomy,[544] energy-efficient investments are perceived as small adjustments rather than a complete change of production models.

Overall, investment plans for the green transition, which include the adoption of technologies and techniques to enhance productivity and resource efficiency, have been **negatively impacted by uncertainty and diminished financial capacity** brought on by the current high inflation, as emerged during the interviews with SMEs and business representatives. Furthermore, the new challenges brought by high inflation are entangled with structural problems related to sustainable finance provisions and corporate reporting requirements, particularly for SMEs seeking access to credit/finance. In addition, interviewed SMEs suggested that the rise of interest rates has increased the cost of investing also indirectly through longer repayment periods, resulting in higher maintenance costs due to rising labour costs.

On the other hand, **the increase in energy prices can provide an incentive for SMEs, especially those upstream in the construction value chain, to invest in sustainable practices to reduce their energy bills and gain energy independence**. High energy prices provide an opportunity and an incentive for firms to increase their investment in energy efficiency, balancing out the decline in other investments. Differently from other investments, energy-efficiency ones are repaid by the savings on energy costs that they allow. Investments in energy-saving technologies reduce operating costs and exposure to volatile prices for fossil fuels.

At present, the effects of inflation on investments in sustainable construction practices are still relatively limited since most ongoing investment projects were agreed upon before the current inflationary environment. However, it is expected that the impact of inflation on investments will manifest in the coming years, specifically in 2023 and 2024.

Adoption of new technology

While the construction sector is a key driver of the EU economy, it faces several challenges relating to, inter alia, energy efficiency and productivity.[545] In fact, the construction sector's productivity grew at around a quarter of the rate of manufacturing, standing at only 1%

[541] European Commission (2023). Transition Pathway for Construction, p. 10.
[542] FIEC (2021). Driving and Supporting Sustainability in Construction. Strategic vision. Available at: https://www.fiec.eu/application/files/8916/5176/0359/SUSTAINABILITY_publication_FIEC_Strategic_Vision.final_compressed_Web.pdf.
[543] European Commission (2023). Transition Pathway for Construction, p. 10.
[544] European Union (2020). Regulation (EU) 2020/852 of the European Parliament and of the Council of 18 June 2020 on the establishment of a framework to facilitate sustainable investment, and amending Regulation (EU) 2019/2088. https://ec.europa.eu/sustainable-finance-taxonomy/.
[545] European Construction Sector Observatory (2021). Digitalisation in the construction sector. Analytical Report, April 2021, p. 12.

compared to the latter's 3.6% in the past two decades.[546] This issue becomes more pronounced in times when the construction sector faces labour shortages and profitability margin squeezes.

According to a study by McKinsey (2016), [547] in terms of digitalisation, the construction industry is generally perceived to have a lacklustre adoption of technology and innovation. This reputation can be attributed to the traditional nature of construction activities and the fragmented structure of the industrial ecosystem, where multiple professionals are required to deliver a building, most of whom are micro and small enterprises. Digitalisation and innovation can be particularly challenging for these smaller entities, which often struggle to survive. At the same time, it is important to acknowledge that the built environment is being transformed by various digital tools and technologies such as BIM (Building Information Modelling), IoT (Internet of Things), sensors, robots, drones, scanning tools, and even earth observation.

The **mechanisms through which inflation impacts the adoption of new technology in the construction industry share many similarities with those associated with green investments** (as highlighted by interviewees). According to trade organisation representatives of downstream players, uncertainty and diminished financial capacity brought by inflation, entangled with the structural problems faced by SMEs seeking access to credit, negatively impacted the investment plan for the digital transition. Interviews with trade organisations and SMEs suggested that the impact of high inflation has been very limited. They also argued that the indirect impact of inflation on increasing interest rates might create a lagged effect, such that the effect of inflation, although declining, on investments is expected to become more evident in the coming years, specifically in 2023 and 2024.

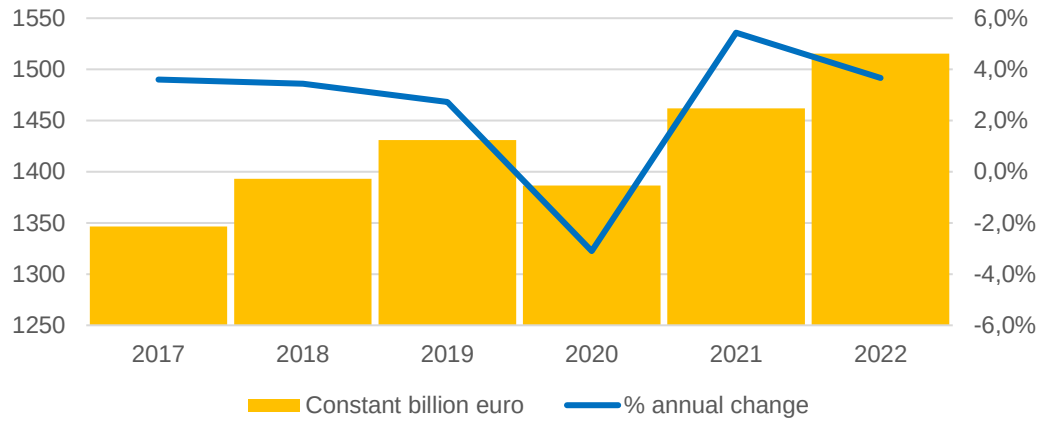
Profitability and turnover

The construction industry experienced a downturn in 2020 due to lockdowns, resulting in a 5% decrease in turnover compared to 2019. However, compared to other industries, this decline was relatively brief and less severe. The pandemic and lockdowns led to a nearly 30% drop in confidence levels in the industry from February to April 2020, but the levels started to slowly recover from May 2020 and stabilised by October 2020. Confidence levels then began to rise more clearly from February 2021 and reached pre-pandemic levels by April 2021.[548] The EU economy had exceeded its pre-pandemic level of output when energy prices surged and trade began to deteriorate as a consequence of the Russian invasion of Ukraine. Governmental fiscal policies, which had provided unprecedented levels of support during the pandemic, were gradually phased out. Monetary policy remained highly expansionary in 2021 and for most of 2022, with interest rates remaining around zero across all EU countries and stimulus measures, such as central bank asset purchases, continuing in the euro area. Low-interest rates stimulated demand for residential real estate, leading to a boom in construction activity. As services started to recover, labour markets tightened, with job vacancy rates exceeding their pre-pandemic levels, possibly due to greater friction in matching firms with labour. [549]

Inflation in 2021-2022 caused uncertainties in the economic system and increased the cost of input, leading to higher operating costs. The subsequent rise in interest rates slowed down the positive demand dynamic in real estate. **The overall outcome was a positive but decreasing turnover growth over time**, as shown by the evolution of construction investments in Europe in Figure 83; however, **profitability margins shrank**, as reported by most interviewed stakeholders.

[546] McKinsey (2016). Imagining construction's digital future. Available at https://www.mckinsey.com/industries/capital-projects-and-infrastructure/our-insights/imagining-constructions-digital-future
[547] European Commission (2023). Transition Pathway for Construction, p. 10
[548] European Commission (2023). Transition Pathway for Construction, p. 11
[549] EIB (2023). Resilience and renewal in Europe. Investment report 2022/2023, p. 23

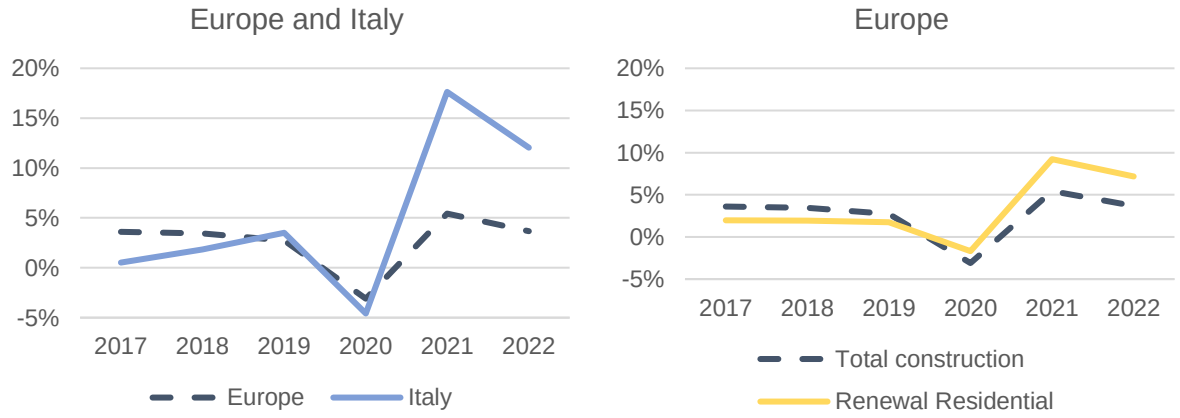
Figure 83. Construction investment in Europe*, 2017-2022. Billion euro, annual % change



Source: elaborated by CSIL based on data from Euroconstruct (December 2022).
(*) Austria, Belgium, Croatia, Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Lithuania, Poland, Portugal, Romania, Slovak Republic, Slovenia, Spain, Sweden.

However, profitability depends on several variables including i) production costs, ii) sale prices and iii) the level and the structure of the demand. Therefore, it is worth noting that **the impact of high inflation on turnover and margins for SMEs in the construction industry varied greatly between Member States and along the value chain**. Exogenous factors, such as national policies, like the Superbonus in Italy, macro trends, like the green transition and digitalisation, and endogenous dynamics have influenced this outcome. For instance, in the renovation sector, thanks to the sustained demand (as presented in Figure 84), the industry has managed to keep profit margins positive by passing the cost of inflation onto final consumers.

Figure 84. Construction investment in Europe*, Italy and Renewal Residential segment, 2017-2022. Annual % change



Source: elaborated by CSIL based on data from Euroconstruct (December 2022).
(*) Austria, Belgium, Croatia, Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Lithuania, Poland, Portugal, Romania, Slovak Republic, Slovenia, Spain, Sweden.

Wage growth rate

Currently, **there is a lack of evidence regarding the impact of inflation on wage growth in the construction industry across Europe**. The effect of inflation varies among countries and even among companies within the same country, with some countries mandating wage increases while others leave the decision up to employers.

According to Eurostat, in the EU in the fourth quarter of 2022, nominal wages in construction (NACE F) have increased by 6.8% year-on-year, compared to 3.4% in the fourth quarter of 2021. The growth level ranged from 1.4% in Denmark to 16.5% in Ireland.[550] However, according to an analysis conducted by the European Trade Union Confederation (ETUC), on average **minimum wages in 2022 have decreased in real terms across all EU Member States**.[551] The sharp rise in prices means that most workers currently earn less in real terms than they did before.

The two main components of labour costs are wages and salaries and non-wage costs. According to interviews, the reduction in expenses related to travel, training, and committee participation during the pandemic period allowed to cut non-wage costs.

According to an industry expert, in countries such as Poland and other Southern and Eastern European Member States, the nominal increase in wages has pushed **many SMEs to transition into the informal economy** by hiring workers without contracts in order to cut labour costs. This is an ongoing structural issue in the construction industry, and inflation has only worsened the situation. In recent years, regulations and policies have attempted to address this problem. However, interviews highlight that the challenges posed by the pandemic and inflation have set back progress and caused the grey area to expand, particularly in Poland.

Access to skilled labour

The European Construction Industry Federation (FIEC)[552] has recently observed an increasing problem of skills gap or mismatch in several EU countries, indicating a discrepancy between the skills of workers and the actual requirements of construction companies. The trend can be attributed to the shortage of workforce, which directly affects productivity. In fact, construction companies struggle to find skilled workers as the sector remains less attractive to young people and women. Therefore, this labour-intensive industry is facing a shortage of skilled labour due to retiring ageing workers, lack of innovation, and low productivity. [553] **This scarcity of skilled labour is a pressing structural issue that affects the entire value chain,** from engineers and architects to technicians and blue-collar workers.

The scarcity of skilled labour has been identified as one of the drivers of inflation by many interviewees. At the same time, the **inflationary pressure further aggravates this structural problem**, creating a vicious cycle. As a result of rising inflation, workers demand higher wages to make up for lost purchasing power, which firms may struggle to meet due to higher non-labour costs. Additionally, many SMEs in the construction sector lack the financial strength to invest to become more appealing to workers. The insufficient availability of skilled labour has three effects: an **increase in labour costs, a decrease in efficiency due to the hiring of less skilled workers, and a loss of potential business opportunities due to understaffed companies facing growing demand**. This, in turn, leads to less competition and, eventually, higher prices of construction services.

Other factors, such as the recent exodus of migrant workers in the construction industry in Poland, have aggravated the situation. Ukrainian construction workers living in Poland left to defend their country against the Russian invasion, causing acute labour shortages in the Polish construction industry.[554]

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[550] Eurostat (2023). Annual increase in labour costs at 5.7% in euro area. *Euroindicators 32/2023*, p. 6.
[551] EURACTIV (2023). Labour shortages felt all over Europe, published on 21/03/23. Available at: https://www.euractiv.com/section/politics/news/labour-shortages-felt-all-over-europe/.
[552] FIEC (2021). Driving and Supporting Sustainability in Construction. Strategic vision, p. 11.
[553] European Commission (2023). Transition Pathway for Construction, p. 9.
[554] EURACTIV (2023). Labour shortages felt all over Europe, published on 21/03/23.

Bankruptcies and insolvencies

The impact of the rise in energy prices on firms' vulnerability is not uniform across sectors and is primarily driven by energy dependence. The construction industries have been impacted relatively less due to their lower dependence on energy. However, more in general, inflation can increase the risk of bankruptcy for businesses by raising production costs, which may lead to liquidity problems, compounded by rising interest rates.

In the construction ecosystem, the combination of late payment and high inflation may increase the rate of bankruptcies and defaults of companies in the next year. According to interviewed stakeholders, while late payment is a well-documented phenomenon, there is a lack of statistical evidence to support the link between high inflation and the bankruptcy of construction firms. Collecting statistical evidence on this phenomenon in all Member States is extremely challenging.

In a high-inflation environment, other factors may impact the risk of bankruptcy for construction SMEs. For example, firms facing liquidity problems due to rising production costs in Poland and other Eastern and Southern European countries may choose to **move from the formal towards the informal economy to avoid default**. Some **building material manufacturers may also choose to stop production and become importers** due to an unbearable spike in their operational costs, a decision that may already have been in the works but was pushed by the inflation context. In contrast, **in segments with ramping demand, such as construction renovation, bankruptcy may not be an issue at all**.

Access to finance and capacity to repay loans

The world of construction and property development involves a variety of sources of financing. Each actor has its unique risk profile and specific financing. Hence, private financial institutions offer different types of financial instruments, financing conditions and terms,[555] depending on the various actors in the industry, such as developers, architects, construction companies, and property owners or investors.

High inflation leads to increased production costs. When combined with late payment and compounded by rising interest rates, it can cause liquidity problems, making it difficult for companies to repay loans and access new credit. This scenario particularly affects construction SMEs that are frequently in a sub-contracting position, thus more vulnerable to the issue of late payments.

Loans provided by private financial institutions for construction and property development vary from large-scale long-term loans for purchasing land, to tailored loans for renovation projects by private homeowners. Many companies in the construction ecosystem primarily rely on loans for working capital, for example, to pay their equipment and workers in anticipation of payment from the sale of the construction project or from the developer. Start-ups and growing companies typically take out specific loans that are tailored towards their growth ambition and investment needs and adjusted to their risk profile.[556] **High interest rates affect the cost of financing and can cause delays in payments**. In such situations, the renegotiation of the construction work price causes delays in the work and, ultimately, in the payments. In addition, as previously mentioned, **it becomes increasingly difficult for SMEs to plan specific investments, particularly in relation to green transition and digitalisation**. This situation leads companies to delay or even cancel their investment plans.

The magnitude of the impact of inflation on the construction industry depends on the size of the companies and their position within the supply chain. SMEs experience more

[555] European Commission (2023). Transition Pathway for Construction, p. 51.
[556] *Ibid.*

barriers than larger companies, such as heavier burdens from bureaucratic duties and the requirement of reporting procedures when it comes to providing proof of financial sustainability. Microenterprises, which make up 90% of EU construction companies, often have limited bargaining power to obtain favourable financing deals due to lower working capital and higher perceived business risk. Moreover, many microenterprises have exhausted their reserves during the last three years, due to the pandemic lockdowns, followed by rising energy prices and inflation. [557]

The renovation segment within the construction ecosystem is the least affected because of high demand, which allows them to pass higher operating costs onto the end consumers, and public support. In fact, Member States and other national public bodies support players aligned with their respective goals in areas such as sustainability and economic development. Energy efficiency loans and mortgages, such as loans linked to improving the energy performance of buildings, are becoming increasingly popular. [558]

On the other hand, companies working in the residential sector are impacted by the **indirect effect of high-interest rates negatively affecting access to credit for households**, which translates into fewer loans for housing.

Start-up and scale-up activity

There is currently no direct evidence to suggest that high inflation has any significant impact on the creation of new start-ups or scale-up activities. However, within the construction ecosystem, there is evidence of new businesses emerging in the construction renovation segment. This includes both new players entering the market and existing companies, such as engineering or architectural firms, expanding their activities in the sector. It is important to note that this trend has been primarily driven by the increasing demand in this sector, which has been stimulated by policy interventions, such as the Renovation Wave[559], and the overall the green transition, rather than the need to improve processes in response to rising energy prices or other inflationary pressures.

International competitiveness

Within the context of the European single market, national differences, such as the indexation of salaries in Belgium, can impact costs and result in a loss of competitiveness for certain Member States. Furthermore, **inflation and political responses vary among countries. This situation, as indicated during the interviews, can lead to competitive disadvantages**. For instance, Dutch construction companies operating near the German border face challenges when competing against their German counterparts who have received substantial subsidies.

At an international level, manufacturers of building materials, for instance, in the parquet industry, face an issue concerning increased imports of low-cost products from non-EU countries, including China, Serbia, and Turkey. The lower purchasing power of European customers, the increasing production costs faced by European companies, and the possibility for extra-EU countries to circumvent the restrictions on the use of Russian wood, are determining greater exposure to competition from extra-EU countries and undermining the EU industry international competition.

[557] European Commission (2023). Transition Pathway for Construction, p. 51.
[558] *Ibid.*
[559] European Commission (2020). A Renovation Wave for Europe - greening our buildings, creating jobs, improving lives. Available at: https://energy.ec.europa.eu/topics/energy-efficiency/energy-efficient-buildings/renovation-wave_en.

Energy production and energy consumption.

The industry's long supply chain includes manufacturers of construction products, who operate in an energy-intensive sector. For these companies, mainly operating in the higher segments of the value chain, the increase in energy prices led to a reduction in **the consumption of energy. In 2022, companies had to downsize their output temporarily or even permanently** in order to contain operating costs. [560] In the event of a persistent energy crisis, with non-competitive energy prices within the EU, production may shift to third countries. This would lead to job losses in the affected industrial sectors and increase the dependence on inputs from third countries for the construction industry.

However, in the rest of the value chain, the construction industry is predominantly labour-intensive and low dependent on energy consumption. Thus, the firms in downstream segments of the ecosystem have been relatively less affected by rising energy prices. **Overall, the impact of high inflation on energy consumption has been neglectable to them**.

A.3.3.5. Passing costs onto consumers

The capacity of companies to pass the costs of high levels of inflation onto consumers varies according to their position along the supply chain, the level of demand they encounter, and their size.

- As highlighted by interviewees, raw and semifinished material suppliers and transport companies were able to fully pass the increased costs to the next stage of the value chain.
- SMEs and business associations interviewed assessed that furniture manufacturers and other building equipment manufacturers were forced to absorb part of the increasing costs, putting pressure on their profit margins. Their ability to pass on the increasing costs depends on the business in which they operate. The residential market (B2C) is characterised by a flow of small orders, the decision-making time is relatively short as well as the size of contacts. In this segment, during the worst period of inflation, companies were able to update their price lists twice a year (usually it is done once per year) and pass on their clients part of the increased production costs. In the contract business (B2B), characterised by large orders, projects can last from 6 months to several years. The price-making activity became very difficult with the uncertainty brought by high inflation, because companies have to retain prices for the entire duration of the project, therefore making significantly less margins if costs increase. Large orders were those more affected by squeezing profitability.
- The ability of downstream companies to transfer costs depends on the level of demand they face. Construction SMEs are typically regionally-based with a limited area of activity. According to interviews, reflecting the financial pressures of higher energy and building material prices on their clients may add an additional burden on SMEs, since it may cause them to lose customers. As a result, their ability to pass the cost of inflation onto clients depends on the level of demand that they face. For example, companies operating in the residential renovation segment, which faced robust demand in 2021-2022 (as reported in above), could fully pass on the increasing costs to their customers.
- The third factor is the size of the company. Most interviewees stressed that on average SMEs have limited bargaining power compared to large companies. SMEs are more likely to operate locally, with a relatively small client network. Furthermore, their

[560] European Commission (2023). Transition Pathway for Construction, p. 22.

activities are less differentiated, which exposes them to the risk of losing clients if prices rise.

A.3.3.6. Future outlook

According to official yearly inflation projections,[561] Europe is expected to experience a decline in inflation in 2023 and 2024 compared to 2022. Despite this, **when making their medium-term plans companies are still facing strong near-term price pressures**. The interviewed sector companies and trade associations expect a decline in energy price, which has partially already occurred, while they are more pessimistic about the decrease in prices of raw materials. Overall, they expect to reach a 'new normal' scenario with production costs on average higher than their pre-pandemic values.

The medium-term outlook for inflation may vary among Member States due to country-specific factors. For example, countries with geographical proximity to Ukraine are highly dependent on the conflict's development and have a higher dependence on Russian imports, particularly in terms of energy and other raw materials like wood. EU sanctions against Russia and plans to change the energy supply chain pose significant challenges for these countries.

Other factors affecting the medium-term outlook include national policies, such as salary indexation. In countries like Belgium, salary indexation may create a negative spiral of inflation and a competitive disadvantage for local companies compared to their international competitors. This issue is generic to the entire economy but, as highlighted by several interviewees, is particularly relevant for the construction ecosystem, which is a labour-intensive industry.

It is worth mentioning that in the construction sector, many micro and small enterprises have exhausted their reserves during the years of the pandemic and rising energy prices and inflation, due to reduced profit margins.[562] Interviews highlighted that construction SMEs lack the financial strength to have a medium and long-term plan. They face many pressures and struggle to manage day-to-day activities, resulting in an average **planning time perspective of around six months**.

A.3.3.7. Existing ecosystem-specific policy measures to help SMEs

At the national level, a number of regulatory actions and measures have been taken to support the construction ecosystem, especially SMEs, according to interviews with the EU SME envoys. These measures addressed different topics:

- **Late Payments**. In France, it was set up a system to analyse the production costs of building materials to support the construction industry in the face of rising prices.[563]
- **Public procurement**. In Bulgaria, by Resolution No. 290 of the Council of Ministers of 2022, a methodology for changing the price of a public procurement contract as a result of inflation was adopted. It regulates how to change the price of a contract for public procurement and a framework agreement as a result of inflation, in which the prices of the main goods and materials forming the value of the construction contract and the

[561] Eurostat (2023). Euroindicators, released on 17 March 2023. Available at: https://ec.europa.eu/eurostat/web/products-euro-indicators/w/2-17032023-ap.
IMF (2023). World Economic Outlook Update. Inflation Peaking amid Low Growth. Available at: https://www.imf.org/en/Publications/WEO/Issues/2023/01/31/world-economic-outlook-update-january-2023.
[562] European Commission (2023). Transition Pathway for Construction, p. 51.
[563] France. Minister of Economics, Finance and Industrial and Digital Sovereignty. Mise en place d'un dispositif d'analyse des coûts de production des matériaux de construction pour accompagner la filière BTP face à l'augmentation des prix. Press release, 26/01/2023. Available at : https://presse.economie.gouv.fr/26012023-cp-mise-en-place-dun-dispositif-danalyse-des-couts-de-production-des-materiaux-de-construction-pour-accompagner-la-filiere-btp-face-a-laugmentation-des-prix/.

framework agreement for construction have been significantly increased. In Germany, in 2022 the Federal Ministry for Housing, Urban Development and Building and the Federal Ministry for Digital and Transport issued circulars addressed to contracting authorities on the federal level (Bund) with regard to procurement for construction of infrastructure projects. In Hungary, the government adopted a measure[564] on the initiation of amendments to contracts concluded for the implementation of public works. Its adoption facilitates interpreting the rules of amending a contract regarding construction materials and products affected by price increases. In Slovakia, the Ministry of Transport prepared an updated methodological instruction[565] in connection with the rise in the prices of construction materials, which defined the mechanism for calculating claims in connection with price increases, taking into account the individual most important materials and their historical development.

- **Direct aids.** In Romania, a series of aid schemes have been launched, through which financial support is provided in the form of a grant from non-refundable external funds. The different schemes included the Grants for investment in retrofitting granted to SMEs in the fields of the food industry and construction. In the call for projects intended for SMEs in the field of construction, 1,448 projects were submitted and 201 projects were contracted, until December 31, 2022.

In addition, the European Commission and Member States have implemented various programs to support the economy and firms[566] not specifically targeting the construction ecosystem but that have been identified as helpful by the interviewees to support construction SMEs in the high inflation environment. These initiatives include:

- **Programmes to alleviate price hikes and ensure a steady supply of construction materials**, such as the REPowerEU program[567], which aims to save energy, accelerate the production and deployment of clean energy, and diversify energy supply; temporary revenue cap[568] on companies producing energy at low cost so that Member States can re-channel these profits to help consumers reduce their bills, including SMEs. Country-specific measures were also implemented to stabilise energy prices. For example, in Belgium certain taxes such as the federal contribution for gas and electricity and green power certificates, are being replaced by excise duties which can easily be adjusted by the government to compensate for energy price variations.[569]

- **Temporary financial aids were also provided to micro, small, and medium-sized companies** to compensate for increasing fuel, energy, and materials costs and help them maintain their activity. The Temporary Crisis Framework for State Aid[570] enabled Member States to use flexibility under State aid rules. The revised State aid guidelines on Climate, Environmental Protection, and Energy[571] provided additional flexibility for supporting building renovations and the deployment of renewable energy and energy-efficient appliances in buildings. During times of crisis, such as the peak in prices

[564] Hungary. Government Decree 13/2023 (I. 24.). Available at: https://njt.hu/jogszabaly/2023-13-20-22.
[565] Slovakia. Ministry of Transport (23/9/2022). Metodický pokyn pre súčasné/prebiehajúce stavby. Available at: https://www.mindop.sk/ministerstvo-1/doprava-3/institut-dopravnej-politiky/indexacne-vzorce/stavby.
[566] European Commission (2023). Transition Pathway for Construction, p. 55.
[567] Euroepan Commision (2022). REPowerEU: A plan to rapidly reduce dependence on Russian fossil fuels and fast forward the green transition. Press Realese, 18/05/2022. Available at: https://ec.europa.eu/commission/presscorner/detail/en/IP_22_3131 https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=COM%3A2022%3A230%3AFIN.
[568] European Council (2022). Council agrees on emergency measures to reduce energy prices. Press release, 30/09/2022. Available at: https://www.consilium.europa.eu/en/press/press-releases/2022/09/30/council-agrees-on-emergency-measures-to-reduce-energy-prices/.
[569] Brugel (2023). National fiscal policy responses to the energy crisis. Available at https://www.bruegel.org/dataset/national-policies-shield-consumers-rising-energy-prices.
[570] European Commission (2023). Temporary Crisis and Transition Framework. Available at: https://competition-policy.ec.europa.eu/state-aid/ukraine_en.
[571] European Commission (2022). Guidelines on State aid for climate, environmental protection and energy 2022. Available at: https://ec.europa.eu/commission/presscorner/detail/en/qanda_22_566.

observed in 2022, grants and direct aid were identified by the interviewees as critical for the survival of construction SMEs. It was recognised that certain entities were precluded from receiving direct aid, particularly in countries where the shadow economy is widespread. To qualify for such aid, firms were compelled to provide financial information on their business, which de facto excluded all companies operating in the grey area between the formal and informal sector.

- **Public funding and public guarantees have also helped improve access to finance for SMEs**, which has been impacted by high inflation. Examples of helpful measures are de-risking and supplying technical assistance, one-stop shops, or roadmaps for cost-effective staged renovations, such as building renovation passports. These initiatives have had a double effect, facilitating access to finance for SMEs and sustaining their demand by improving access to loans for their potential clients.

A.3.3.8. Possible additional measures that would help SMEs

According to all the interviewed stakeholders, grants and direct aids were deemed necessary for the survival of construction SMEs during times of crisis, but **what the construction ecosystem really needs is a well-functioning regulatory framework**. Interviewees highlighted two main problems with the current regulatory framework. Firstly, **it is not sufficiently designed with SMEs as a norm**, even though they account for the vast majority of players in the construction ecosystem. Often, the aid requirements are designed for large companies and are considered too complex to manage by SMEs. Secondly, **regulations and policy responses must be designed and implemented at the European level**. The current regulatory framework allows too much autonomy to Member States, leading to unfair competition between firms operating in different Member States.

In terms of specific topics, **SMEs, business associations and industry experts interviewed envision improvements in several regulations**, including:

- **The Late Payment Directive (LPD):**[572] According to the European Builders Confederation (EBC), this Directive has created a longstanding unfair framework that puts construction SMEs at a disadvantage, creates uncertainty and unreliability across the construction value chain and beyond. In their position paper,[573] they call for an ambitious revision of the LPD based on the principle of zero tolerance regarding long payment terms. This is considered necessary to establish a strong and clear framework that offers a level playing field across B2B and PA2B relations and transactions. The ongoing revisions to the LPD in 2023 appear to have taken these suggestions into account, with the stricter payment limits set at 30 days (see Section 4.1).[574]

- **Public procurement**: The interviewees also call for further implementation guidelines for public authorities and an improved exchange of best practices to increase and advance the direct participation of SMEs in public procurement.[575]

- **Price of materials**: According to one business association interviewed, in 2022 the possibility of indexing the price of raw materials to inflation was discussed with the

[572] Directive 2011/7/EU of the European Parliament and of the Council of 16 February 2011 on combating late payment in commercial. Available at: https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex%3A32011L0007.
[573] European Builders Confederation (2023). EBC position on the revision of Directive 2011/7/EU on combating late payment in commercial transactions. Position paper. Available at: https://www.ebc-construction.eu/2023/03/20/late-payment-ebc-calls-for-an-ambitious-revision-of-the-late-payment-directive/.
[574] European Commission (2023). Regulation of the European Parliament and of the Council on combating late payment in commercial transactions. COM(2023) 533/final 2. Available at: https://ec.europa.eu/info/law/better-regulation/have-your-say/initiatives/13665-Late-payments-update-of-EU-rules_en.
[575] European Builders Confederation (2020). EBC position on the implementation of Public Procurement in the European Union

European Commission. This measure, which is considered potentially useful by the industry, was eventually not introduced.

- **Classification of building materials**: The industry advocates for more clarity in this regard. At the moment, there are still conflicting actions regarding the use of important materials for the construction industry, such as wood products. On the one hand, there are policies recognising the role and value in terms of sustainability of wood products; on the other hand, other policies hamper the availability of wood. Forest tree strategies, biodiversity strategies, and the Land use and forestry regulation for 2021-2030 (LULUCF)[576] state that wood should stay in the forests to have a carbon sink.
- **Trade relations with Russia**: The decision to interrupt trade relations with Russia is having a huge impact on the industry. Besides energy supply issues, Russia used to be a major importer of raw materials for the construction industry, such as wood. Interviewees complain about the lack of tailored support measures to counterbalance the unintended negative effects on the construction industry.
- **Shortage of qualified workforce:** The industry is no longer attractive to the younger generation, leading to a shortage of skilled labour. While the European Union has acknowledged this problem, individual Member States have not been proactive in addressing it through their education systems. Moreover, there are significant disparities between countries. Some of them are not realising the importance of having a skilled labour force in successfully implementing European climate policies at all levels, including SMEs. As a result, SMEs are missing out on growth opportunities. According to interviews, educational programs such as training, re-training, and university programs need to be developed, and cross-country and international migration should be stimulated to address this issue.

[576] The LULUCF Regulation (EU) 2018/841. Available at: https://climate.ec.europa.eu/eu-action/european-green-deal/delivering-european-green-deal/land-use-forestry-and-agriculture_en.

A.3.4. Energy intensive sector case study

A.3.4.1. Ecosystem background

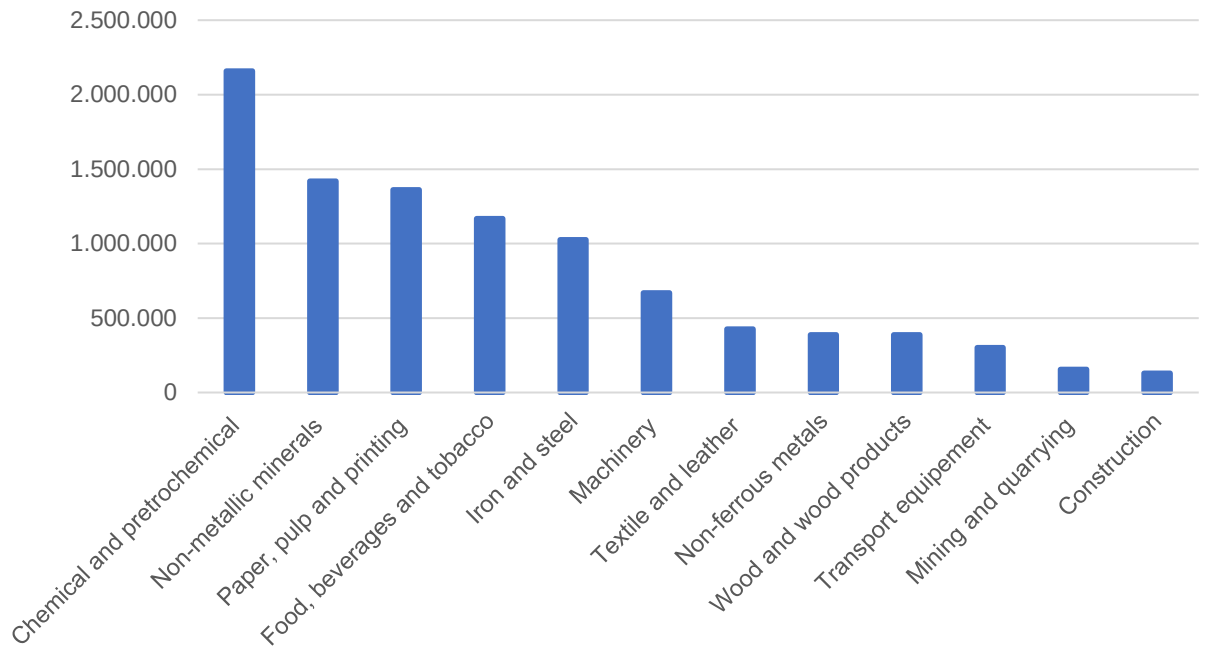
Energy-intensive industries (EIIs) account for almost half of the industrial energy input demand in the EU industry[577] and are the starting point of many value chains in the Single Market, providing raw, processed and intermediate materials to a wide range of downstream sectors.[578] As such, **EIIs are an integral part of the EU industrial base** and employ approximately 6.8 million people,[579] account for 5.6% of EU added value, have a turnover of EUR 2.1 million, and are represented by 404,000 businesses.[580] Various industries, including those involved in the production and manufacturing of chemical, iron and steel, refinery, extraction and quarrying, glass and quarrying, cement, paper, and fertiliser make up the EII ecosystem (see Figure 85 for an overview of the EII landscape). The two largest sectors are the iron/steel and chemicals, with an estimated 3.2 million workers in the EU-27.[581]

There are important differences within the ecosystem in terms of energy consumption. On the higher end, chemicals, steel, paper and non-metallic industries consume over 60% of industry-related energy in the EU. More specifically, chemicals is the largest consumer (20% in 2019), followed by steel (17%), paper and non- metallic minerals (13% respectively). Figure 85 below provides a bar chart of the energy consumption of various EIIs. It is also worth noting that energy consumption of steel and non-metallic minerals has strongly decreased in the last two decades (-29% and -24% since 2000 respectively). Moreover, textile energy consumption has dropped by 62%[582]. This suggest that this is a **dynamic ecosystem** that keeps evolving depending on energy consumption efficiency gains made by the different sectors that comprise it.

Feedback from consulted stakeholders indicate that the **proportion of SMEs within this ecosystem varies**. For example, according to an interviewee from the paper industry, around two thirds of existing companies in this sector are SMEs; however, there are also bigger firms. Similarly, with regards to minerals, feedback from the Industrial Minerals Association (IMA) also suggests that firm size varies; however, there is also a sizeable number of SMEs within this sector according to an interviewee. In addition, it is important to note that regardless of the nature of the sector (which may be energy-intensive due to the nature of the manufacturing performed), **SMEs tend to overall be more energy-intensive than larger enterprises**. This is due in part to the lack of economies of scale because of limited resources.[583] Generally, SMEs may not have the same level of resources to invest in energy efficiency or access knowledge and finance to invest in new technologies and processes. This makes many energy-intensive **SMEs particularly exposed to volatility in energy markets and prices**.

[577] European Commission (2023). EU Industrial Strategy. Available at: https://single-market-economy.ec.europa.eu/industry/strategy/energy-intensive-industries_en.
[578] European Commission (2022). Investment support for ecosystems energy intensive industries. Available at : https://ec.europa.eu/docsroom/documents/51115/attachments/1/translations/en/renditions/native.
[579] EIIs also represent about 11% of all employment in all EU industry.
[580] European Parliament (2020). EII, Challenges and opportunities in energy transition. Available at : https://www.europarl.europa.eu/RegData/etudes/STUD/2020/652717/IPOL_STU(2020)652717_EN.pdf.
[581] *Ibid.*
[582] Enerdata (2023). ODYSSEE-MURE. Energy consumption trend by industrial branch. Available at: https://www.odyssee-mure.eu/publications/efficiency-by-sector/industry/energy-consumption-trend-industrial-branch-eu.html.
[583] Pinget, A., Bocquet, R. & Mothe, C. (2015). Barriers to Environmental Innovation in SMEs: Empirical Evidence from French Firms. *M@n@gement*, *18*, 132-155.

Figure 85. Total final energy consumption by industrial sector in energy-intensive industries



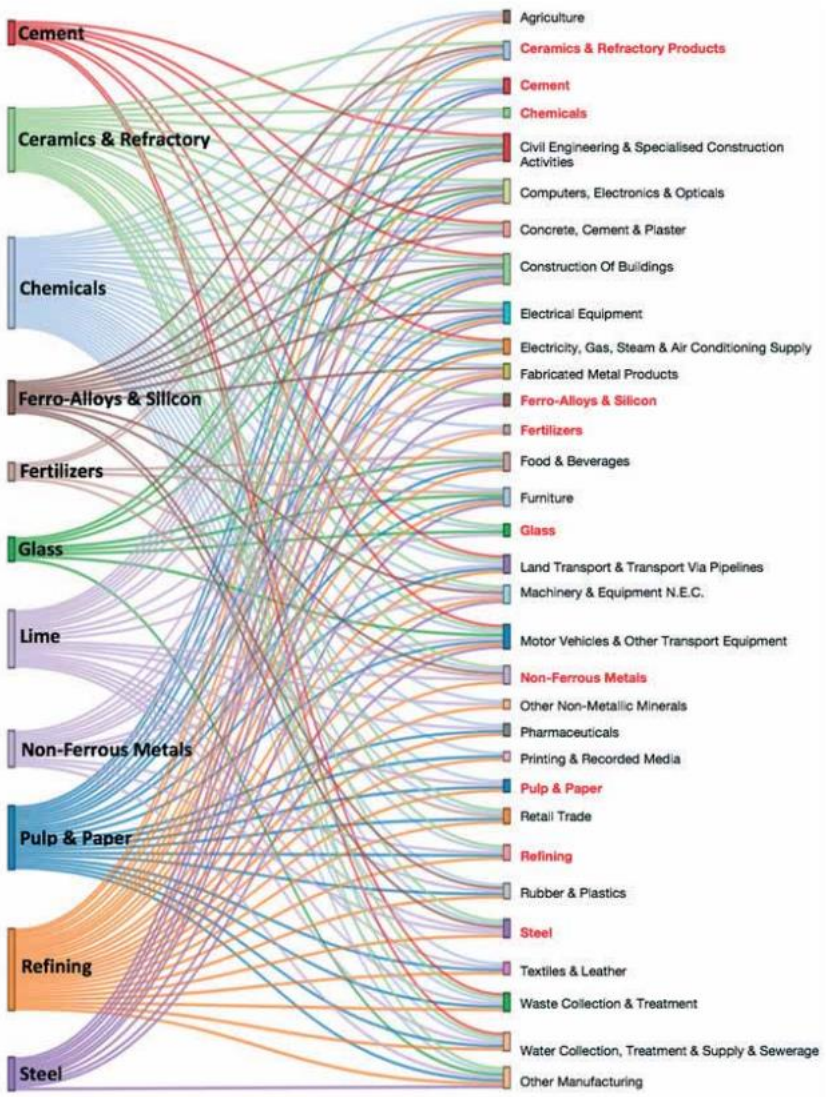
Source: Eurostat. Online data code: NRG_BAL_S.

The presence of **EIIs within the Single Market is an important competitive advantage for high-tech production**, such as in the automobile industry or chemical industries. Indeed, EIIs produce outputs that are used in a wide array of other manufacturing and economic sectors. The role of EIIs has consequently been recognised by the EU's Industrial Strategy which has in previous years been focusing on value chains.[584]

Figure 86 provides an illustration of how outputs created by the EIIs feed into other sectors of the European economy:

[584] European Commission (2020). Communication: A New Industrial Strategy for Europe. Available at: https://commission.europa.eu/document/a0dfe54f-f8bb-46f7-8828-d58c1cd8efa8_en.

Figure 86. Value chains between Energy-intensive industries and other sectors



Source: European Commission.[585]

A.3.4.2. Key drivers of inflation within the ecosystem

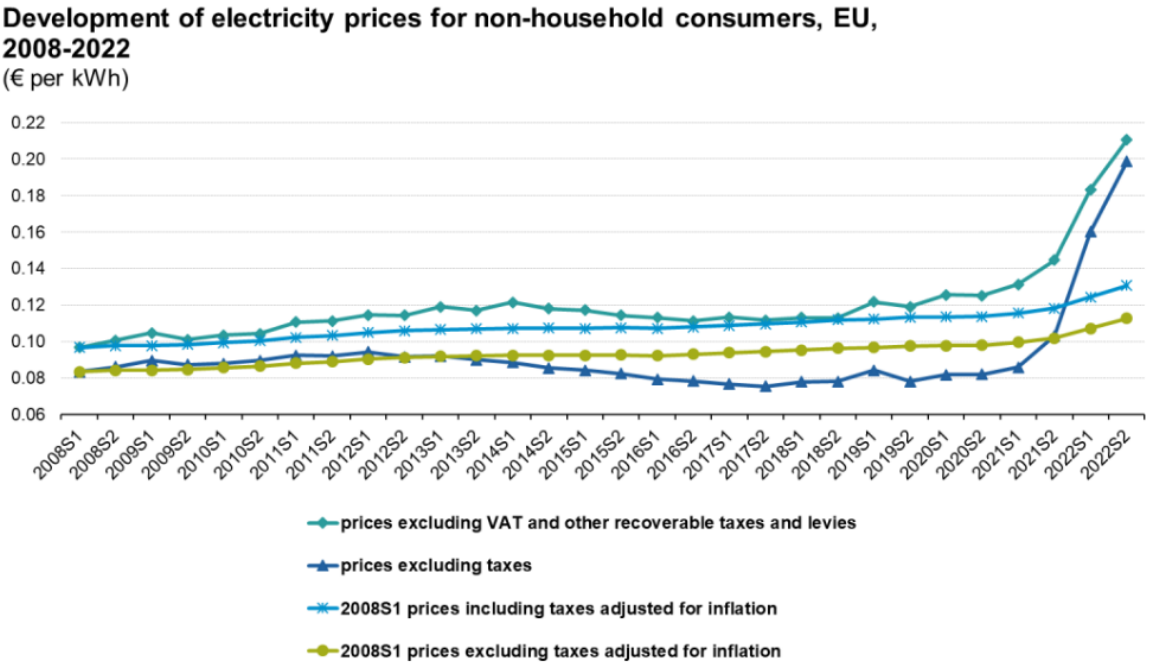
There are several factors driving the inflationary pressures faced by EIIs, however, due to the nature of the sector, the main driver of inflation is **soaring energy prices**.

Europe's **dependence on imports** for a large percentage of its energy needs, the ongoing armed conflict in Ukraine and the resulting sanctions imposed on Russian gas have led to **unprecedented rises in the cost of gas and electricity** and have led to the **energy crisis** of 2021-2022. To illustrate the extent of these soaring prices, the price of electricity across the EU-27 for non-households jumped from around 0.08 EUR per kWh to nearly 0.22 EUR per

[585] European Commission (2019). Masterplan for a Competitive Transformation of EU Energy-intensive Industries Enabling a Climate-neutral, Circular Economy by 2050. Available at: https://ec.europa.eu/docsroom/documents/38403.

kWh (a threefold increase) in the second semester of 2022 (prices excluding tax).[586] Figure 87 below shows the significant increase in in the cost of electricity in the EU.

Figure 87. Evolution of electricity prices for non-households between 2008-2022



Source: Eurostat Online data code: nrg_pc_205.

In addition to soaring energy prices, there is also a **high degree of price volatility** which also affects energy-intensive SMEs. For instance, wholesale gas prices in the EU witnessed a large amount of fluctuation in the fourth quarter of 2021. The TTF spot price started the quarter at 85 €/MWh, rising to 116 €/MWh in early October 2021, falling back to 60 €/MWh by the end of that month, rebounding in November 2021, reaching levels never seen before in December 2021 (183 €/MWh), to finish the year at 60 €/MWh.[587] Energy price volatility can have a significant impact on EIIs. Fluctuating energy prices can indeed put pressure on their overall expenses, as energy bills make up a large percentage of their total costs and can therefore make it difficult for them to develop medium and longer-term strategies.

Moreover, there are also other factors which are driving inflation for EIIs. First, **supply chain disruptions** which have emerged during the pandemic have also been contributing to inflationary pressures on EIIs. More recently, the Russian war of aggression against Ukraine has also affected some supply chains which are critical to the activities of some types of EIIs. For example, disruption to fertiliser supply chains originating from Ukraine and Russia added strain on the European fertiliser industry.[588]

Another factor important to note is the **shortages and disrupted supply of raw material**. For example, the paper industry witnessed significant supply issues to meet the demand for paper products in the Single Market.[589] Additionally, in 2022 Intergraf (the European printing industry

[586] Eurostat (2023). Electricity prices statistics. Available at: https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Electricity_price_statistics#Electricity_prices_for_non-household_consumers.
[587] DG ENERGY (2021). Quarterly report on European gas market. Available at: https://energy.ec.europa.eu/system/files/2022-04/Quarterly%20report%20on%20European%20gas%20markets_Q4%202021.pdf.
[588] DG GROW (2022). Decoupling from Russia. Monitoring supply chain adjustments. Available at: https://ec.europa.eu/docsroom/documents/53694/attachments/1/translations/en/renditions/native.
[589] European Parliament (2022). Paper price spike and shortage of supply. Available at : https://www.europarl.europa.eu/doceo/document/E-9-2022-003894_EN.html.

association) announced that the graphic industry was experiencing unprecedented shortages of paper supply.[590] This EII had been experiencing significant challenges in the years preceding the pandemic and war in Ukraine as between 2016-2021, a 25.8% decrease in the European graphic paper industrial base was reported,[591] In addition, the war in Ukraine and its impact on wood and pulp (key raw material for paper manufacturing extracted from wood) supply were also reported as an added challenge to the sector.[592]

A.3.4.3. Key impacts of inflation on the ecosystem

There have been several types of adverse impacts from the recent inflationary pressures on the ecosystem, ranging **from very severe (i.e. cessation of production) to more moderate impacts**. They are detailed below.

On the more severe side, the energy crisis has forced **some EIIs to completely halt production**. For example, there have been reports of metal producers in Germany and Spain having to entirely stop production as the higher costs made their activities financially unsustainable, despite the price of steel trading near record levels in the last ten years (peaks in prices were witnessed in late 2021).[593] More specifically, in Germany, according to a survey of 24,000 enterprises conducted by the German Chambers of Commerce and Industry (DIHK), more **than one in four businesses in the chemicals sector and 16% of businesses in the car sector stated they were compelled to stop production.**[594] This is also the case in another energy-intensive sector: a representative from paper industries reported that some smaller manufacturers were left with no choice but to halt altogether production given the soaring and extremely volatile energy prices.

More moderate impacts include the reduction of production and of the industrial output of EIIs. In this respect, a good indicator to appreciate the impact of higher energy prices on the ecosystem is the **levels of industrial energy demand**. The International Energy Agency (IEA) estimated that European **industrial gas demand fell by 25%** in the third quarter of 2022.[595] Although declining demand can be partially attributed to energy efficiency gains, the large drop recorded in the second half of 2021 was also the result of widespread shutdowns and scaling back of industrial production. As noted above, steel production faced significant challenges but so did chemicals and aluminum, both having reduced their output in the second half of 2022.[596]

As result, the energy crisis and its associated detrimental consequences on EIIs have led important segments of the **ecosystem to no longer be able to meet the needs of the Single Market**. For example, with regards to the chemicals sector, the IndustriAll European Trade Union (IndustriAll Europe) and the European Chemical Industry Council both reported that that the EU as whole developed a trade deficit of EUR 5.6 billion in the first half of 2022 for the first time ever as a result of importing more chemicals than exporting, both in terms of volume and value.[597] However, a review of official EU statistics provided by Eurostat seems to indicate that

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[590] Intergraf (2022). Shortages of paper causes chaos among printers and their customers. Available at: https://www.intergraf.eu/communications/press-releases/item/373-shortage-of-paper-causes-chaos-among-printers-and-their-customers.
[591] *Ibid.*
[592] *Ibid.*
[593] Eurometal (2022). Spanish steel plants suspending operations amid record energy: Unesid. Available at: https://eurometal.net/spanish-steel-plants-suspending-operations-amid-record-energy-unesid/; Reuters (2022). UPDATE 2-Steelmaker Lech-Stahlwerke halts production as power prices soar. Available at : https://www.reuters.com/article/ukraine-crisis-germany-steel-idUSL5N2VD4U4. Trading Economics (2023). Steel trading data. Available at: https://tradingeconomics.com/commodity/steel.
[594] Reuters (2022). Energy crisis chips away Europe's industrial might. Available at : https://www.reuters.com/business/energy/energy-crisis-chips-away-europes-industrial-might-2022-11-02/.
[595] *Ibid.*
[596] *Ibid.*
[597] Industriall (2023). Joint Statement on the impact of the energy crisis on the EU chemical industry. Available at: https://news.industriall-

this trade deficit is only relevant for trade with some third countries, notably China in 2022.[598] The impact of inflation in relation to the international competitiveness of European EIIs is further addressed in in one of the sub-sections below.

A.3.4.4. Detailed impacts of inflation on SMEs

Payment practices and propensity to make payments late

With respect to the issue of late payments, as detailed in the main report, the analysis of SAFE data suggests that inflation increases the likelihood that firms will experience problems due to inflation in industry as a whole, however, no such effect was found using Orbis data. At the level of the ecosystem, with the exception of an increase during the pandemic, the average number of collection days has remained steady since the pandemic has been brought under control, however this analysis did not take into account data from 2022 onwards.

Participation in public procurement

As noted in the main report, similar to other ecosystems such as digital and electronics, **participation in public procurement has remained steady for EIIs** in recent years (see Section 4.5.3 of the main report).

Adoption of sustainable practices

EIIs have been facing calls from policymakers to ensure their **business activities are aligned with the decarbonisation agenda** both at EU and national level.[599] While it is too early to adequately assess the effects posed by inflation on this agenda, there are a number of existing initiatives at the national level aimed at supporting EIIs to develop and take up innovative and cutting-edge technology to facilitate energy efficiency and ultimately become sustainable carbon-neutral industries. For example, Spain invested EUR 82 million in an energy storage R&D centre while Greece is developing its first CO2 storage facility, which is estimated to be worth some EUR 300 million.[600]

At the EU level, the need for EIIs to adopt sustainable practices is addressed in the Recovery and Resilience Facility (RFF) via national Recovery and Resilience Plans (RRPs).[601] The RRF Regulation specifies that each Member State must devote at least 37% of its total allocation to measures that support the green transition, which can only be achieved by EIIs adopting more sustainable practices.

Looking ahead, increased carbon taxes and higher prices for emission rights (linked to the Carbon Border Adjustment Mechanism (CBAM) for the cement, iron and steel, aluminium, and fertilisers sectors) coupled with higher energy prices will add pressure on EIIs to move to fossil-free energy. At this stage, the impact of inflation of green investment is not clear; however, it is reasonable to assume inflation, coupled with public support, may act as a further catalyst for the Green transition, as suggested by the quantitative analyses in Section 4.4.3.

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europe.eu/Article/868#:~:text=For%20the%20first%20time%20ever,employment%2C%20and%20to%20avoid%20redundancies . See also: CEFIC (2022). Energy crisis the EU chemical industry is reaching breaking point. Available at: https://cefic.org/media-corner/newsroom/energy-crisis-the-eu-chemical-industry-is-reaching-breaking-point/.

[598] Eurostat (2023) Production and international trade in chemicals. Available at: https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Production_and_international_trade_in_chemicals#Trade_in_chemicals_by_Member_State.

[599] See for example European Parliament (2020). Energy Intensive Industries: Challenges and opportunities in energy transition. Available at: https://www.europarl.europa.eu/RegData/etudes/STUD/2020/652717/IPOL_STU(2020)652717_EN.pdf.

[600] European Commission (2022). Investment support for ecosystems energy intensive industries.

[601] *Ibid.*

Profitability and turnover

Overall, the impact on EIIs' profitability appears **mixed**. A recent study conducted by LSE on behalf of the European Investment Fund found that there are **small and partially insignificant impacts** of energy prices on profitability.[602] More specifically, electricity prices do not significantly impact profitability of EIIs, however, gas prices were found to **decrease profitability** by 1%. Moreover, the impact varies by sector, some sectors seeing a **large negative impact** (e.g. mining) and others with **positive impacts** such as minerals.

Moreover, it should be noted that the impact on profitability is **not even across the Single Market**. While at the EU level, the average profit margins of the chemical, basic metal and mineral product sectors were found to have decreased by 54% according to one study, some Member States fared better than others. For example, profit margins were reported to be -34% for Spain and -38% for France.[603] Germany was also below the EU-average with -48%. Conversely, the Netherlands and Poland were reported to have experienced significant changes on the profit margins of their chemical, basic metal and mineral product industries with -105% in the case of Dutch companies and -129% in the case of Poland.[604] The reason why countries have been affected differently lies in the energy mix of each country and their resulting level of exposure to the decreasing supply of gas since the outbreak of the war. For example, both France and Spain have a diversified energy mix, which has been integrating renewables in the last decades giving these two Member States mitigation strategies and alternative energy to support their energy intensive firms. Moreover, in the case of France, the availability of nuclear energy was also an important factor in limiting the impact of inflation (linked to energy prices) on energy intensive SMEs. By contrast, the Netherlands and Poland are heavily reliant on fossil fuels (coal in the case of Poland) and gas, particularly in the case of the Netherlands.

Adoption of new technology

With regards to the adoption of new technology, feedback from interviews suggest that energy intensive SMEs have been focusing on overcoming the challenges posed by inflation to their profitability and avoiding bankruptcy. As such, it would appear that SMEs have not had the resources to invest in new technology.

However, the adoption of new technology, particularly low-CO2 technologies is critical to the long-term profitability of European energy intensive SMEs due to their dependency on foreign fossil fuel energy and in light of the evolving regulatory environment for decarbonisation. In the case of the steel industry, it was estimated that significant investments will need to be made to respond to these challenges, estimated to be as high as EUR 100 billion by 2050—from European producers, depending on the scale of new and retrofitted facilities.[605]

Wage growth rate

As for the rest of the EU economy, the sustained increase in inflation levels has put pressure on energy intensive industries SMEs to increase wages of their staff. This was confirmed by a representative of the paper industry who reported that higher wage growth rates fueled by the

[602] London School of Economics (2023). Final Presentation Capstone Project The impact of energy prices on SME investment and profitability. Available at: https://institute.eib.org/wp-content/uploads/2023/04/EIF_LSE-Capstone_Final-Presentation_vF.pdf.
[603] PwC (2022). How to approach rising energy costs.
[604] *Ibid.*
[605] McKinsey & Company (2021). The future of the European steel industry. Available at: https://www.mckinsey.com/~/media/mckinsey/industries/metals%20and%20mining/our%20insights/the%20future%20of%20the%20european%20steel%20industry/the-future-of-the-european-steel-industry_vf.pdf.

cost-of-living crisis have been increasing overhead costs of SMEs. The outlook on wage growth and inflation among EIIs and the rest of the economy is uncertain.

Access to skilled labour

Energy-intensive SMEs have been facing the same issues as other types of SMEs in getting access to skilled labour. According to a recent European Labour Authority report,[606] metal working machine tool setters and operators, welders and flame cutters and sheet metal workers were among the professions for which there was a shortage in the labour supply. Conversely, a consulted stakeholder from the paper industry indicated that the sector was not experiencing significant labour shortages. Therefore, labour shortages may not be relevant to all energy intensive SMEs, and the impact of inflation on access to skilled labour will vary accordingly.

Bankruptcies and insolvencies

Despite national measures to support EIIs, there has been an **increasing number of bankruptcies being recorded among EU industries**. Following a period of record low numbers of bankruptcies during the pandemic, there has been a rise in the number of firms going bankrupt since the second quarter of 2022 (see Section 4.2.2).[607] With regards to energy intensive SMEs, interview feedback from the minerals sector confirms that a few bankruptcies were reported. Similarly, feedback from the paper industry also confirms that bankruptcies have been filed, however, data is lacking at this time due to the protracted process of filing for bankruptcy. There are widespread concerns among energy intensive stakeholders that further bankruptcies are looming ahead.

Access to finance and capacity to repay loans

Inflation has negatively affected the availability of and access to financing for energy intensive firms and SMEs more generally. While SMEs were able to gain wider access to financing during the COVID-19 pandemic as EU financial instruments were mobilised and extensive national-level measures deployed under the Temporary Framework for state aid, **there has been since an important decline in the uptake of debt-based instruments on the part of SMEs in 2022.**[608] This is primarily due to the increasing cost of borrowing as interest rates have been raised by the European Central Bank in recent months in an attempt to slow down inflation. As a result, banks have considerably tightened SME credit standards at the outset of 2022.

Start-up and scale-up activity

According to an interview, energy intensive SMEs are typically established players and therefore there may be lower market entry rates than for other types of industries. The absence of evidence on any impact on start-ups suggest that it is reasonable to assume inflation has not noticeably impacted this ecosystem. However, there may have been an impact on scale-ups as some energy intensive firms have been facing constraints in terms of profitability.

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[606] European Labour Authority (2023). Labour shortages in Europe – is the labour market tightening? Available at: https://www.ela.europa.eu/en/news/labour-shortages-europe-labour-market-tightening.

[607] Bnp Paribas. Economic Research. EUROPEAN UNION: SECTORAL VARIATIONS IN BUSINESS BANKRUPTCIES. Available at: https://economic-research.bnpparibas.com/html/en-US/European-Union-sectoral-variations-business-bankruptcies-2/22/2023,48271#:~:text=Business%20bankruptcies%20in%20the%20European,Eurostat%20on%20Friday%2017%20February.

[608] EIB (2022). The European Small Business Finance Outlook 2022. Available at : https://www.eif.org/news_centre/publications/eif_working_paper_2022_84.pdf.

International competitiveness

The high dependence of Europe on imports for its energy needs has adversely impacted the global competitiveness of energy intensive industries. At the height of the energy crisis, some commentators suggested that some EIIs, such as aluminium, fertilisers, and chemicals producers are at risk of permanently moving production to third countries where energy prices are more affordable and sustainable such as the United States.[609] However, interview feedback some EIIs such as the paper industry is capital intensive, therefore factories and manufacturing sites cannot be easily offshored. Despite this, an interviewee underscored the risk that companies might reduce their future investments in Europe and instead favour investments overseas where energy prices are significantly lower and legislation less costly.

Energy production and energy consumption

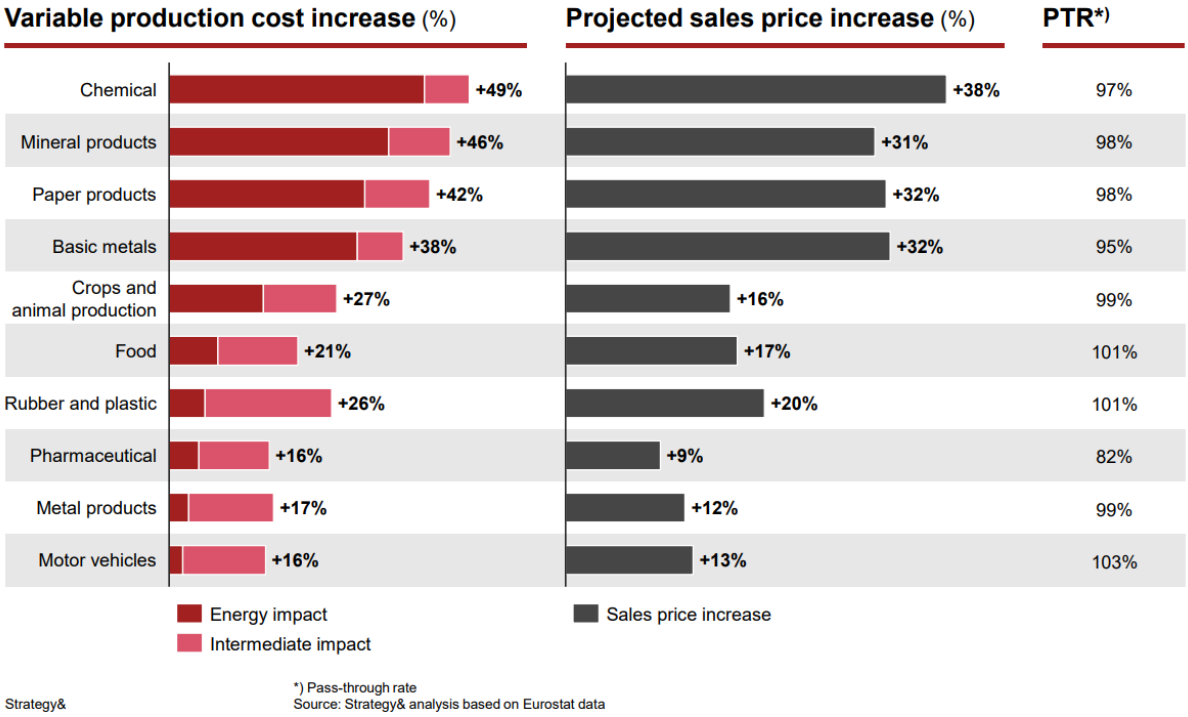
See above regarding the adoption of sustainable practices.

A.3.4.5. Passing costs onto consumers

The extent to which EIIs have passed on higher costs created by inflation onto consumers vary by sector. According to a recent PwC study, chemicals, minerals, paper and basic metals were the sectors for which projected sales price increases were estimated to be the highest with respectively +38%, +31%, and + 32% for both paper and basic metals. Conversely, rubber and plastic, metal products and pharmaceutical were the energy-intensive sectors who were least able to pass on higher production costs onto their consumers with respectively +26%, 17% and 16% (see Figure 88). The extent to which companies are able to pass on higher production costs onto consumers is captured by the pass-through rate, which provides an indication of the proportion of these costs which can be passed on. Several factors influence pass-through rates, for example, whether the sector is operating on global markets. This is the case of the pharmaceutical sector which, according to one study, is unable to increase its sales prices too much as it has global competitors. The figure below shows (i) the variable production cost increase, (ii) projected sales price increase and (iii) the pass-through rates (PTR) for several sectors, including some belonging to the energy-intensive ecosystem.

[609] Reuters (2022). Energy crisis chips away Europe's industrial might. Available at: https://www.reuters.com/business/energy/energy-crisis-chips-away-europes-industrial-might-2022-11-02/.

Figure 88. Cost increases among energy intensive industries in the EU-27



Source: PwC.[610]

A.3.4.6. Future outlook

It is difficult to provide a reliable assessment of how inflation will affect EII SMEs in the medium term given the high amount of uncertainty linked to monetary policy and geopolitical factors.

This ecosystem has been facing long-term structural challenges in the past two decades. Prior to the COVID-19 pandemic, the overall EII ecosystem had been shrinking in terms of the number of jobs mostly due to world market effects, cost competition and overproduction in some market segments. As a result, employment levels before the 2008-2009 financial crisis never fully recovered and were further aggravated by the pandemic. For example, the steel industry employment in the EU-28 contracted by 11%, from 365,000 in 2011 to 326,000 in 2021. In addition, the green transition and its objective of a achieving a climate-neutral economy is likely to also impact this ecosystem (even though a statistical study conducted by ETUC[611] found that no significant impact on jobs among EIIs was to be expected in relation to the ongoing decarbonisation process).

As energy and raw material prices continue to go down, inflationary pressures are likely to be eased on EIIs. However, the EU-27 GDP is also slowing down and therefore there may be less demand in the years to come. Notwithstanding, EIIs will continue to face pressures in terms of energy costs as the armed conflict in Ukraine drags on and transition costs for green objectives continue to be borne by EIIs.

[610] PwC (2022). How to approach rising energy costs.
[611] ETUC (2020). Adaptation to Climate Change and the world of work. Available at: https://www.etuc.org/sites/default/files/publication/file/2020-08/ETUC-adaptation-climate-guide_EN_final.pdf.

A.3.4.7. Existing ecosystem-specific policy measures to help SMEs

A number of measures have been taken at the national and EU level to support EIIs and to address the issue of rising and volatile energy prices since the outbreak of the war in Ukraine. These include **retail price caps, regulated tariffs, support programmes for energy-intensive companies, and liquidity or capital backing for energy companies**, including even **nationalisation** in some instances[612] (e.g. Germany for instanced nationalised the energy company Uniper September 2022).[613] Another type of measure aims to stabilise and reduce wholesale prices and ensure energy security. This includes initiatives to encourage energy savings and increase supply but also to cap energy costs, particularly wholesale gas prices.

At the national level, several support measures including direct subsidies and grants for EIIs have been implemented under the Temporary Crisis Framework. For example, the German federal government implemented a programme worth EUR 5 billion specifically to address the needs of energy-intensive industry.[614] Under this programme, eligible energy-intensive and trade-intensive companies can receive grants of up to EUR 50 million towards their increased gas and electricity costs. Similarly, in France, a EUR 5 billion scheme to support energy intensive companies in the form of direct grants for additional costs due to severe increases in natural gas and electricity prices was introduced.[615] While it is too early to assess the effectiveness of those schemes, feedback received from a leading French business association suggest the Temporary Framework has been welcome by French SMEs.

A.3.4.8. Possible additional measures that would help SMEs

Feedback from consulted stakeholders indicates that the existing eligibility criteria under the state aid Temporary Framework were adequate in responding to the needs of the energy intensive SMEs.

Beyond the needs posed by the energy crisis, there is a need to support SMEs in relation to the Green transition. The European Chemical Industry Council (CEFIC) has called for a number of measures to be taken to this end, namely:[616]

- Further R&D&I funding to address the main challenges towards the achievement of competitive low-CO2 processes in EIIs as well as adequate support for the testing of advanced low-CO2 technologies to improve market readiness.
- Achieving and maintaining globally competitive energy prices, including a sufficient, reliable and competitively priced low CO2 electricity supply to enable further electrification of industry.
- Financing schemes to support companies (particularly SMEs) refurbish old industrial facilities and modernise production processes.

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[612] IMF (2022). Beating the European energy crisis. Available at: https://www.imf.org/en/Publications/fandd/issues/2022/12/beating-the-european-energy-crisis-Zettelmeyer.

[613] Le Monde (2022). Germany finally nationalizes energy company Uniper. https://www.lemonde.fr/en/economy/article/2022/09/22/germany-finally-nationalizes-energy-company-uniper_5997850_19.html.

[614] German Ministry for Economic Affairs and Climate Action (2022). https://www.bmwk.de/Redaktion/EN/Pressemitteilungen/2022/07/20220714-5-billion-euros-aid-programme-launched-for-energy-intensive-industry.html.

[615] European Commission (2022). Press release. State aid: Commission approves €5 billion French scheme to support energy intensive companies in context of Russia's invasion of Ukraine. Available at: https://ec.europa.eu/commission/presscorner/detail/da/ip_22_4152.

[616] CEFIC (2018). Energy-Intensive Industries Call For An Ambitious EU Industrial Strategy To Help The Industry Better Contribute To The EU Long-Term GHG Goals. Available at: https://cefic.org/media-corner/newsroom/energy-intensive-industries-call-for-an-ambitious-eu-industrial-strategy-to-help-the-industry-better-contribute-to-the-eu-long-term-ghg-goals/.

- Technical and financial support for the creation of industrial clusters as an important tool in improving resource efficiency and thus reducing CO2 emissions of industrial facilities.
- Streamlining and further use of public procurement and low-CO2 standards for products to develop the European market for low CO2 products.

A.3.5. Textile case study

A.3.5.1. Ecosystem background

The textile ecosystem includes firms engaged in the **production of materials, intermediate goods and finished textile and leather products**. More specifically, the ecosystem-includes activities such as the transformation of natural (cotton, wool, flax, silk), man-made – artificial (viscose) or synthetic (polyester) – fibres into yarns and fabrics, the tanning of leather and fur production, and the manufacturing of a various range of finished products spanning from wearing apparel, footwear and accessories to home textiles, carpets and rugs. The ecosystem includes also the production of technical and industrial textiles (e.g. non-wovens) which are used for various industrial applications, both within and outside the ecosystem (e.g. agriculture, construction, automotive, electronics, healthcare, and even military sectors.). The production of certain textile products has become strategically highly important, especially since the outbreak of the COVID-19 pandemic.

The ecosystem is populated by over 220,000 companies and almost 1,900,000 employees (Table 32). With the notable exceptions of EU-headquartered global brands – which despite outsourcing most of their products also carry out some manufacturing activities in the EU – **the average size of companies in the ecosystem is small:** SMEs account for 99.6% of the total ecosystem's companies.[617]

Table 32. Data on the subsectors composing the EU textile ecosystem (2019)

Subsectors	Production	Turnover	Value added	Number of enterprises	Number of persons employed
	Million EUR	Million EUR	Million EUR	Units	Units,
01 - Man-made fibers	7,415	8,069	2,140	287	26,553
02 - Yarns	7,619	8,000	1,873	2,819	48,164
03 - Fabrics	22,096	22,575	7,101	15,304	167,911
04 - Tanned and dressed leather and fur	8,752	8,855	2,153	2,972	39,024
Manuf. of intermediate products	45,882	47,500	13,267	21,382	281,652
05 - Home textiles	18,703	19,958	5,841	26,659	184,857
06 – Technical & industrial textiles	21,623	23,500	7,121	15,097	147,752
07 - Textile wearing apparel and accessories	65,757	69,769	20,884	123,068	847,252
08 - Leather clothes and accessories	20,067	20,403	6,615	15,986	136,266
09 - Articles of fur	402	445	116	2,497	6,849
10 - Footwear	25,559	26,449	7,457	18,827	254,763
Manuf. of finished products	152,112	160,523	48,035	202,134	1,577,739
Total Textile Ecosystem	197,994	208,023	61,302	223,516	1,859,392

Source: European Commission. Data on the EU textile ecosystem and its competitiveness.

Wearing apparel and footwear production are the largest subsectors of the ecosystem. Technical and industrial textiles are considered promising and strategic because of the innovative content potential, leather and fur for their export potential (the EU is the leading world exporter of tanned leather and fur). The production of intermediate products (man-made fibers, yarns, fabric) accounts for around 25% of total ecosystem turnover. Some activities (e.g. knitwear factories) are progressively disappearing in the EU.

[617] European Commission (2021). Data on the EU textile ecosystem and its competitiveness. Available at: https://data.europa.eu/doi/10.2873/23948.

Italy, Germany, France and Spain hold the most prominent positions in the ecosystem across nearly all subsectors. They have the largest number of enterprises and produce the highest values in terms of production and turnover.[618] Moreover, the majority of the EU's leading brands operating in the ecosystem are headquartered in these countries. Central and Eastern European Member States specialise in more labour-intensive activities and generate a smaller share of turnover. Nonetheless, the main EU companies often locate certain production facilities in these countries. The textile **ecosystem has a strong territorial component**, being organised around clusters and industrial districts, as well as an **important social potential**, with a strong presence of female workers in the workforce.

The textile value chain is highly globalised. This enlarges EU companies' actual and potential markets but, at the same time, it exposes them to international competition. This holds true especially for finished products such as leather accessories, clothes, and footwear. While being strongly **export-oriented**, these subsectors also see a substantial **presence of extra-EU imports domestically**, particularly in the medium-low priced market segments. The production of intermediate products (yarns, fabric) is less outward-oriented and production is mainly destinated to satisfy the needs of the EU industry. At the same time, intermediate products manufacturing relies to some extent on **raw materials and components sourced outside the EU**. This is the case of raw cotton imported from Turkey, Pakistan and China, hides sourced in Brazil and the US, wool coming from China and Australia, man-made fibres from South Korea as well as dyes, resins and other chemical components mainly sourced from Asia.[619]

A.3.5.2. Key drivers of inflation within the ecosystem

The first driver of inflation in the textile ecosystem was the **rise of prices of raw materials and components** used in textile manufacturing that started during the COVID-19 crisis. More specifically, the main causes were:

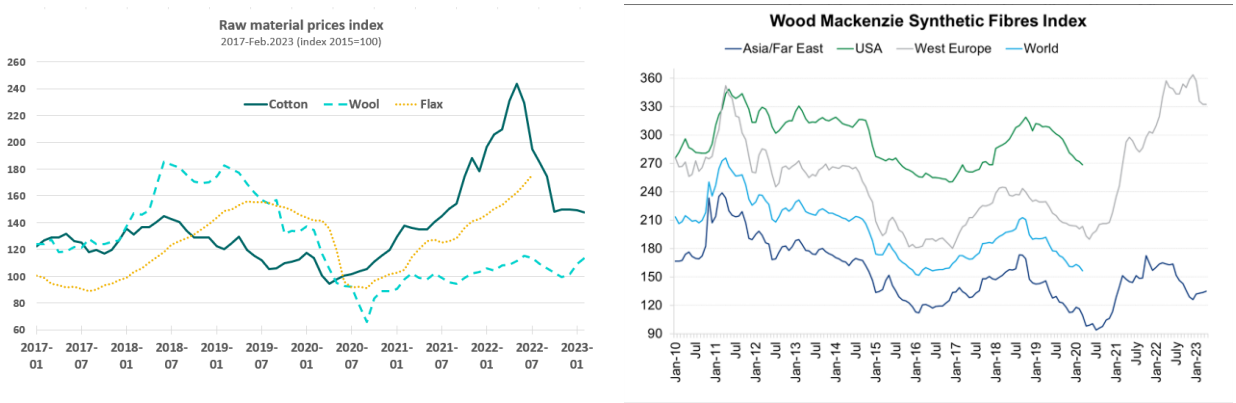
- **The supply chain disruptions** that caused scarcity of products and materials and consequently the increase of their prices across different ecosystems and supply chains. When looking at the textile ecosystem specifically, the following factors seem to have exacerbated the situation:
    - i) the marked presence of outsourcing activities of EU companies, particularly in the case of large brands in the apparel and footwear sector, relying on a global network of suppliers and increasing their exposure to GVC - Global Value Chains disruptions;
    - ii) the dependence of EU manufacturers on foreign suppliers for specific intermediate products and raw materials (e.g. combed wool, dyes[620] and chemical components) necessary for manufacturing activities and for which the EU offer was insufficient;
    - iii) the nature of clothes and footwear sales which, being seasonal, requires products to be available in due time on the market, thus forcing companies to accept price increases – even if high – from their suppliers, since contract clauses and penalties could be extremely severe.

[618] European Commission (2021). Data on the EU textile ecosystem and its competitiveness. Available at: https://data.europa.eu/doi/10.2873/23948.
[619] *Ibid.*
[620] European Commission (2022). Annual Single Market Report 2022. Commission Staff Working document. P.12. Available at https://ec.europa.eu/docsroom/documents/48877.

- **Higher transportation and logistics costs**, including road transport but especially sea transport, which made the final price of products on the EU market even more expensive. The main extra-EU sources for the textile ecosystem are Asian countries (not only China, which is the most important trading partner, but also Vietnam, Pakistan, India, South Korea). The transport cost of a container from Asia increased by three digits in 2021 (e.g. the Shanghai-Rotterdam Drewry Container Index, which is an indicator that tracks the freight costs of 40-foot containers via major routes, increased from USD 2,186 to USD 14,807 in the period October 2020-October 2021) and it remained high also for most of 2022.[621]
- **The weakening of the Euro** in 2021 and 2022, which made purchases in dollars more expensive for EU companies compared to competitors.

Prices of both **natural and man-made fibres** increased substantially and, despite now decreasing, they are generally still above the pre-crisis levels (see Figure 89)**. Prices of chemical components** used in production have also strongly increased (e.g. price of dyes and pigments increased by +20.8% in 2022).[622]

Figure 89. Price Index for a selection of raw materials used in the textile industry



Source: EURATEX processing of INSEE and CELC data; Wood Mackenzie.

In addition to the current inflationary context, some additional specific dynamics affect raw material prices: as for wool, the offer is rigid (it takes several years to increase the size of flocks); for hides, the reduced supply of cereals caused by the Russian war of aggression against Ukraine impacted on livestock farming activities and the availability and quality of skins, and for synthetic fibres, they are subject to high volatility linked to the oil prices.

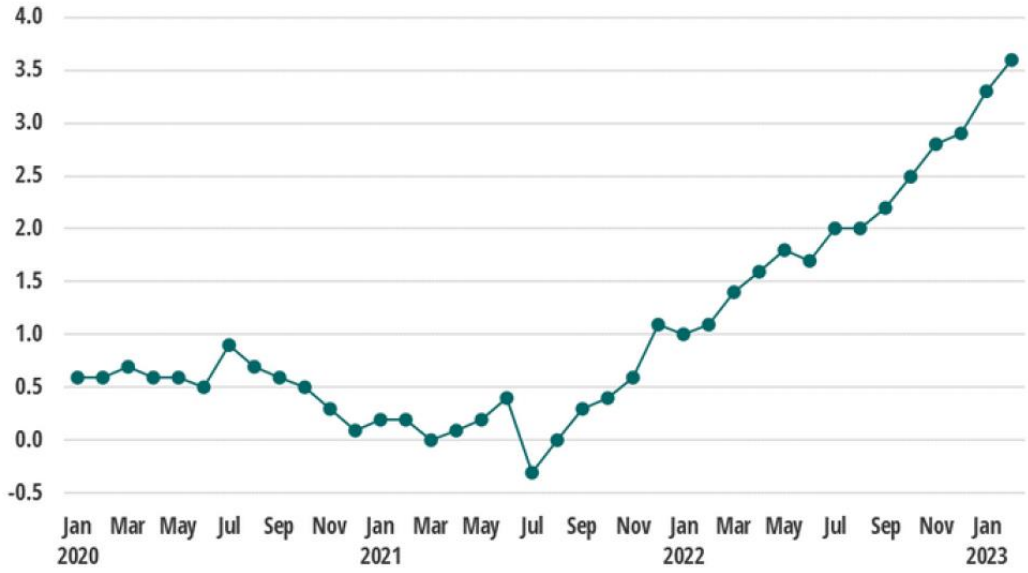
The second driver of inflation was the rise of energy prices on production and transport costs, which started in mid-2021 and was exacerbated after the Russian military aggression against Ukraine. As a whole and compared to other ecosystems, the textile sector is not an energy-intensive one; still, significant differences exist within its subsectors (e.g. the average purchases of energy/production ratio is 0.6% in clothes manufacturing and up to 4.9% in finishing of textiles activities).[623] **The impact of rising energy prices was thus differentiated along the value chain and, according to the feedback from interviews, it was clearly visible in the more energy-intensive subsectors/activities**, such as the production of man-made fibres, technical textiles, finishing processes of dying and printing, etc. The impact was high also in the leather processing subsector.

[621] Drewry World Container Index Database. Available at: https://en.macromicro.me/collections/4356/freight/44756/drewry-world-container-index.
[622] EURATEX Economic Update, Fourth quarter 2022- provided to CSIL in April 23.
[623] Eurostat. Purchases of energy products - industry and construction (sbs_pu) by NACE codes.

The factors above caused an **increase in production prices within the ecosystem**: +7% and +23% for EU production of man-made fibres respectively in 2021 and 2022; +2.4% and 10.8% for textile products (yarn, fabrics), +0.6% and +3.9% for clothes.[624] Interestingly, so far, **production price increases have been higher upstream in the value chain** (fibres, yarn, fabrics production) where raw material and energy costs have a higher incidence, if compared to **downstream segments** (clothes manufacturing).

Finally, **consumer prices for final products continued to increase in 2022** as shown in Figure 90, contributing to an increase in the inflationary pressure on consumers (e.g. HICP prices for clothes increased by over 3% during 2022).

Figure 90. HICP – Consumer Prices of clothing – Monthly data (12-month average rate of change)



Source: EURATEX Economic Update, fourth quarter 2022 - provided to CSIL in April 23.

A.3.5.3. Key impacts of inflation on the ecosystem

Despite the textile manufacturing activities rebound of 2021 and 2022 (after the 2020 drop caused by the COVID-19 pandemic), the general increase of prices of energy, transport costs, and the higher-than-usual price of inputs placed and are still placing a great strain on companies. This holds true, particularly, in the high energy-intensive sectors manufacturing intermediate products, but it might progressively extend downstream because of deteriorating market conditions in the context of high inflation and reduced consumers' purchasing power, particularly in the middle-low market segment.[625] Non-luxury fashion sales are forecast to grow between negative 4 percent and positive 1 percent in Europe in 2023. [626] Data from March 2023 also show that business confidence is worsening along the textile and clothes value chain.[627]

Management of production complexities due to supply disruptions and recent price increases, the uncertainty in the macroeconomic context foreseen for the next few years, and limited access to finance - particularly for SMEs - seem to be causing a postponement or a reduction in the size of investments including in new technologies and in green transitions which are

[624] EURATEX Economic Update, fourth quarter 2022 - provided to CSIL in April 23.
[625] Irish Times (2022). H&M profits fall to a tenth of last year's level as inflation and consumer caution hit. Available at https://www.irishtimes.com/business/2022/09/29/hm-to-cut-costs-as-profits-hit-by-inflation-cautious-shoppers/.
[626] McKinsey&Company (2022). The state of fashion 2023. Available at: https://www.mckinsey.com/industries/retail/our-insights/state-of-fashion.
[627] EURATEX Economic Update, Fourth quarter 2022.

perceived at the same time to be a potential driver of growth and competitiveness. Additionally, the international competitiveness of EU companies might decrease and the debate on the convenience of producing in the EU might exacerbate.

A.3.5.4. Detailed impacts of inflation on SMEs

Payment practices and propensity to make payments late

Within the ecosystem, **inflation seems to have a limited specific impact on delaying payments**. However, according to the feedback from interviews, payment delays might be reasonably more impactful for those companies that already face a longer collection period, such as:

- Companies operating in the B2B sector if compared to those operating B2C: while B2C deals are generally paid instantly or at the end of the work, business customers often expect to be able to pay in instalments, per stage or with net terms because of the high volume of transactions, which extends the full payment period.[628]
- Companies sourcing raw materials and components from non-EU suppliers, generally setting payments at 30-60 days, but selling products to EU companies where payment terms are generally longer (with the EU average at around 80 days – see Section 4.1 in the main report). Tanneries sourcing hides in North America and selling leather to the EU furniture industry, firms purchasing wool in Australia and selling yarns to EU clothes manufacturers are examples of companies that might, more than others, suffer from a delay of payments in the EU.

Participation in public procurement

The role of public procurement as a demand generator for textile products seems to have increased in recent years. This was the case of demand for healthcare textile products (e.g. protective equipment) following the COVID-19 outbreak[629] and, apparently, at present also the demand for textile and leather products from the defence industry (uniforms, leather boots) as indicated by a sector expert and a sector association. Demand from the defence sector has also been indicated as a potential driver of innovation in some specific segments (e.g. lightweight and bulletproof garments).[630]

This potential market has attracted the interest of companies operating in the EU textile ecosystem but the stiff price competition in this segment seems a factor discouraging participation. The current inflationary context seems to put further pressure. One interviewed SME producing uniforms and workwear that compete in bids with extra-EU players directly or indirectly (by way of importers/wholesalers located in the EU) argued that the present inflationary context worsens the situation of EU manufacturers for which costs are higher if compared to those of Asian competitors.

This discouragement due to the inflationary effect is higher for the most price-sensitive segments, and lower for products that require high customisation or technical content.

Adoption of sustainable practices

[628] https://www.evolvepayment.com/blog/difference-between-b2b-and-b2c-payments/.
[629] European Commission (2022). Scenarios towards co-creation of a transition pathway for a more resilient, sustainable and digital textiles ecosystem, p. 5-7. Available at https://ec.europa.eu/docsroom/documents/49360
[630] European Commission (2021). Annual Single Market Report 2021. Commission Staff Working document, p. 171. Available at https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52021SC0351

The inflationary context did not have (so far) a clear negative effect on the adoption of sustainable practices but it seems to be undermining its future development.

The attention to the green transition remains high, but **how to finance it** is increasingly a concern (e.g. in a recent survey conducted within the EuroBoosTEX project to a sample of companies – mainly SMEs: i) the **green transition was the top challenge** companies are considering to tackle, ii) **need for financial support to achieve it was mentioned by two thirds of the surveyed companies**).[631]

Companies' awareness of the importance of having sustainable products in their catalogues remains also high, as it is perceived as a competitive advantage in front of competitors, particularly from outside the EU. Still, it is argued (according to a sector expert) that the management of production complexities due to supply disruptions and recent price increases might have contributed to some demotivation in the implementation of sustainable production. Postponement of investments in green transition because of short-term challenges seems to be occurring and this could deteriorate further in the context of a slowdown of demand for textile products. The effects have different intensities within the ecosystem. The fatigue seems to be higher for small companies producing on behalf of large fashion brands and particularly for those for which sustainable product label was mainly intended as marketing leverage to enter/to remain in the brands' supplier network (and increase sales) instead of being a long-term strategy.

Adoption of new technology

Similar to the above, the adoption of advanced technologies is perceived by EU textile manufacturers as key to obtaining high product quality and more sustainable and safe products, which are relevant competitive advantages to exploit. Innovation (e.g. for more efficient management of machinery) has been perceived as a strategic investment, particularly in this period of high production costs. Still, according to the interviews conducted, companies' approach seems to prefer incremental innovation, requiring small investments, the value of which is carefully verified (e.g. in cost saving thanks to improvements in energy efficiency). More significant investment plans are currently postponed.

Profitability and turnover

After the 2020 drop, companies across the ecosystem saw turnover growth again. This growth (similar to other ecosystems) was driven by prices more than by output volumes.[632]

Companies' turnover and profitability results depended on multiple factors, including the possibility of passing their increasing production costs to clients (without losing them), which in turn depends on the market served and the position in the supply chain occupied.

Turnover growth did not necessarily imply profitability growth. Updated official data on companies' margins are not available but, according to the interviews, a squeeze on margins might have occurred, particularly upstream of the value chain where the incidence of cost in manufacturing is higher.

Wage growth rate

Salary increases were differentiated across EU countries, with a high impact in Belgium and Portugal because of the indexation of salaries in those countries. The collective agreement

[631] European Cluster Collaboration Platform (2022). Joint European Initiative in Textile Industry for Europe's recovery boosting digital and green transition. Market Study, gaps and needs analysis. Available at https://clustercollaboration.eu/community-news/euroboostex-market-study-useful-guide-embrace-european-textile-industry-twin.
[632] EURATEX Economic Update, Fourth quarter 2022.

renewal was also mentioned by a sector association as one of the causes of salaries increases in Spain.[633]

Discussion on minimum wages seems to exacerbate wage growth concerns among firms in Eastern Europe, where the pressure to adjust salaries to inflation is high. At the same time, companies, particularly SMEs manufacturing for large fashion brands, which directly compete with (low-cost) Asian suppliers, fear that any increase in wages could negatively impact on their competitiveness.

More generally, interviewees argued that substantial-high salary increases could make SMEs less competitive on the global context. Since outsourcing strategies are less frequently implemented, wage growth would become a fixed cost that companies have to absorb.

Access to skilled labour

Availability of skilled labour is a structural issue in the textile and leather industries. Low-skilled workers comprise 30-40% of the workforce, and another 50-60% of workers are classified as medium-skilled.[634] The share of young employees employed in the textile ecosystem is falling, and the ecosystem is facing an ageing trend. **These are structural trends affecting the ecosystem and not associated with the present inflationary context.**

Hiring low-skilled labour is also an issue because of the competition, now becoming more pressing, with other sectors (e.g. logistics) which offer precarious jobs, but at higher salaries that the EU textile industry cannot offer without losing its global competitiveness (e.g. in the leather processing segment).

Bankruptcies and insolvencies

No specific evidence of an increase in bankruptcies and insolvencies was found for the textile ecosystem, but both the two main EU sector associations operating in the ecosystem argue that the current situation is putting the survival of companies, particularly SMEs, at risk and the number of bankruptcies, if not increasing yet, will do so in the near future. In order to avoid bankruptcies and insolvencies, some companies both in the leather and textile sector are likely to take the decision to **stop their manufacturing activity**. The textile association also mentioned that **some companies have already decided to temporarily stop or reduce production in Europe**, as a survival strategy.

Access to finance and capacity to repay loans

Access to credit and finance seems to be a structural problem for SMEs, which can worsen in the context of high-interest rates. Within the ecosystem, there are companies for which the cycle for financial return could be rather long (e.g. 9 to 12 months from the purchase of raw material to the sales of the finished product) and SMEs are more exposed if they cannot finance purchases with their own capital. The relevance of this factor became even more important in the last few years (2021 and 2022) with the exceptional boom in activities that many sector companies faced for which having access to credit was crucial.

Start-up and scale-up activity

No evidence of a specific trend.

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[633] Additional information available from ERICA- Repository for the European Leather Industry's Collective Agreements available at https://euroleather.com/national-information.

[634] European Commission (2021). Data on the EU textile ecosystem and its competitiveness – Final Report – Available at: https://data.europa.eu/doi/10.2873/23948.

International competitiveness

The international competitiveness of textile EU productions has been recently undermined by the direct and indirect effects of inflation.

- The estimated **impact of energy cost on the EU textile industry was higher than in the case of competitors**. It was estimated at 6 times higher than in US and China, undermining the attractiveness of EU as a manufacturing base for textile products.[635]
- **EU export prices** of several types of textile products (e.g. home textile, technical and industrial textile), which **have been growing faster** than its main international competitors already before 2019, further increased recently, also because of production prices increases. (e.g. unitary export prices of EU clothes increased by 50% in 2022).[636]
- Inflation is reducing the purchasing power of EU consumers. **Price-sensitive demand is moving towards cheaper segments where non-EU products are generally more price-competitive** if compared to EU productions (sales of luxury products are instead expected to perform better).[637]
- The sector expert interviewed argued that the increase in prices of raw materials and components was an issue mining EU textile competitiveness, but not as much as the **lack/limitation of access to raw materials due to supply chain disruptions** (e.g. the US textile industry was less exposed to raw materials scarcity because, for example, it is self-dependent for cotton as it sources it domestically).

Energy production and energy consumption

Interviewees (both associations and SMEs) generally agreed on the fact that easy energy efficiency gains to reduce energy consumption have generally been implemented by companies before or during the energy crisis. At the same time, they seem to be convinced that more drastic actions to reduce energy consumption would require the purchase of expensive state-of-the-art energy-efficient machinery, which is at the moment generally postponed because of the current context.

A.3.5.5. Passing costs onto consumers

The textile industry experienced a significant decline in 2020 as the demand for clothes and footwear (its main subsectors) contracted sharply due to the lockdowns imposed by the COVID-19 pandemic. The rebound of manufacturing activities started in 2021 and continued in 2022, stimulated by recovering consumers' demand but also by the much more limited presence of Chinese products on the EU and global markets (because of the country's COVID-19 containment measures), which left room for the growth of EU producers. **In this context of higher demand, companies generally were able during 2021 and 2022 to pass costs to the subsequent step of the value chain**.

- As highlighted by interviewees, companies upstream (B2B) of the value chain were able to pass costs. The demand for yarns and fabric in the EU was high (also because

[635] Euratex (2022). The EU textile industry is highly concerned about the potential loss of competitiveness caused by the EU's inaction of the energy crisis, and the Chinese and Us subsidies to domestic industry. Available at https://euratex.eu/news/the-eu-textiles-industry-is-highly-concerned-about-the-potential-loss-of-competitiveness-caused-by-the-eus-inaction-of-the-energy-crisis-and-chinese-and-us-subsidies-to-domestic-industry/.

[636] European Commission (2021). Data on the EU textile ecosystem and its competitiveness – Final Report – Available at: https://data.europa.eu/doi/10.2873/23948.

[637] McKinsey&Company (2022). The state of fashion 2023. Available at: https://www.mckinsey.com/industries/retail/our-insights/state-of-fashion.

of some lack of Asian products) and companies were able to pass costs to wearing apparel manufacturers. Companies implemented two (or even more) times a year price increases in their catalogue.

- Companies downstream (B2C) were able to pass costs to final consumers directly or indirectly (through retailers) also thanks to the ability to mask these increases by adapting their commercial strategies and product mix. These companies' strategies are becoming even more relevant in order to protect margins in a context of inflationary pressures.[638]
- Passing costs was easier for leading high-end brands than for companies operating in price-sensitive segments (e.g. workwear, home textile). When LVMH, Kering and Chanel presented their annual results in early 2022, they clearly indicated they would be revising upwards their most iconic products' prices repeatedly during the year.[639]

A.3.5.6. Future outlook

The drop and sudden rebound of production and demand in the 2021-2022 period was exceptional and far beyond the economic cycles that the textile sector has been used to facing. The interviewed sector companies and trade associations expect a **progressive and gradual decrease in raw material prices and energy costs** providing some relief along the supply chain and the manufacturing sectors. However, **price levels are expected to remain higher than historical pre-crisis ones, and also comparatively higher than those faced by extra-EU competitors**.

The attention is also put on **consumer prices which are expected to remain high and might discourage the demand for textile products on the final market**. Interviews indicated that, so far, price variation for wearing apparel, footwear, and accessories have been accepted by consumers, but this could not be the case in the future.

In the context of higher-than-normal prices and a slowdown of demand, the pressure on the value chain will remain high and impact several aspects of its functioning, including the following aspects:

- An **exacerbation of the debate on raw material sourcing**, questioning the sourcing of (cheap) raw materials from outside the EU to reduce manufacturing costs of final products and making the EU textile industry more competitive vs the need to build up/strengthen the supply chain within the EU. Dual interests are reported along the supply chain.
- **Location of production and outsourcing strategies evolution**. With the reactivation of nearshoring strategies during the recent COVID-19 disruptions, the potential relevance of certain players (e.g. Turkey for the proximity to the EU and for access to lower cost of energy) or North African countries (Tunisia, Morocco and Egypt) as alternative sources to Asia became more evident. These trends are not expected to dissolve in the short term.
- **Distribution of costs and profits along the value chain.** A fairer distribution of costs and profits between large brands and their suppliers will be critical for the survival of companies, particularly SMEs as the first, in order to be competitive globally, are more

[638] McKinsey & Company (2022). How the apparel industry can ADAPT to inflation. Available at https://www.mckinsey.com/capabilities/growth-marketing-and-sales/our-insights/how-the-apparel-industry-can-adapt-to-inflation.
[639] Fashion Network (2022). Caught between inflation and rising costs, fashion seeks to strike new balance. Available at https://ww.fashionnetwork.com/news/Caught-between-inflation-and-rising-costs-fashion-seeks-to-strike-new-balance,1424510.html.

and more exigent in terms of quality and sustainable content of products and the latter are squeezed by high production costs.

A.3.5.7. Existing ecosystem-specific policy measures to help SMEs

Ecosystem companies benefit from the general measures for SMEs as well as state aid (e.g. in Italy)[640] but no ecosystem-specific policy measures were generally implemented at the national level.

The EU has taken action to support sustainable investments in the textile ecosystem, to make it greener but at the same time more competitive. The following two initiatives can be mentioned:

- CISUTAC is a 4-year Horizon Europe project. It aims to support the green transition path for the textile sector, coherently with the EU Strategy for Sustainable and Circular Textiles (March 2022). Started on September 2022 and led by Centexbel, the Belgian research centre for textiles and plastics, the CISUTAC consortium is EU-wide including global leading brands and companies (including SMEs), civil society organisations, research and technology organisations and EU associations. The main objective is to run demonstration pilots of industrial applications of new technologies for textile circularity, and favour the wider uptake of these technologies thanks to capacity development and dissemination actions[641].
- RegioGreenText is a three-year project, started in February 2023, supported by the European Commission Interregional Innovation Investments Instrument and coordinated by the European Innovation Council and SMEs Executive Agency. The project is led by EURATEXT and brings together 43 partners from 11 European regions, including 24 SMEs pioneering innovative solutions to recycle textile waste. The goal is to develop innovative solutions for textile recycling, bring them to commercialisation so as to make the EU textile value chain more competitive and resilient. As such, this measure can potentially support the textile ecosystem transition to a more sustainable model.[642]

The impacts of these projects on SMEs (not directly participating in the projects) can be seen only in the longer run.

A.3.5.8. Possible additional measures that would help SMEs

- The highest priority seems to be put by business associations and SMEs interviewed on the need for an improvement of the **regulatory framework**, which should be carefully designed to achieve fair competition and transparency (inc. on sustainability, on supply chains traceability) thus granting a level playing field for EU companies. This becomes even more important in the textile ecosystem because of the high extent of global competition to which EU companies are subject to and because of the high potential of this sector in driving the green transition. The need for **more green criteria in public procurement** of textile products or the **revision of EU Emissions Trading System** (EU ETS) were mentioned as examples. The need for **export restrictions on**

[640] PubAffairs Bruxelles (2021). State aid: Commission approves €245 million Italian scheme to support the textile, fashion and accessories sector in the context of the coronavirus outbreak. Available at: https://www.pubaffairsbruxelles.eu/eu-institution-news/state-aid-commission-approves-e245-million-italian-scheme-to-support-the-textile-fashion-and-accessories-sector-in-the-context-of-the-coronavirus-outbreak/.
[641] See: https://www.cisutac.eu/.
[642] See: https://euratex.eu/news/projects-recycle-textile/.

EU raw materials were also mentioned by representatives of the leather industry, which is also suffering from international competition.

- **Supporting access to credit and finance** is a priority for all SMEs. Finance and credit are structural problems that are expected to worsen in the context of higher interest rates. According to a sectoral expert interviewed, SMEs' financial leverage to absorb rising costs (of materials, of energy, of labour, of money) are limited, particularly after the recent crisis years. SMEs struggling to access the EU funds is also perceived as a challenge (the textiles ecosystem is underrepresented in EU research and innovation programmes).[643]

- **Measures to support investments in technological innovation**. Only marginal improvements in production processes were operated in recent years and investment plans were generally postponed. The need for a dedicated investment scheme for the purchase of energy efficient state-of-the art machinery (at present generally purchased by Asian companies and not by EU ones) was mentioned as an example by the sector association. The role of emerging technologies, such as digital precision technologies, in improving the efficiencies of industrial processes and reduce the carbon footprint of e-commerce (by reducing the percentage of returns) is also mentioned in the EU Strategy for Sustainable and Circular Textiles.[644]

- **Measures to support the green transition.** Leading fashion brands put pressure on their suppliers, including EU SMEs, to increase the sustainability content of their products and processes. As such SMEs play a crucial role in implementing the transition towards sustainable and circular textiles, but at the same time they are heavily affected by the additional costs of the ecological transition.[645] The Commission adopted in March 2022 the first EU Strategy for Sustainable and Circular Textiles.

- **Measures to create and support skilled labor**. The lack of a skilled workforce is a structural problem for the textile ecosystem, but at the same time the ecosystem requires a highly skilled workforce to unlock the potential for the employment opportunities brought by the digital and green transitions. Reskilling and upskilling workers, integrating green and digital skills and improving the attractiveness of the sector are indicated as priorities in the TCLF -Textile, Clothing, Leather and Footwear - Pact for Skills.[646] Areas such as eco-design, fibre development, innovative textile production will become more and more important.[647] Skilled workers with advanced technology and digital knowledge will be in particularly high demand.[648] The need for coordination between educational institutions and companies and actions to attract workers were mentioned as an example. The presence of already established and consolidated textile clusters was mentioned as a factor that could be further exploited to this end.[649]

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[643] European Commission (2022). Scenarios towards co-creation of a transition pathway for a more resilient, sustainable and digital textiles ecosystem, p. 12. Available at: https://ec.europa.eu/docsroom/documents/49360.

[644] European Commission (2022) EU Strategy for Sustainable and Circular Textiles, p. 4. Available at: https://eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=CELEX:52022DC0141.

[645] SME United (2022). SME United's views on the Strategy for Sustainable and Circular Textile. Available at: https://www.smeunited.eu/publications/smeuniteds-views-on-the-strategy-for-sustainable-and-circular-textiles.

[646] EURATEX (2021). Pact for Skills for the EU TCLF industries. Available at: https://euratex.eu/wp-content/uploads/TCLF-Pact-for-Skills-FINAL-v1.pdf.

[647] European Commission (2022) EU Strategy for Sustainable and Circular Textiles Available at: https://eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=CELEX:52022DC0141.

[648] European Commission (2020). Technological trends in the textiles industry. Available at: https://op.europa.eu/en/publication-detail/-/publication/4ce54c78-d5f9-11ea-adf7-01aa75ed71a1/language-en.

[649] European Cluster Collaboration Platform (2022). Joint European Initiative in Textile Industry for Europe's recovery boosting digital and green transition. Market Study, gaps and needs analysis. Available at: https://clustercollaboration.eu/community-news/euroboostex-market-study-useful-guide-embrace-european-textile-industry-twin.

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