The COVID-19 Impact and Fiscal Policy Response on EU Small and Medium-Sized Enterprises:

A PUBLIC POLICY PERSPECTIVE

THE LONDON SCHOOL OF ECONOMICS AND POLITICAL SCIENCE

#BelieveInSmall

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ARDL	Auto-Regressive Distributed Lag
ECDC	European Centre for Disease Prevention and Control
EEA	European Economic Area
EIB	European Investment Bank
EIF	European Investment Fund
ESRB	European Systemic Risk Board
EU	European Union
Eurostat	Statistical Office of the European Communities
GDP	Gross Domestic Product
IMF	International Monetary Fund
LSE	London School of Economics and Political Science
MAR	Missing at Random
Mid-caps	Middle Capitalization Companies
NACE	*Nomenclature statistique des activités économiques dans la Communauté européenne* (Statistical classification of economic activities in the European Community)
OECD	Organization for Economic Cooperation and Development
OxCGRT	The Oxford COVID-19 Government Response Tracker
SME	Small or Medium-sized Enterprise
WHO	World Health Organization

Executive Summary

The COVID-19 pandemic and the restrictions to contain the spread of the disease, coupled with widespread economic uncertainty, represented an unprecedented economic shock to businesses worldwide. Within the European Union (EU), Small- and Medium-sized Enterprises (SMEs), comprising over 99% of the EU corporate population, disproportionately suffered the pandemic's economic impact. SMEs struggled with a decline in consumer demand, disrupted supply chains, and acute liquidity shortages.

To support SMEs and protect the regional economy, EU policymakers implemented unprecedented fiscal measures at both national and EU levels. These measures included emergency lifeline provisions such as loans and credit guarantees, demand support mechanisms such as subsidies and tax reductions, along with legislative reforms to prevent mass business closures. While these fiscal interventions garnered widespread acknowledgment for their efficacy in mitigating SME bankruptcies, disparities in policy effectiveness and unintended consequences on business dynamism underscore the critical need for a nuanced examination of their impact on SME creation dynamics within the EU economy.

Objective & Contributions

Existing literature on the impact of COVID-19 and the fiscal policy response in the EU focuses on SME bankruptcies, while ignoring the effects on firm creation. Furthermore, the limited research available relies on simplistic assumptions in ex-ante simulations of the COVID-19 impact and uses early pandemic data only. This report aims to fill this research gap by gathering empirical data ex-post and analysing the effect of COVID-19 and the fiscal policy response on both SME bankruptcy and creation rates in the EU. The ultimate objective is to inform EU policymakers in enhancing SMEs' resilience for both current and future challenges.

Our analysis provides three main contributions that build upon the work from Julien Brault's *Recent Trends in EU Corporate Demography and Policy: COVID and Beyond* (2023):

1. Improved Data: With cell calibration, we improve the accuracy of the SME bankruptcy and creation rates in the Orbis dataset, the main data source used in Brault (2023). In particular, we make the data more representative of the true EU corporate population.

2. COVID-19 Impact on SME Population: With this new, more representative data, we update Brault's (2023) analysis on the COVID-19 impact on SME bankruptcy and creation rates. We apply a difference-in-differences inspired methodology with data extending until December 2022.

3. Fiscal Policy Impact: We assess the effectiveness of the fiscal policy response to COVID-19 by isolating the correlation between fiscal policy deployment and SME bankruptcy and creation rates in the EU between March 2020 and December 2022. We apply panel data regression models that control for the COVID-19 intensity, governments' containment measures, and amendments to bankruptcy laws.

Findings & Key Results

1. Cell calibration successfully improves the representativeness of SME creation rates in the data but does not meaningfully increase the SME bankruptcy rates to align with the true EU corporate population. This signals the presence of survey selection bias, which future research should address.

2. After the pandemic began in March 2020 and until December 2022, the SME population shrunk by 0.9% — equivalent to approximately 430,000 missing SMEs in the EU.

    - The decline resulted from a lack of SME creation, while the region witnessed lower bankruptcy rates with respect to historical trends.

    - COVID-19 impacted countries and firm age categories heterogeneously, and to a lesser extent, sectors.

    - Only the youngest firms (aged 0-2 years old) experienced an increase in bankruptcy rates during the pandemic.

3. The fiscal policy response to COVID-19 effectively protected SMEs from bankruptcy in the EU but did not promote the creation of SMEs.

- On average, a 1% increase in fiscal policy deployment assisting enterprises is statistically significantly associated with a 2.4% decrease in SME bankruptcy rates.

- Emergency lifeline measures, mainly loans and credit guarantees, drove fiscal policy effectiveness in reducing SME bankruptcies.

- The fiscal policy response did not address the uneven distribution of the COVID-19 impact and did not benefit younger SMEs as much as older firms.

Policy Implications

While our results do not establish causality, our analysis of the COVID-19 impact and the effects of fiscal policy deployment on the SME population provide useful lessons for EU policymakers to enhance pandemic recovery efforts and better respond to other current and future crises.

- Devote recovery funds to promote entrepreneurship and the creation of new SMEs, to revitalise the currently stagnant entrepreneurial SME ecosystem in the EU. Implement OECD guidelines and loan subsidies reducing the cost of credit for new start-ups.

- Reduce information and access barriers to improve take-up of fiscal policies, especially among start-ups, given the disproportionately negative impact of COVID-19 on the youngest SMEs.

- Enhance policy targeting towards the most vulnerable countries, sectors, and firms to mitigate the unequal impact of economic shocks such as COVID-19 by enhancing governments' practice of monitoring and evaluation and avoiding universalist programs.

- Find a balanced approach between safeguarding firms from bankruptcies and implementing policies that promote firm creation to maximise business dynamism, increase employment opportunities, and promote sustainable economic growth in the EU.

1. Introduction

Background and Research Justification

On the week of March 11, 2020, the World Health Organization (WHO) declared that "COVID-19 can be characterised as a pandemic"[1]. The COVID-19 pandemic and the associated public measures to contain the spread of the disease induced a rapid transformation of citizens' lives worldwide. This report delves into the economic consequences of the COVID-19 pandemic, which also constituted unprecedented external economic shock that contracted global output by 3.4% in 2020 (OECD, 2021).

Enterprises battled with a decline in demand, disruptions to supply chains and production, and liquidity issues. Among all firms, Small- and Medium-Sized Enterprises[2] (SMEs) suffered disproportionately, as they were overrepresented in the most vulnerable sectors, and grappled with smaller cash buffers, worse access to finance, weaker supply chain capabilities, and fewer operational skills (OECD, 2021). In the EU, SMEs represent the backbone of the economy, accounting for 99.8% of businesses, 65% of employment (approximately 100 million people), and over half of the GDP (Eurostat, 2023).

In the EU, the fiscal policy response to COVID-19 was also unprecedented. It focused on SMEs, recognising their relevance (IMF, 2020). National authorities offered generous liquidity support measures, and in most cases temporarily modified laws to defer bankruptcy proceedings. At the supranational level, the EU three safety nets, worth €540 billion, included provisions like the €25 billion EIB Pan European Guarantee Fund for SMEs and the NextGen EU package to complement the aid provided by national governments (Mileusnic, 2023).

Four years after the WHO's declaration of the pandemic, assessing the impact of the COVID-19 shock and the subsequent fiscal policy responses on the population of SMEs in the EU remains crucial for policymakers to address ongoing and future challenges. Following the COVID-19

[1] Speech transcript at https://www.who.int/director-general/speeches/detail/who-director-general-s-opening-remarks-at-the-media-briefing-on-covid-19---11-march-2020

[2] SMEs are enterprises which employ fewer than 250 staff, and have an annual turnover below 50€ million, and/or an annual balance sheet total below 43€ million. Within this category, small enterprises employ fewer than 50 staff, and have an annual turnover and/or balance sheet total below 10€ million (EU recommendation 2003/361).

crisis, SMEs in the EU faced subsequent shocks, including the energy crisis triggered by Russia's invasion of Ukraine in February 2022. The energy crisis exacerbated energy prices, inflation, and supply chain disruptions (Camonita et al., 2022). This highlights the critical role of empirical evidence in guiding policymaking aimed at enhancing SMEs' resilience and, in turn, promoting employment and economic growth in the EU.

The existing literature on the impact of COVID-19 and consequent fiscal policy response on EU SMEs is scarce and presents some limitations. Notably, the literature tends to focus narrowly on SMEs' propensity for bankruptcy during the pandemic, while overlooking SME creation. However, bankruptcy and creation rates collectively influence the total SME population. Moreover, much of the available research needs to be interpreted with caution, since it relies on early pandemic data and simplistic assumptions in ex-ante simulations of COVID-19 impacts.

Objective

This report seeks to address these research gaps by analysing empirical data ex-post (i.e., after COVID-19 happened) to understand the COVID-19 impact and the effects of fiscal policies on SME bankruptcy and creation rates, which shape the SME population in the EU. We build on Brault's *Recent Trends in EU Corporate Demography and Policy: COVID and Beyond* (2023), the first attempt in the literature to analyse *both* SME bankruptcy and creation rates during the pandemic. Brault (2023) applied a modified difference-in-differences (diff-in-diffs) approach to assess the impact of COVID-19 on EU SME bankruptcy and creation rates between March 2020 and March 2021, compared to historical averages obtained between 2015 and 2019.

We expand upon Brault's (2023) analysis through three contributions. First, we implement a methodology called 'cell calibration' to provide more representative data on SME bankruptcy and creation rates within the EU. This refined dataset, extended until December 2022, enables us to enhance and update the diff-in-diffs analysis of the COVID-19 impact on SME bankruptcy and creation rates. Our third contribution addresses a limitation of the diff-in-diffs method, which encompasses all events post-March 2020 under the COVID-19 impact, including the pandemic itself, governmental containment measures, and various public policy responses.

In our third contribution, we aim to untangle the effects of the fiscal policy response on the SME population to better understand the role of fiscal policies during the pandemic. Alongside

data capturing the weekly evolution of SME bankruptcy and creation rates, we incorporate weekly information on all fiscal policies implemented in the EU from March 2020 to December 2022. Subsequently, we employ panel data regression models to discern the correlation between the fiscal policy response and SME bankruptcy and creation rates. This analysis includes control variables such as the COVID-19 death rate, governmental containment measures like lockdowns, and the presence of temporary amendments to bankruptcy laws.

Research Questions

This report takes stock of the evolution of SME bankruptcy and creation rates in 24 EU countries from March 2020 to December 2022, and evaluates the effectiveness of fiscal policy responses aimed at mitigating the COVID-19 shock. Informed by our findings, we offer useful policy recommendations for both national authorities and EU institutions like the European Investment Fund (EIF), the leading risk finance provider for SMEs in the EU, to enhance SME resilience in the face of the current and future crises.

- What was the impact of COVID-19 on SME bankruptcy *and c*reation rates in the EU? How did the impact vary across countries, sectors, and firm age? How did these channels ultimately impact the population of SMEs in the region?
- What role did the fiscal policy response play in mitigating the impact of COVID-19 on SME bankruptcy creation rates in the EU? How did this role vary across sectors and firm age?
- What policy implications can we draw from these findings?

Outline

The remainder of the report is organized as follows. Section 2 reviews the existing literature on the effects of COVID-19 and the consequent fiscal policy response on EU SMEs. In Section 3, we describe our three main contributions and the empirical framework that structures them. Section 4 outlines the primary datasets used for our empirical analysis. Sections 5 and 6 detail the methodology and findings, respectively, of each of our three contributions. Finally, in Section 7, we conclude with the policy implications derived from our findings.

2. Context: A Review of the Current Literature

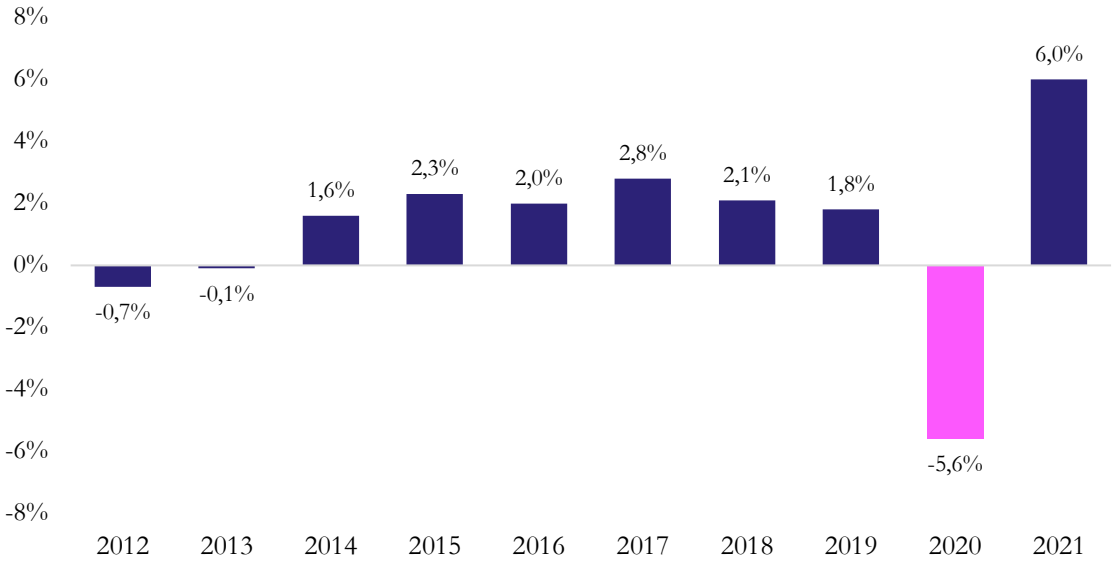
This section reviews the existing research on the impact of the COVID-19 pandemic and the subsequent fiscal policy response aimed at assisting firms on changes in firm bankruptcy and creation rates. However, the literature mostly provides estimations on the effects on SME bankruptcy rates only, overlooking changes in the creation of SMEs.

2.1. The impact of the COVID-19 crisis on EU SMEs

2.1.1. Magnitude of COVID-19 impact

The COVID-19 pandemic and the restrictions to contain the spread of the disease, coupled with widespread economic uncertainty, represented an unprecedented external shock to business conditions across the globe (OECD, 2021). Enterprises struggled with a decline in demand, disruptions in supply chains and production, and liquidity challenges, which in turn worsened unemployment rates (Juergensen, Guimón, & Narula, 2020). In the EU, real GDP growth contracted by 5.6% in 2020 (***Figure 1***), and the unemployment rate rose from 6.4% to 7.7% (Đukić, Štaka, & Drašković, 2021).

Figure 1. Real GDP Growth Rate – EU 27 Average



Source: Eurostat

Among all enterprises, the COVID-19 crisis disproportionately impacted SMEs compared to larger firms. SMEs tend to have smaller cash buffers, worse access to finance, weaker supply

chain capabilities, and fewer operational skills (OECD, 2021). In the EU, SMEs represent the backbone of the regional economy: they comprise 99.8% of employing businesses, 65% of total employment, and 54% of total production (EUROSTAT's Structural Business Statistics, 2020). Therefore, the corporate structure of the EU's economy made the region particularly vulnerable to the COVID-19 shock.

Regarding the impact of the COVID-19 shock on SME population in the EU, the literature mainly provides simulations of the evolution of SME bankruptcy rates in the absence of policy support to mitigate the COVID-19 impact. With data from 27 European countries, Gourinchas et al. (2021) forecasted that SME bankruptcy rates would have surged by an average of 9 percentage points (ppt). Ebeke et al. (2021) predicted a potential rise of 11 to 20 ppt in the share of insolvent firms. Kaya (2022) used survey data to estimate SMEs' insolvency risk, which increased by an average of 10% at the outbreak of the pandemic, then escalated to 21% during the pandemic.

2.1.2. Heterogeneity of COVID-19 impact

The COVID-19 crisis did not affect all SMEs equally. Notably, the impact occurred unevenly across industrial sectors and firms' characteristics. Research conducted by Vet et al. (2021) indicates that industries reliant on human contact, such as the cultural and creative sectors and the aerospace industry suffered the most from the pandemic and subsequent lockdown measures. This aligns with the Canton et al. (2021) findings, which found heightened vulnerability in sectors dependent on customer interactions, such as accommodation, food services, and transportation.

Those findings align with other studies. Kaya's (2022) analysis of Germany, France, Italy, Spain, and the Netherlands emphasised the pandemic's disproportionate effect on the tourism and transport sectors' insolvency risk compared to sectors like construction. Kalemli-Ozcan's (2020) study across 13 EU countries identified the accommodation and food services, arts, entertainment and recreation, and education sectors as among the worst affected industries. Hinterlang et al. (2023) found SMEs in the German cultural sector experienced the greatest increase in default probability.

In contrast, financial and fintech services experienced relatively smaller impacts. The cycle of increased bankruptcy risks and increased financial needs boosted the demand for financial services during the recession (Dörr et al., 2021). Digital SMEs consistently outperformed their non-digital counterparts by effectively addressing challenges in customer acquisition – a key constraint for non-digital companies (Vet et al., 2021; EC, 2021). Additionally, innovative SMEs exhibited a lower likelihood of default compared to non-innovative firms because of improved access to bank loans and enhanced customer outreach (Kaya, 2022).

The literature does not reach a consensus on the COVID-19 impact distribution in terms of SME size. Kaya (2022) found that small- (10 to 50 employees and a maximum balance sheet of €10 million) and medium-sized (50 to 250 employees and a maximum balance sheet of €43 million) firms suffered heightened insolvency risk the most at the onset and during the COVID-19 pandemic, even though micro-firms (fewer than 10 employees and a maximum balance sheet of €2 million) exhibit the greatest vulnerability to bankruptcy in normal times. Given micro-firms' lower funding needs and fixed costs because of lower turnover and fewer employees, the fiscal policy response during the pandemic sufficiently covered the micro-firms' costs to survive. Moreover, Adian et al. (2020) showed SMEs with fewer than 2- employees suffered a more severe negative demand shock on sales than larger firms.

2.2. The effects of the fiscal policy response

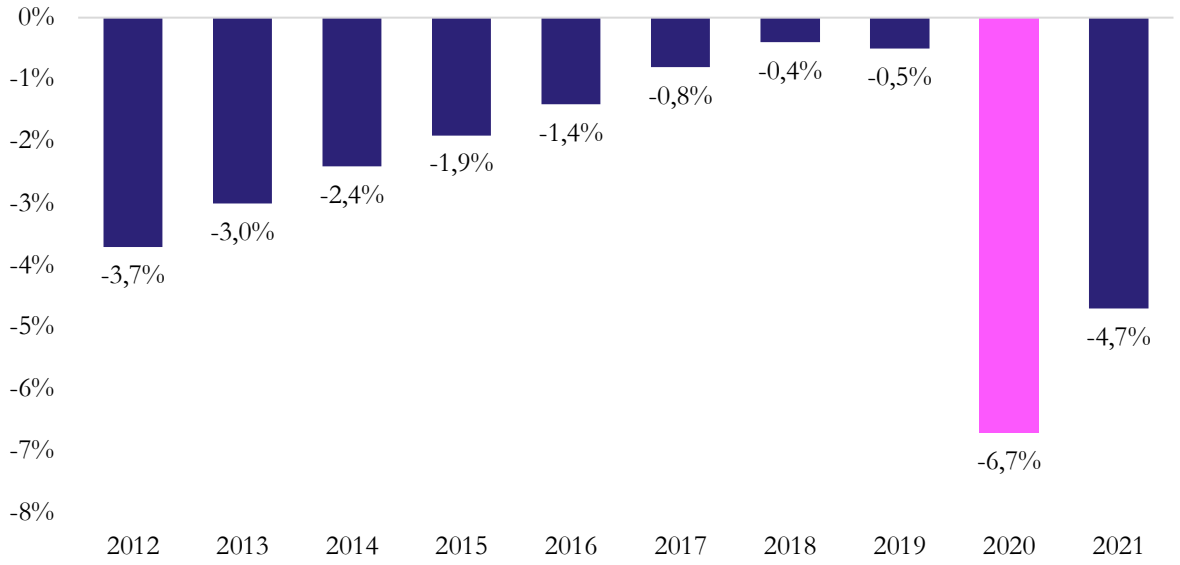
2.2.1. The fiscal policy response in the EU

Also unprecedented, the fiscal policy response in and across the EU sharply increased the average government deficit to -6.7% in 2020 (***Figure 2***). EU member states implemented a variety of fiscal instruments, which the IMF broadly classified into *emergency lifeline measures* and *demand support measures* (Deb et al., 2021). Emergency lifeline measures provided sustained cashflow support via loans, credit guarantees, equity injections, and asset purchases. Demand support measures included fiscal measures more likely to appear immediately in the fiscal deficit, such as direct cash transfers, tax reforms, and increased public spending on items like vaccines and health equipment.

In addition to these measures, most EU member states amended insolvency laws to prevent mass firm closures and any resulting labour market upheaval. Reforms included suspension of

requirements for bankruptcy filings and deadline extensions for insolvency proceedings (Coutinho, Kappeler, & Turrini, 2020). Crucially, these reforms gave firms time to utilize other fiscal support measures (e.g. liquidity support, direct cash transfers, wage schemes, loan guarantees, etc.) without facing imminent closure.

Figure 2. Government Deficit-to-GDP Ratio – EU 27 Average



Source: Eurostat

At the supranational level, the EU also took sizeable action. This presented its share of challenges, as EU member states diverged among historical North-South divisions and economic disparities. The negotiations between different blocks of EU countries led to aid packages providing more loans than grants (Echebarria, 2021). Amid these challenges, the EU implemented three safety nets to complement national responses worth a total of €540 billion (Debrun et al., 2021).

These safety nets consisted of i) support for unemployment risks (€98.4 billion), ii) SME financing through a pan-European guarantee fund (€200 billion), and iii) a credit line to finance domestic COVID-19 related healthcare costs (€240 billion), though no Member State applied for the credit facility (Europa.eu, 2024). Importantly, all three aid packages generally favoured southern EU members, who experienced the worst of the pandemic's impact (Lindner et al., 2022). Additionally, the EU implemented the NextGen EU package and Recovery and Response Facility (RRF) – the EU's largest pandemic-era aid package.

2.2.2. The effect of fiscal policy response on EU SMEs

Consensus in the literature confirms that the large fiscal response reduced SME bankruptcies across the EU. However, the effectiveness of the fiscal response depended on firms' characteristics and the fiscal instruments utilised. For example, Ebeke (2021) found that fiscal measures would have reduced COVID-19 induced insolvency, but the impact on SMEs was 50-75% less effective than on larger firms. Deb et al. (2021) examined the differential effectiveness of emergency lifeline and demand support measures across 52 countries during the pandemic and found emergency lifeline measures were more effective during times of strict containment measures.

In some cases, poor targeting of fiscal policies resulted in money wasted on firms that did not need it or on firms insufficiently productive, which prevented creative destruction. Gourinchas et al. (2021) forecasted that 89% of disbursed funds would be allocated to SMEs that could survive without the fiscal assistance. Demmou et al. (2021) found that, without any policy intervention, the share of firms becoming illiquid in Europe would have tripled by the end of 2020; however, of these, 11% would have become illiquid even in the absence of the pandemic. Highly indebted and unproductive enterprises benefited from widespread lower interest rates and reduced collateral requirements during the pandemic (Kaya, 2022).

In Germany, the fiscal intervention during the pandemic led to a backlog of 25,000 expected but unresolved micro-firm insolvencies (Dörr et al., 2021). This hindered creative destruction and imposed barriers to entrepreneurship. Hinterlang et al. (2022) also analysed the German fiscal package and concluded that firm subsidies were costly and crowded out private investment. More importantly, in sectors such as agriculture and information technology (IT) & communication, where the probability of default was predicted to decrease after the COVID-19 shock, public subsidies would further prevent default and hinder creative destruction.

While numerous studies suggest an issue of poor targeting, not all empirical evidence aligns with this view. Coad et al. (2023) found that policy support was effectively directed towards the most affected firms in the EU, which were not necessarily the least productive firms. Harasztosi et al. (2022) found that pre-pandemic indicators of corporate weakness, such as financial

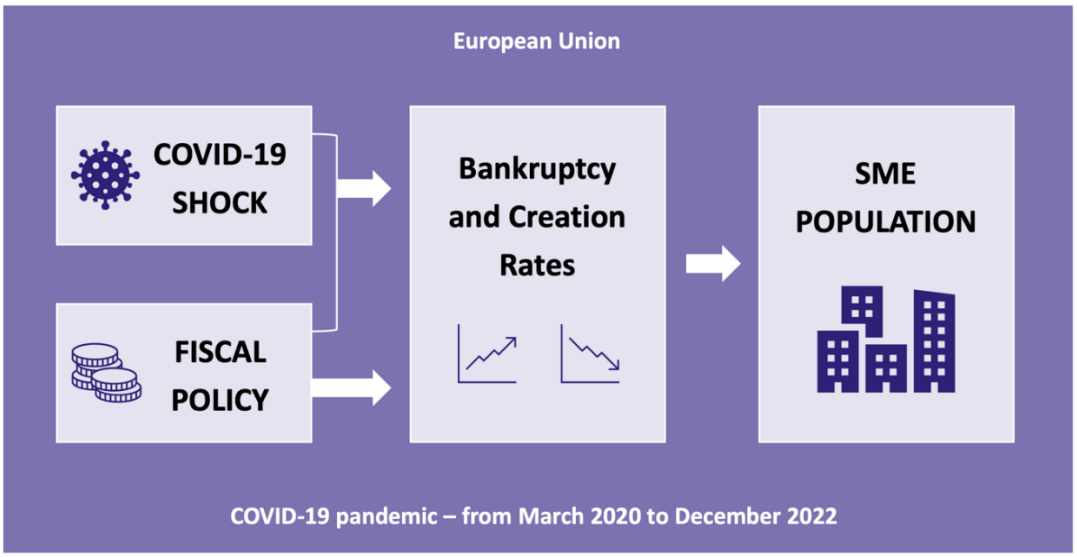
distress, losses, or high indebtedness, did not significantly impact EU firms' probability of receiving support – suggesting effective policy targeting.

In sum, without the fiscal policy response aimed at protecting SMEs during the pandemic, SME bankruptcy rates in the EU would have increased by an average of at least 9 ppt. The COVID-19 shock was unevenly distributed across SMEs' industries and characteristics, whereas the fiscal policy response was indiscriminate. Numerous studies highlight poor targeting of fiscal policies towards unproductive firms, preventing creative destruction during the recession. While this would have deterred the market entry of new SMEs, the literature does not provide direct estimations of the extent to which the fiscal policy response affected SME creation in the EU.

3. Empirical Framework

Current research examining the COVID-19 impact and the fiscal policy response on the EU's SME population focuses on firm bankruptcies, ignoring the effects on firm creation. Moreover, most available literature relies on ex-ante simulations of the COVID-19 impact, relying on early pandemic data and simplified models. This report aims to fill this research gap by collecting empirical data *ex-post* and analysing the effect of COVID-19 and the fiscal policy response on *both* SME bankruptcy and creation rates, to obtain a more holistic understanding of the SME population in the EU (***Figure 3***).

Figure 3. Empirical Framework: Research Question



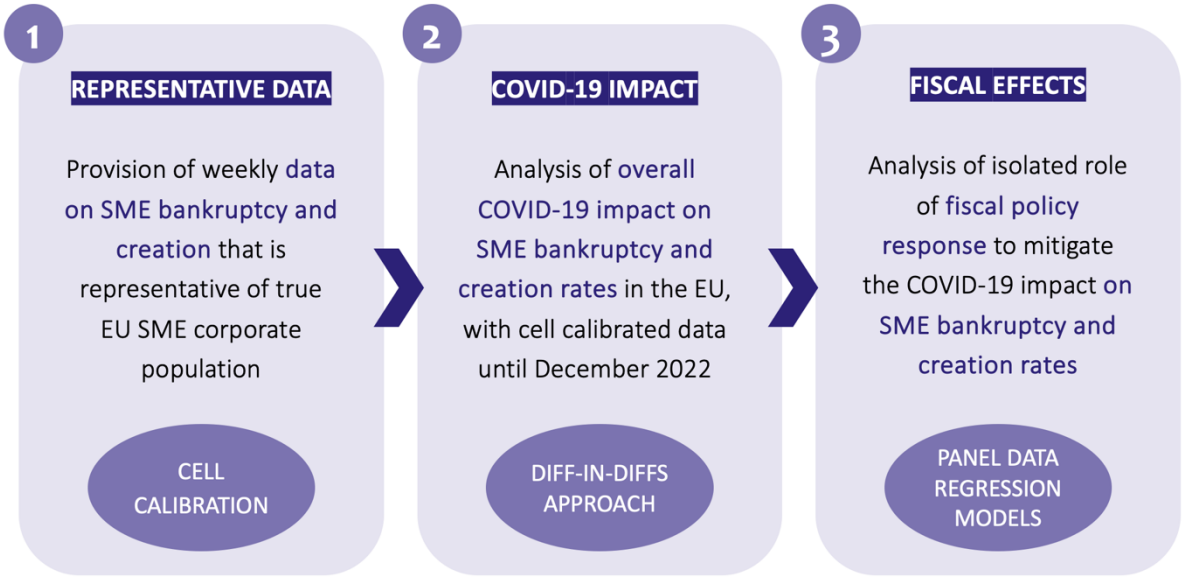
Source: Own elaboration

To achieve this objective, our analysis leverages Brault's (2023) study, which utilized a distinctive dataset providing harmonized, weekly data on SME bankruptcy and creation rates in the EU, alongside the implementation of discretionary fiscal policies to alleviate the effects of COVID-19. With this data, Brault (2023) applied a modified diff-in-diffs approach to assess the COVID-19 impact on SME bankruptcy and creation rates in the EU until March 2021.

Building on Brault's (2023) approach, we make three contributions (See ***Figure 4***). First, we provide more and improved data. The dataset underlying the SME population variables in Brault (2023) (bankruptcies and firm creations) does not represent the true EU SME population. For example, smaller and younger firms are underrepresented, while larger, more productive

firms are overrepresented. To overcome this challenge, we apply a cell calibration methodology that adjusts the data on bankruptcy and creation rates to accurately reflect the true EU SME population.

Figure 4. Empirical Framework: Three Main Contributions



Source: Own elaboration

Second, with this new, more representative data, we update Brault's (2023) analysis on the COVID-19 impact on SME bankruptcy and creation rates. Our analysis goes further to provide new results based on data extended further into time – the data no longer ends in March 2021, but extends until the end of December 2022. Within the diff-in-diffs methodology, we compare bankruptcy and firm creation rates before and after March 2020, grouping together everything that occurred after this date – including the pandemic by itself, but also governments' containment measures and the various public policy responses.

In our third contribution, we isolate the correlation between the fiscal policy response and SME population to better understand the role fiscal policies played during the pandemic. We apply panel data regression models that relate weekly fiscal policy deployment to the weekly evolution of SME bankruptcy and creation rates across countries. These regression models control for the intensity of the pandemic (approximated by the weekly evolution of the COVID-19 death rate), governments' containment measures (captured by Oxford's Stringency Index), and temporary amendments to bankruptcy laws.

4. Data

The primary dataset we utilise is Brault's (2023) modified version of the Bureau Van Dijk's Orbis database (hereafter, 'Orbis'). Orbis contains weekly updates of the total number of active SMEs[3], newly created SMEs, and SMEs going bankrupt. From these variables, we derive the SME bankruptcy and creation rates. Because not all years begin on a Monday, the first and last weeks of a calendar year may not equal full seven-day weeks. Thus, we implement Brault's (2023) approach by standardising the weekly Orbis data into 'isoweek' time periods with each 'isoweek' containing seven days. Orbis contains information from the first 'isoweek' of 2015 to the last 'isoweek' of 2022, disaggregated by country, industrial sector, and firm age (***Table 1***).

Table 1. Orbis data – Countries, Sectors, Firm Age Categories

COUNTRIES (27 EU)
Austria, Belgium, Bulgaria, Croatia, Republic of Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Poland, Portugal, Romania, Slovakia, Slovenia, Spain and Sweden.
INDUSTRIAL SECTORS (NACE Rev. 2 European Commission Statistical Classification)
Agriculture, Forestry, and Fishing (A); Mining, Electricity and Water (BDE); Manufacturing (C); Construction (F); Wholesale and Retail Trade (G); Transportation and Storage (H); Accommodation and Food Service Activities (I); Information and Communication (J); Real Estate Activities (L); Professional, Scientific, Technical, Administration and Support Service Activities (M-N); Public Administration, Defence, Education, Human Health and Social Service Activities (O-P-Q); Arts, Entertainment and Recreation (R); Other Service Activities (S); Activities of Households (T); Activities of Extraterritorial Organizations (U)
FIRM AGE CATEGORIES
0-2 years old; 2-5 years old; 5-10 years old; 10 years or older

Source: Own elaboration based on Orbis dataset

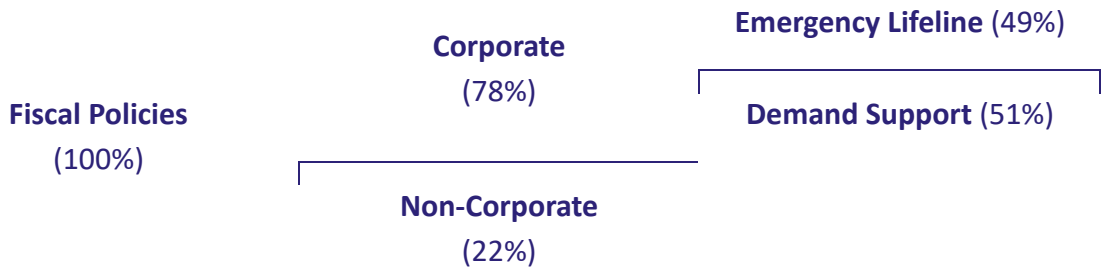
[3] SMEs as defined by the European Commission Recommendation 2003/361/EC. Technically, the category includes both "SMEs and Mid-caps". However, as SMEs represent 99.8% of the EU corporate population, the category essentially contains SMEs.

The second dataset in our analysis is Eurostat's Business Demography database (hereafter, 'Eurostat'). This database collects information provided by the EU countries' respective statistics offices, following EU regulations which ensures reliability and comparability. The information in Eurostat can be disaggregated by country and industry. However, Eurostat typically takes over two years to update, with results presented yearly. The Eurostat indicators most relevant to our analysis include the total number of active firms, total number of bankruptcies, number of firm creations, and number of companies that survived within the age range of one to five years old. While Eurostat does not allow us to differentiate between SMEs and larger firms, we consider Eurostat a valid data source for the corporate population through these indicators because SMEs represent 99.8% of all EU firms.

We also use a third dataset – Brault's (2023) modified version of the European Systemic Risk Board (ESRB) database. The ESRB database provides information on the fiscal policies announced during the pandemic to mitigating the COVID-19 impact in the EU. The data includes announcement date, expiry date, monetary amount, and policy type, for each policy and disaggregated by country. The fiscal measures are discretionary and announced by national governments. However, the ESRB database contains incomplete information on the disbursement of the pledged fiscal policies. We extend Brault's (2023) assumption that EU member states evenly deployed, or disbursed, the monetary amount announced for each policy over all the weeks between the announcement and the expiry date. The resulting variable approximates the weekly policy deployment for every EU country from March 2020 until December 2022.

We consider two classifications of the fiscal policies aimed at mitigating the COVID-19 impact (***Table 2***). First, we distinguish between *corporate* and *non-corporate* fiscal measures. *Corporate* fiscal policies are explicitly directed towards enterprises and represent the main category of interest for our analysis. *Non-corporate* fiscal policies assist economic agents other than firms, mainly individuals like households, renters, unemployed, and pensioners. Within corporate fiscal policies, we apply a second classification using IMF's (Deb et al., 2021) distinction between *emergency lifeline* – loans, credit guarantees, and equity injections, not immediately reflected in the fiscal deficit – and *demand support* measures – subsidies and tax deferrals and reductions (for more detail, see Appendix A).

Table 2. Classification of Fiscal Policies in Our Database



Note: In parenthesis, the frequency of each sub-category within the category in the previous node.

Source: Own elaboration from Orbis database

In addition to the data on SME bankruptcy and creation rates from Orbis and on fiscal policy deployment from the ESRB database, we include three additional variables: COVID-19 death rate, Stringency Index, and temporary amendments to bankruptcy laws (***Table 3***). First, we incorporate the weekly evolution of the COVID-19 death rate, for each EU country, to capture the pandemic's intensity. We utilised the European Centre for Disease Prevention and Control's (ECDC) notification rate, expressed as the number of COVID-19 deaths over 100,000 population. During the pandemic, EU Member States reported this information on a weekly basis to the European Surveillance System (TESSy).

Next, we construct a COVID-19 Stringency Index from Oxford's COVID-19 Government Response Tracker (OxCGRT), to capture the weekly evolution of the 'strictness' of COVID-19 policy measures, such as travel bans, school and workplace closures, and other restrictions on movement, for each EU country. The OxCGRT compiles data on governments' COVID-19 restrictions and containment measures into a daily score from 0 to 100, between 2020 and 2022 – the higher the score, the more 'strict' or 'stringent' the government's public health containment response[4].

[4] To compute the weekly stringency score average, we followed the normalization approach in Deb et al. (2021) to ensure the daily stringency scores fall between 0 and 1. We re-scale, or normalize, the OxCGRT stringency scores by ensuring the lowest and highest daily stringency scores map to 0 and 1, respectively. Then, we identify the distance of each country's daily stringency score from the minimum and divide this by the range of scores. Then, we calculate the seven-day mean of the normalized daily stringency scores, across isoweeks and for each EU member nation.

Finally, we construct a binary variable denoting whether, in a given week, an EU country amended the national bankruptcy law. We source the bankruptcy law amendments data from INSOL Europe and the LexisNexis COVID-19 Tracker of Insolvency Reforms. From the EU 27 countries, 19 implemented a temporary suspension of insolvency filing to debtors, creditors, or both[5]. No clear correlation exists between the temporary amendments of bankruptcy laws and Orbis's evolution of SME bankruptcy rates in our database. This is due to constraints in Orbis's data collection, including peaks in bankruptcy rates at the beginning, middle, and end of the year, and the difficult distinction of firms' market exits from attrition (Bajgar, Berlingieri, Calligaris, Criscuolo, & Timmis, 2020). For more detail on these variables, see Appendix A).

Table 3. Summary of Main Variables in the Database

Variable	Source
SME Bankruptcy and Creation Rates	*Orbis database (Brault, 2023)*
Fiscal Policy Deployment	*European Systemic Risk Board (ESRB) database (Brault, 2023)*
COVID-19 Death Rate	*European Centre for Disease Prevention and Control (ECDC)*
Stringency Index	*Oxford's COVID-19 Government Response Tracker*
Temporary Amendments to Bankruptcy Law	*INSOL Europe/LexisNexis COVID-19 Tracker of Insolvency Reforms*

Source: Own elaboration

[5] The 8 member states that did not modify bankruptcy laws are Croatia, Cyprus, Denmark, Greece, Ireland, Malta, the Netherlands, and Sweden.

5. Methodology

5.1. Cell Calibration

The Problem: Orbis's Lack of Representativeness

As introduced in the Empirical Framework, one of the main shortcomings of the analysis by Brault (2023) relates to the data on SME population. Neither Eurostat nor alternative sources reliably provide this information with weekly updates, minor time lags, and decomposed by firm age. Brault (2023) rightly utilized the Orbis database (see Data) to overcome these challenges. However, Orbis possesses its own limitations. Smaller and younger firms are underrepresented (Gal, 2013). Enterprises in Orbis are systematically larger in terms of employment and more productive in terms of gross output (Bajgar et al. 2020).

Orbis's skewness toward more productive firms arises from the underestimation of the dispersion between the typical (or median) firm and underperforming firms (10th percentile of the productivity distribution), while accurately capturing the productivity dispersion between the typical firm and top performing firms in the 90th percentile of the productivity distribution (Bajgar et al. 2020). Thus, Orbis fails to capture lower performing firms. This implies that, by using Orbis, our analysis of the COVID-19 impact and fiscal policy response on the EU SME population would better reflect the dynamics of top performing firms.

Finally, Brault (2023) raised the issue that Orbis seems to include more empty-shell companies than other databases, including Eurostat. Empty-shell companies possess no active business operations or significant assets and sometimes exist solely to obtain financing. They tend to be created and go bankrupt less often than other firms, leading to an underestimation of SME bankruptcy and creation rates. Because of all these limitations, our findings "reflect Orbis, with all its advantages and limitations" (Brault, 2023: 10), and not the true EU corporate population.

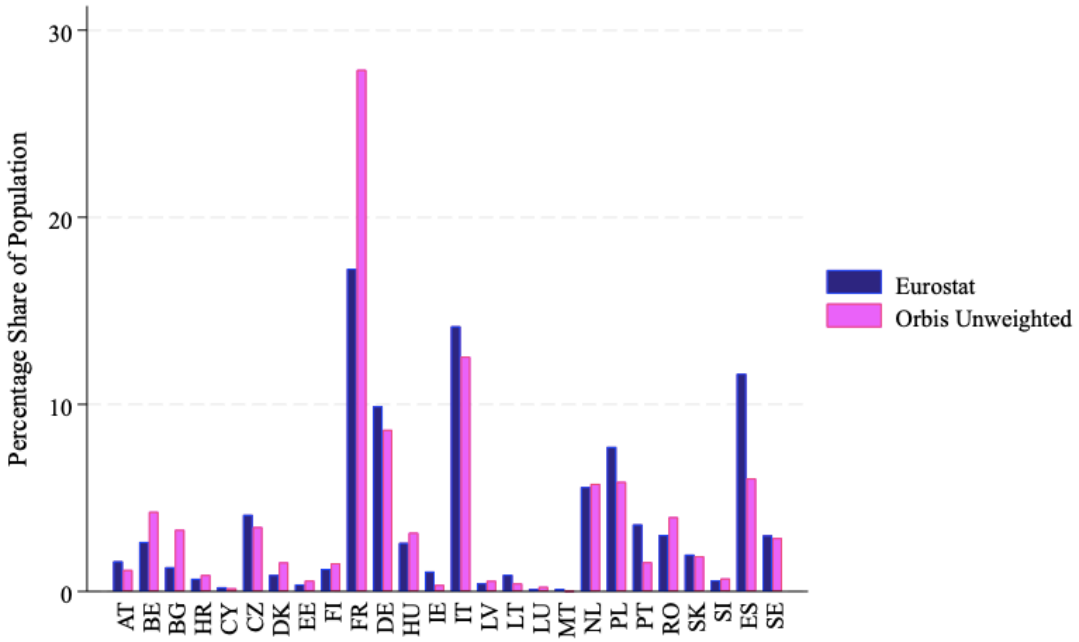
SME Population: Orbis vs. Eurostat

When comparing Orbis's annualized results with Eurostat, we directly observe some of Orbis's limitations and note key differences by country, economic sector, and firm age. ***Figure 5*** reveals important imbalances in the corporate population by country, notably showing that French firms are overrepresented in Orbis (28%) relative to their population share of active firms in

Eurostat (17%). This imbalance may result from particularly good coverage of the Orbis dataset for France (Brault, 2023), relative to the coverage of firms in other European countries.

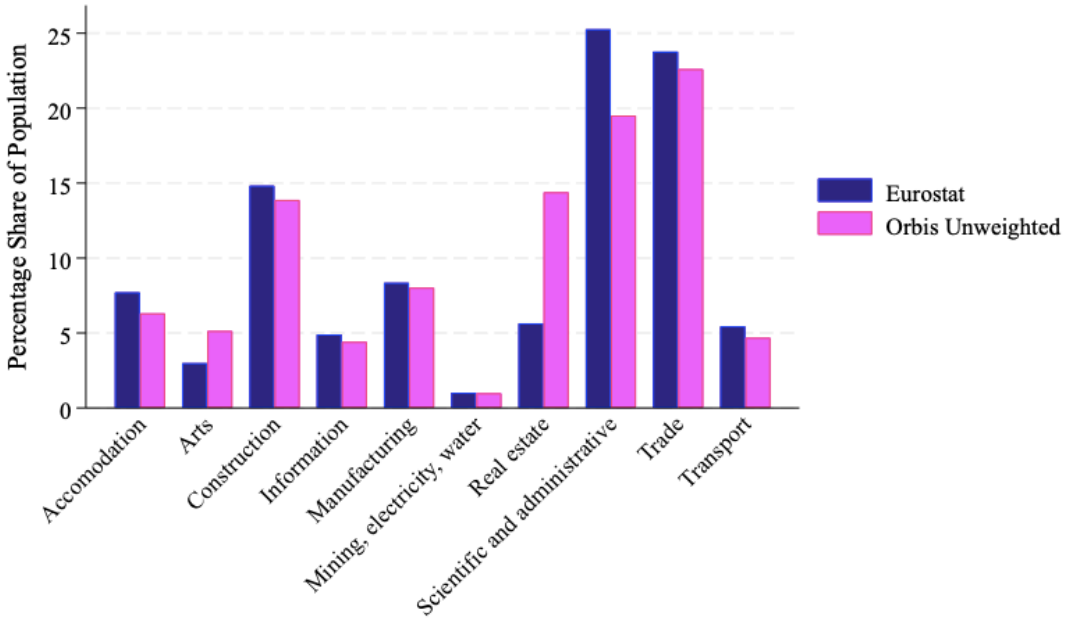
Figure 6 depicts the main differences in population shares by economic sector between Eurostat and Orbis. Specifically, the Real Estate industry comprises approximately 14% of the Orbis population on average in 2020 – 8 percentage points larger than the Real Estate share of the Eurostat population. Orbis seems to underrepresent firms in the Scientific and Administration industry, which comprises approximately 19.5% of Orbis versus 25% of Eurostat's population. Finally, in *Figure 7* we observe that younger firms, between 0 and 2 years old, are underrepresented in Orbis, as indicated by Gal (2013).

Figure 5. Share of Firm Population in Orbis and Eurostat, By Country (2022)



Source: Own elaboration

Figure 6. Share of Firm Population in Orbis and Eurostat, By Industry (2022)



Source: Own elaboration

Figure 7. Share of Firm Population in Orbis and Eurostat, By Firm Age (2022)

Source: Own elaboration

The Solution: Cell Calibration

To improve the representativeness of Orbis, we implement cell calibration based on the methodology of Kalton and Flores Cervantes (2003) and Haziza and Beaumont (2017). Through cell calibration, we obtain weights that allow Orbis data to resemble Eurostat's corporate population as similarly as possible (Brick & Kalton, 1996), while keeping Orbis's weekly updates and level of detail. Previous research applied cell calibration to Orbis data with mixed results, depending on the variables considered. Gal (2013) obtained improved the representativeness of the number of firm employees of the database (i.e., firm size), while Bajgar et al. (2020) showed that calibration with weights did not improve the representativeness of productivity variables in Orbis.

To implement cell calibration, we follow a five-step process detailed in ***Table 4***. In the first two steps, we harmonize Orbis (step 1) and Eurostat (step 2) data according to a common criterion (Appendix B for more detail). This makes both databases, in terms of economic sectors and age groups, compatible. We also remove three EU countries (Greece, Ireland, and Malta) that present data limitations. In step 3, we annualize Orbis data to express the share of active firms in each weekly country-sector-firm age cluster as annualized percentages. In step 4, we calculate the weights for each cluster in each dataset by dividing the share of active firms in Eurostat by the share of active firms for the same cluster in Orbis. This results in a weight for each cluster. In step 5, we apply the weights to Orbis's weekly data to resemble the corporate distribution in Eurostat. For each cluster, we use the same weights for all weeks in the same year and duplicate the 2021 weights for 2022, as Eurostat did not provide data for 2022 at the time of analysis.

Table 4. Cell Calibration Strategy

Step	Goal	Method
1	Adapt Orbis database to common criteria	- Elimination of countries that do not meet requirements. - Elimination of industrial sectors that do not meet requirements. - Merge data for firms 5 year or older.

2	**Adapt Eurostat database to common criteria**	- Elimination of countries that do not meet requirements. - Elimination of industrial sectors that do not meet requirements. - Merge data of active firms by age group following common criteria.
3	**Annualise Orbis**	- Add weekly number of births in a year for each cluster of firms. - Add weekly number of deaths in a year for each cluster of firms. - Obtain maximum value of active firms in a year for each cluster of firms
4	**Weights calculation**	- Use simple cell calibration to obtain weights for al country-industry-age cluster every year.
5	**Weights imputation to weekly data**	- Weights obtained in previous stage are replicated for all weeks in the year. - Weights obtained for year 2021 are replicated in year 2022.

Source: Own elaboration

We detail the calculation of weights in Orbis below for step 4 of our calibration strategy. For every country $c \in C$, with C the list of countries in our adapted database; sector $s \in S$, with S being the industrial sectors; and firm age $a \in A$, being A the group ages defined in Table 1, we obtain that every year y between 2015 and 2021 the share of firms in Orbis SO_{csay} will be given by:

$$SO_{csay} = \frac{ACO_{csay}}{\sum_{c \in C} \sum_{s \in S} \sum_{a \in A} ACO_{csay}}, \qquad y \in \{2015, \ldots, 2021\}$$

, with ACO_{csay} being the number of active firms of that country, sector, and age in Orbis database the year y.

Taking ACE_{csay} as the number of active firms of that country, sector, and age in Eurostat the year y, the share of firms in Eurostat SE_{csay} is defined as:

$$SE_{csay} = \frac{ACE_{csay}}{\sum_{c \in C} \sum_{s \in S} \sum_{a \in A} ACE_{csay}}, \qquad y \in \{2015, \ldots, 2021\}$$

Following Gal (2013), we define the simple cell weight as the weight that equalizes the share of every country-sector-age cluster of every year between both databases.

$$w_{csay} \times SO_{csay} = SE_{csay}$$

, so w_{csay} follows $\forall\, c \in C, s \in S, a \in A, y \in \{2015, \ldots, 2021\}$.

We calculate the final weights by dividing both shares, so that:

$$w_{csay} = \frac{SE_{csay}}{SO_{csay}}$$

Our calibration methodology rests on two main assumptions. First, we assume the number of active firms in both datasets varies minimally in the short term. This assumption allows us to apply the weights calculated for a given cluster to all weeks within the same year and utilise 2021 weights for 2022, given lack of data for 2022 in Eurostat. Our second assumption is that data missing in Orbis are Missing At Random (MAR). Under this assumption, firms present in Orbis differ from those firms not listed in Orbis only through the observed variables. Consequently, calibrating the data makes Orbis resemble the true EU corporate population captured by Eurostat in terms of the total number of firms, as well as bankruptcy and firm creation rates.

5.2. Difference-in-Differences Inspired Methodology

To estimate the impact of the COVID-19 crisis on SME population, we rely on the diff-in-diffs inspired methodology in Brault (2023). The data encompasses SME bankruptcy and firm creation rates from 2015 to 2022, derived from the cell-calibrated Orbis database (see section 5.1). We smooth the outliers in the SME bankruptcy and creation rates following Brault's (2023) winsorization method consistent of two steps. First, we replace the rates' standard deviation at the 1st percentile over a one-year rolling window with the threshold value. Second, we replace the weekly SME bankruptcy or creation rates whose standard deviation is over 10 times the

smoothed one, as well as the two previous and following weekly rates, with the moving average of the previous quarter.

The diff-in-diffs inspired methodology proceeds as follows. We compare the weekly SME bankruptcy and creation rates between our 'treatment' period (from March 2020 to December 2022) and our 'control' period (every week between 2015 and 2019). The 'treatment' starts the week of the 11th of March 2020, when the WHO officially announced the COVID-19 pandemic. The 'first difference' is given by the difference between SME bankruptcy or creation rates registered during the treatment week and the average of the rates in the equivalent week between 2015 and 2019. The 'second difference' is the difference between each week after treatment and the average rates between 2015 and 2019. The causal effect of the COVID-19 pandemic is approximated by the difference of the two differences.

This approach is used for every week for the entire period, obtaining a COVID impact model given by:

$$y_{wt} = \beta_0 + \sum_w \beta_w T_t 1_{\{W=w\}} + e_{wt}$$

, where:

- y_{wt} is the bankruptcy or establishment rate at week *w* and period *t*, with *t* being the treatment period (March 2020 to December 2022) or the counterfactual period before March 2020.
- β_w is the 'difference-in-difference', meaning the difference between the counterfactual and the post-COVID rates each week.
- T_t is an indicator that equals to 1 when it's the treatment and 0 otherwise.
- $1_{\{W=w\}}$ is a different indicator that takes the value of 1 if *w* is equal to some *W* for all weeks.

We run the model over every country-sector-age SME cluster for each week, and then combined over the entire period, to obtain the share of SME population added or destroyed after the COVID-19 shock.

The model presents some limitations. First, the parallel trend assumption is not fully supported by the data, thus potentially biasing the results and leading to an imperfect approximation of causality. Secondly, we assume the treatment occurred on a fixed date for all EU countries, even though wide variation exists in the official pandemic start date across all countries. Finally, the model does not include covariates like containment measures or fiscal policies deployed because the covariates could correlate with each other and exhibit clear endogeneity with the treatment (i.e., the COVID-19 pandemic). Including endogenous covariates would have increased the bias of our estimations, thus hindering the causal inference of the difference-in-difference inspired methodology even further. All three limitations represent scopes for future research in this topic.

5.3. Panel Data Regression Models

The diff-in-diffs inspired methodology compares SME bankruptcy and creation rates before and after March 2020. As a result, the estimated differentials correlate with everything that happened after this date – including the pandemic by itself, but also the containment measures and policy responses. We overcome this limitation by applying regression models to descriptively isolate the effects of fiscal policy deployment during the pandemic on SME bankruptcy and creation rates. Our regression models also control for the intensity of the COVID-19 shock, as well as the containment measures and law amendments implemented across countries.

First, we assess the relationship between the fiscal policy response and SME bankruptcy and creation rates considering all SMEs across the 24 EU countries. We then repeat the analysis considering only one industry and one age group at time to understand the heterogeneity of the effect across firms with varying characteristics. The methodology mainly relies on the two-way fixed effects panel data linear regression model (sub-section 5.3.1). We also consider the advantages and limitations of the common correlated effects model (sub-section 5.3.2).

Regardless of the chosen specification, the main limitation of this methodology is that the explanatory variables in the regression models are not exogenous; they are correlated with the error term of the model. This is a consequence of simultaneous causality – i.e., the magnitude of SME bankruptcy and creation rates influences the amount of fiscal support deployed to assist

SMEs –, and omitted variable bias – i.e., factors like state's creditworthiness correlate with both the fiscal policy deployment and SME bankruptcy and creation rates. As a result, we can only discuss correlations, without inferring causal effects between the variables of interest (Stock & Watson, 2020).

5.3.1. Two-Way Fixed Effects Panel Data Linear Regression Model

We estimate the average effect of fiscal policy deployment on SME bankruptcy and creation rates in the two-way fixed effects linear regression model – 'two-way' because it includes both country- and time- fixed effects. The main specification we estimate is:

$$Y_{i,w} = \beta_0 + \sum_{m=1}^{m} \beta_{w,m} Fiscal_{i,w} + COVID\_deathrate_{i,w} + Stringency\_Index_{i,w} + Bankr\_Amendment_{i,w} + \alpha_i + u_w + \varepsilon_{i,w}$$

, where:

- $Y_{i,w}$ captures either the SME bankruptcy or creation rate (over number of active SMEs), at week w and country i. The percentage is annualised.
- $Fiscal_{i,w}$ denotes the fiscal policy deployment at week w and country i, as a share of the national GDP, by type of policy m. m can be corporate and non-corporate, or emergency lifeline and demand support (see Data for more detail). The percentage is annualised.
- $COVID19\_deathrate_{i,w}$ denotes the COVID-19 death rate at week w and country i.
- $Stringency\_Index_{i,w}$ represents the Oxford's Stringency Index (capturing governments' containment measures against the pandemic) at week w and country i.
- $Bankr\_Amendment_{i,w}$ is a binary variable on whether a country i has a temporary amendment to the national bankruptcy laws in place in week w (1) or not (0).
- α_i and u_w control for country- and time-fixed effects, respectively.
- $\varepsilon_{i,w}$ is the error term.

The main object of interest is the effects of fiscal policy deployment (captured by $\beta_{w,m}$) on SME bankruptcy and creation rates, which ultimately shape the SME population in the EU. Our approach closely follows Deb et al.'s (2021). The authors apply the high-frequency identification method of Gertler and Karadi (2015) to quantify the effect of announced COVID-19 fiscal measures on economic activity across 52 countries throughout 2020. While our regression model specification closely resembles Deb et al.'s (2021), we rely on weekly data, while Deb et al.'s (2021) variables are updated daily and thus considered high frequency.

We apply the model to a (strongly balanced) panel database combining all the variables listed in ***Table 3***, in the Data section. The data follows 24 EU member states (excluding Greece, Ireland, and Malta due to data limitations) over all 'isoweeks' between March 2020 and December 2022. We calibrate the SME bankruptcy and creation rates (approach described in section 5.1) and smooth the outliers (winsorization process described in section 5.2). The model accounts for the cell-calibrated distribution of active SMEs in the EU by assigning frequency weights to the different countries.

Because we use panel data, the model's error term for a given country may correlate with itself in different time periods, which can bias the estimated coefficients of the model. To control for this error term within-country correlation, we obtain cluster-robust standard errors in the regression's estimation as proposed by Arellano (1987). We assume the model's error terms are not correlated across countries, and that the number of clusters – i.e., 24 EU countries – is sufficient. The literature widely considers approximately 20 clusters as sufficient with strongly balanced panel data, otherwise 50 clusters is recommended (Cameron & Miller, 2015).

After testing the model form expressed above, we estimate the same model with lagged values of the dependent variable and the independent variable. Including lagged values of the dependent variable assumes that current bankruptcy and creation rates influence future rates – a defining feature of a dynamic model. Including lagged values of the independent variable assumes the relationship between fiscal policy deployment and SME bankruptcy and creation rates is not only contemporaneous but may be delayed or persist over time (Beck & Katz, 2011). To decide on the number of lags, we use the F-test (Stock & Watson, 2020). This approach recommends including lags if the overall statistical significance of the model does not decrease.

5.3.2. Common Correlated Effects Panel Data Regression Model

In theory, the Common Correlated Effects Model (CCE) (Pesaran, 2006) is more adequate to analyse the relationship between fiscal policy deployment and SME bankruptcy and creation rates across EU countries. The CCE model accounts for 'cross-country dependence' and 'slope heterogeneity', which our data exhibits. 'Cross-country dependence' occurs when at least one common shock (COVID-19 pandemic) affects all countries. 'Slope heterogeneity' refers to the effect of fiscal policy deployment differing across countries (for more details, see Appendix C). Unlike the two-way fixed effects linear regression model, the CCE model accounts for these two features, otherwise captured by the error term, and reduces the bias of the estimated coefficients (Thombs, 2022).

The CCE model's form resembles the two-way fixed effects model, but adds both dependent and independent variables' cross-country averages to control for cross-country dependence and slope heterogeneity:

$$Y_{i,w} = \beta_0 + \sum_{m=1}^{m} \beta_{w,m} Fiscal_{i,w} + COVID\_deathrate_{i,w} + Stringency\_Index_{i,w} + Bankr\_Amendment_{i,w} + \gamma_i \bar{V}_w + \alpha_i + u_w + \varepsilon_{i,w}$$

, where $\gamma_i \bar{V}_w$ denote the variables' cross-country averages.

In practice, however, the CCE model does not suit our analysis because of the limited variation of our data, and especially of our main independent variable, i.e., fiscal policy deployment. The limited variation results from the assumption that EU member states evenly deployed the monetary amount announced for each policy over all the weeks between the announcement and the expiry date (see Data). Thus, when including the variables' cross-country averages, little variation remains, which ultimately translates into a decline in the model's overall statistical significance.

We present the CCE model because of its advantages and advocate for future research in this topic. The main results are in Appendix C. However, given the constraints on our data, we relied on the two-way fixed effects linear regression model for the elaboration of this report.

6. Main Findings

6.1. Validity of Cell Calibration and Data Representativeness

To assess the effectiveness of our cell calibration technique as a method to improve Orbis's representativeness, we tested the assumptions behind the technique (see section 5.1). First, we assumed that weights can be calculated yearly and then replicated for each week within a year. For this assumption to hold, the weights must remain stable over time. We validated this assumption by calculating the average percent change of weights across all clusters every year (*Table 5*). On average, the weights changed an average of 3.6% per cluster every year. The highest change of weights occurred in 2021, which may result from the pandemic's effects on data collection and survey response.

Table 5. Yearly Average % Change of Weights Across Clusters (2016-2021)

Year	2016	2017	2018	2019	2020	2021
Average percentage change of weights	4.7	0.9	3.5	1.8	2.3	8.3

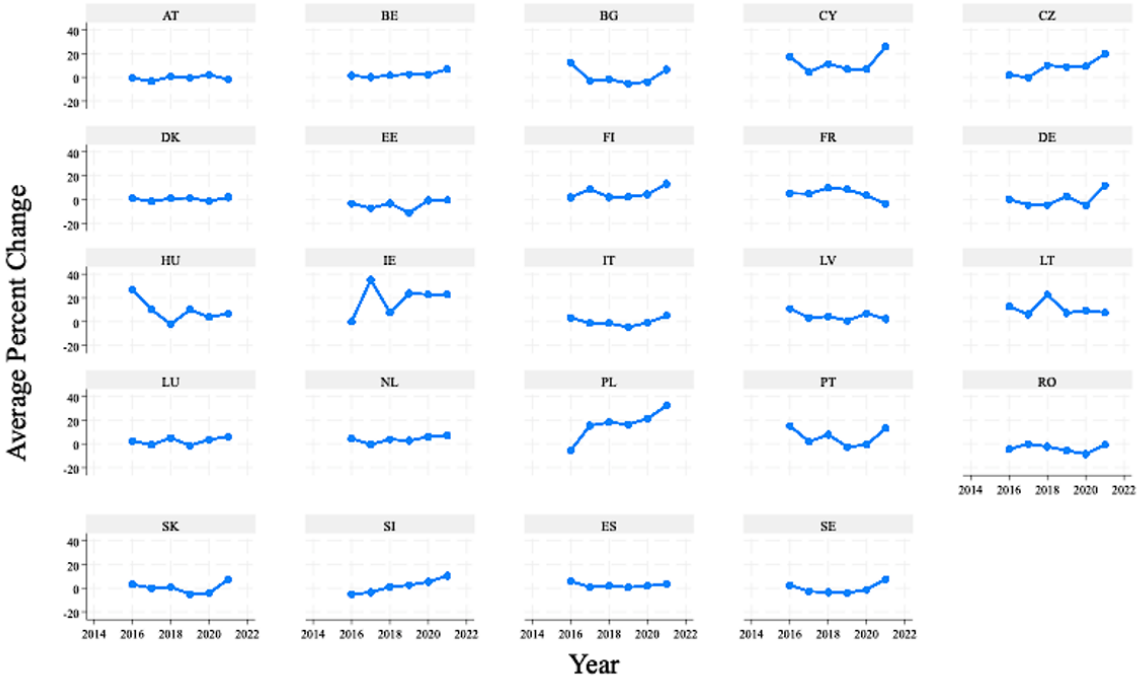
Source: Own elaboration

These results indicate that our assumption holds true for the entire database. While differences between Orbis and Eurostat increment over long periods of time, in the short term they can be considered negligible. To ensure that the assumption holds true for the different variables, we disaggregated the results by firm age, sector, and country (see Appendix D). Clusters with older firms exhibit more stable weights than younger firms, with an average change in weight close to 0%, and all economic sectors show similar levels of weight stability, ranging from a 3% to 6% average percent change in weight.

Importantly, most countries displayed stable weights across years (i.e. the average percent change in weight does not exceed 10%). *Figure 8* shows the average year-to-year percent change of weight for each country from 2016 to 2021. Cyprus (CY), Czechia (CZ), Hungary (HU), Lithuania (LT), and Poland (PL), however, varied beyond 10% in their yearly weights. Of those five, Hungary showed high variation initially but maintained weight stability after 2018, whereas

Czechia exhibited a substantial increase in weight variation for 2021 only. Cyprus, Lithuania, and Poland demonstrated a year-by-year average change over 10% – high variation – and could possibly increase the noise of our cell calibration process in our analysis.

Figure 8. Yearly Variation of Weight Average, by Country (2016-2021)



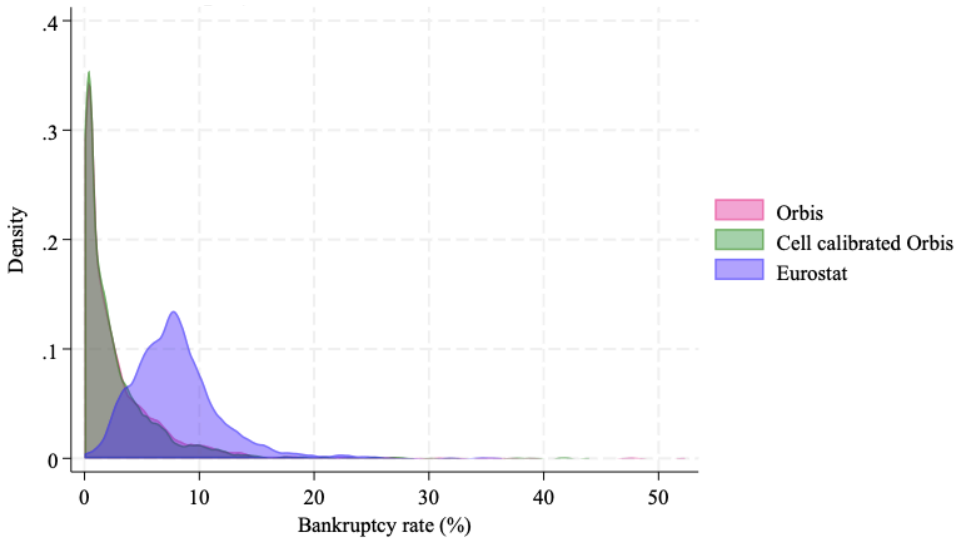
Source: Own elaboration

Within the cell calibration methodology, we also assumed that the inclusion of weights would not substantially increase the variability of our estimates. Including weights in our estimations risks the loss of precision, as higher variance reduces standard errors (Solon, Haider, & Wooldridge, 2013). This loss of precision can be summarized by $F = 1 + CV(w)^2$, where $CV(w)$ is the coefficient of variation of the weights used (Kalton & Flores-Cervantes, 2003). The loss of precision observed in our study is $F = 1.75$: the weights produced in our analysis increase the variance of our estimates by approximately 75%. Still, experiments with similarly high variance – weighting school populations in the United States (Tipton & Mamakos, 2023) and Swiss municipalities (Pareto & Pavone, 2010) – show the possibility of obtaining meaningful results if the gains from better point estimates provided by the inclusion of weights mitigate the loss of precision.

Finally, we tested the Missing at Random assumption, which presumes the observed characteristics account for all differences between Eurostat and Orbis. Based on this assumption, we expected calibrated Orbis data to represent firms not participating in the original Orbis survey, and, thus, to better represent the true EU corporate population. Our cell calibration methodology equalized the share of active firms of each cluster in Orbis to resemble Eurostat's share of active firms, therefore improving the representativeness of Orbis' active firms. However, cell calibration produced mixed results for the SME bankruptcy and creation rates – our main variables of interest.

We observe a 2.87% bankruptcy rate in pre-calibrated Orbis compared to a 7.78% bankruptcy rate in Eurostat. After applying cell calibration, Orbis shows a 2.79% bankruptcy rate, lower than its pre-calibrated counterpart. Moreover, the distribution of SME bankruptcy rates almost equals the distribution of the original Orbis data (***Figure 9***). However, this result is strongly associated with the initial years in our dataset. Average bankruptcy rates in the calibrated Orbis database show a late improvement relative to the original Orbis data, with larger rates in 2020 and 2021 (***Table 6***). Therefore, in the later years of our database, the average bankruptcy rates better reflect the true rates reflected in Eurostat. However, these results are still poor, as Eurostat's bankruptcy rate remains nearly three times the rate in the calibrated Orbis dataset.

Figure 9. Comparison of Bankruptcy Rates Across Databases



Source: Own elaboration

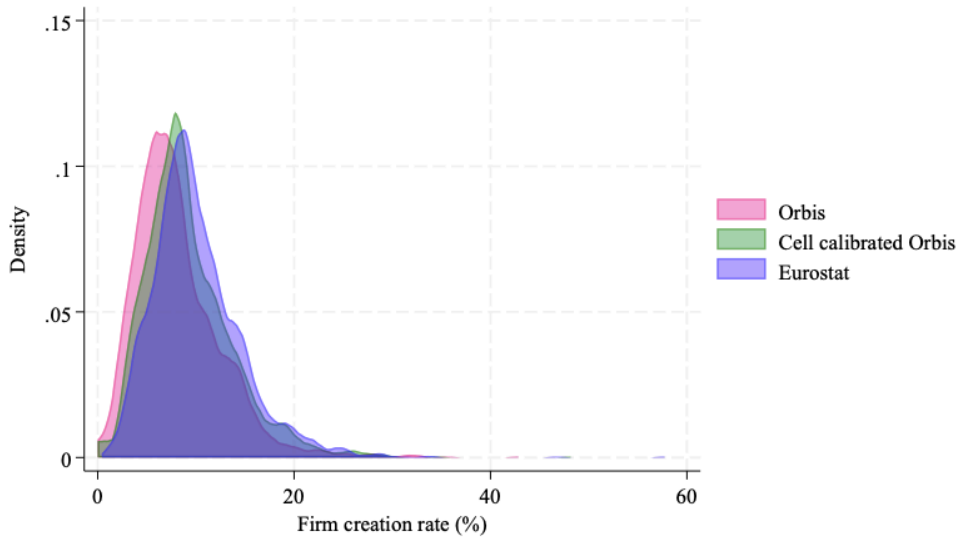
Table 6. Average Annual Bankruptcy Rates (%) Across Databases

Year	2015	2016	2017	2018	2019	2020	2021
Orbis database	2.80	2.26	2.84	3.61	2.87	2.76	2.87
Calibrated Orbis database	2.52	2.34	2.79	3.33	2.72	2.83	2.92
Eurostat database	7.57	7.65	7.21	7.24	8.28	7.67	8.77

Source: Own elaboration

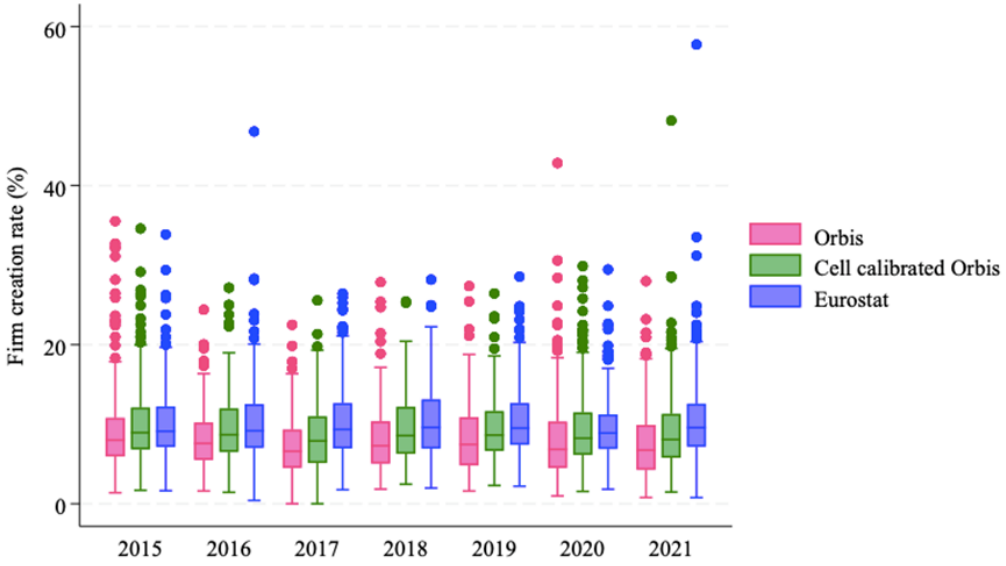
In contrast, the average firm creation rate across years increases from 8.1% to 9.1% after applying cell calibration to the Orbis database, closely resembling Eurostat's 9.7% firm creation rate. The distribution of firm creation rates in the calibrated Orbis database is also closer to the firm creation rate distribution in Eurostat (***Figure 10***). This alignment of the firm creation rate distribution between calibrated Orbis and Eurostat remains consistent for every year of our study. As shown in ***Figure 11***, the firm creation rates between 2015 and 2021 in the calibrated Orbis database have a similar distribution to Eurostat's distribution of firm creation rates. In most years, the volatility in the calibrated Orbis also decreases, compared to the original Orbis.

Figure 10. Comparison of Firm Creation Rates Across Databases



Source: Own elaboration

Figure 11. Comparison of Firm Creation Rates Across Databases, by Year



Source: Own elaboration

In summary, cell calibration somewhat improved Orbis' representativeness of the true EU corporate population. However, not all assumptions hold, especially the Missing at Random assumption. Consequently, while the calibrated Orbis' SME creation rates more closely resemble those of Eurostat and are thus more representative, the improvement in SME bankruptcy rates remains minimal. This may occur because the firms surveyed by Orbis exhibit clear differences from those not surveyed, such that those surveyed are less prone to bankruptcy. One example involves certain firms from the French Real Estate sector (overrepresented in Orbis), known as *société civile immobilière*. These enterprises, which individuals create to buy properties, have a low likelihood of default. Finally, the cell calibration technique increases the variability of our estimates.

6.2. Overall COVID-19 Impact on EU SME Bankruptcy and Creation Rates

This section reviews the results from applying the diff-in-diffs methodology – described in sub-section 5.2 of **Methodology** – to cell-calibrated data until December 2022. It assesses the overall impact of COVID-19 on SME bankruptcy and creation rates in general, and by country, sector, and firm age. The 'overall' COVID-19 impact encompasses everything that happened after March 2020 until December 2022: the pandemic by itself, governments' containment

measures, and the fiscal policy response. This section also compares the findings to those obtained by the same methodology but with not cell-calibrated data until March 2021, to assess the outcomes' evolution of bankruptcy and creation rates over time and with more representative data.

In sum, between March 2020 and December 2022, the population of SMEs in the EU decreased by 0.9% due to the COVID-19 shock. A lack of firm creation primarily drove this decline in the EU SME population, which also experienced fewer bankruptcies than expected without the pandemic. The COVID-19 impact on the SME population varied significantly across countries, with some countries experiencing increases in the SME population. From 2021 to 2022, this heterogeneity increased, suggesting the fiscal policy response did not offset this disparity. Heterogeneity of the COVID-19 impact across sectors also existed but occurred to a lesser extent than the variation observed across EU countries. Furthermore, only the youngest SMEs experienced more bankruptcies during the pandemic, further discouraging firm creation.

6.2.1. Overall COVID-19 Impact on SME Population in the EU

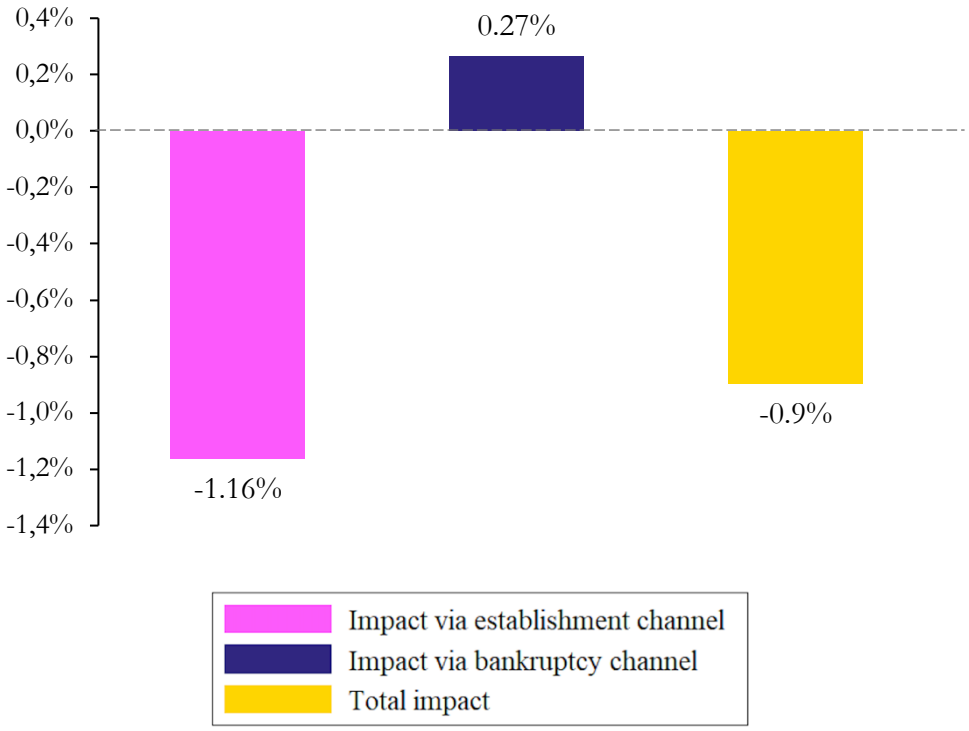
Figure 12 summarises the changes in the EU SME population after March 2020 and until December 2022, compared to the expectation without the pandemic (for detail on evolution over time, see **Appendix E**). These changes result from either the differences in SME creation rates (pink) or changes in SME bankruptcy rates (purple). After March 2020, a decline in the creation of SMEs reduced the SME population by 1.16%. Simultaneously, a decrease in the number of SMEs going bankrupt – caused by the temporary amendments in bankruptcy laws and the unprecedented policy response – increased the SME population by 0.27%.

Considering both the decline in SME creation rates and the decline in SME bankruptcy rates from March 2020 to December 2022, the overall population of EU SMEs declined by 0.9% (yellow), compared to the expectation without COVID-19. In our cell-calibrated version of Orbis dataset, this reduction translates to 434,107 missing SMEs, approximately equal to the number of SMEs in the French manufacturing sector or in Czechia's wholesale and retail trade sector.

If we compare these results to those obtained using data until March 2021 (**Figure F1** in **Appendix F**), the conclusions remain similar. The decline in the SME population results from a lack of firm creation, despite fewer bankruptcies than usual. The persistence of this

phenomenon up to December 2022, nearly three years after the pandemic's commencement, indicates a sustained long-term negative impact on the vitality of business dynamism across the EU. An explanation for this finding – further explored in section 6.3 – resides in a fiscal policy response excessively focused on protecting SMEs against bankruptcy, preventing creative destruction and the entry of new firms in the EU market.

Figure 12. Impact of COVID-19 on SME Population (by Dec 2022)



Source: Own elaboration with EIF collaboration

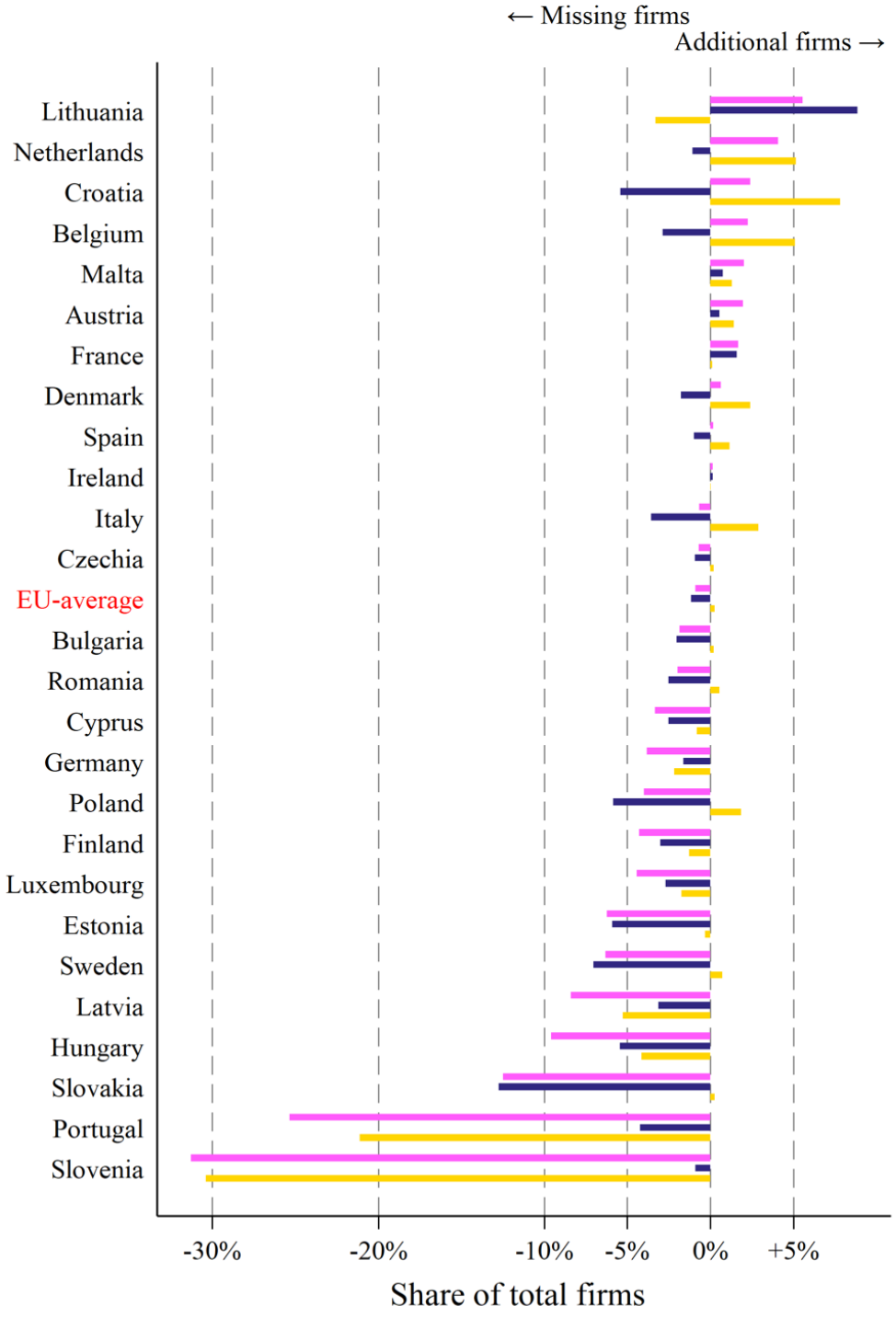
6.2.2. COVID-19 Impact by Country, Industry, and Firm Age

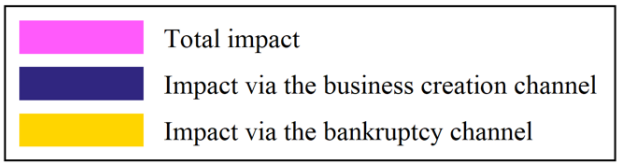
By Country

The impact of COVID-19 on the SME population in the EU varied significantly across countries (***Figure 13***, in pink). Approximately two-thirds of EU countries experienced a negative impact on SME population, while one-third benefited from the pandemic. Among the former, approximately half witnessed both a reduction in creation rates (purple) and an increase in bankruptcy rates (yellow), such as Germany, Finland, and Portugal. For other countries like Denmark, Italy, and Poland, the negative impact on the SME population resulted solely from a

reduction in firm creation. Among the countries that benefitted, like the Netherlands and Croatia, the increase in the SME population during the pandemic mainly resulted from lower bankruptcy rates than usual.

Figure 13. Impact of COVID-19 on SME Population, By Country (by Dec 2022)





Source: Own elaboration with EIF collaboration

When extending the data cut-off from March 2021 to December 2022 (***Figure F2*** in **Appendix F**), the impact of heterogeneity across countries intensifies. For example, Estonia's SME population shrank by approximately 3% by March 2021 to over 10% by December 2022. This finding suggests the fiscal policy response to the pandemic in the EU did not address the uneven distribution of the COVID-19 impact. This finding also aligns with a European Parliament report (Vet et al., 2021) attributing the uneven economic consequences of the pandemic to the different business support measures across EU countries. Additionally, varying levels of digitalization among member states, through remote working and e-commerce, played a key role, with more digitally advanced countries experiencing less economic hardship.

Some countries consistently experienced an increase in the number of SMEs over time, such as Croatia and France. By contrast, Portugal and Slovenia consistently experienced the largest declines in their SME population. By the end of December 2022, these two countries struggled with 25% of missing firms compared to historical averages. This extreme result may partly result from the selection of reference periods for historical averages, which experienced abnormally low rates of bankruptcies. However, that is not the whole story. Portugal, for example, ranked among the countries most severely hit by the pandemic in terms of GDP growth from 2019 to 2020, and possessed one of the lowest credit ratings, which limited the scope of the country's pandemic response. Portugal also exhibited the highest proportion of individuals employed by small enterprises, particularly vulnerable during the pandemic (European Commission, 2020).

Conversely, the corporate landscapes of certain countries experienced significant transitions from March 2021 to December 2022. Notably, this trend occurred in countries like Luxembourg and the Netherlands. Luxembourg initially experienced an increase in firm creation during the pandemic. This increase largely resulted from an influx of corporations establishing subsidiaries in the country partly motivated by the generous policy response of EU institutions and

Luxembourg's status as a low-tax country. These corporations also anticipated future tax increases in other countries, which factored into their decisions to establish a presence in Luxembourg. However, in a subsequent phase of the pandemic, Luxembourg experienced adverse effects on its corporate population size partly due to the introduction of the 15% minimum corporate tax rate that diminished the country's appeal as a tax haven. By December 2022, Luxembourg exhibited a 6.5% rate of missing SMEs and ranked among the countries with the largest declines in its SME population – a significant reversal from enjoying the most significant increase in its SME population by May 2021, even if the country's small corporate size exaggerated this shift.

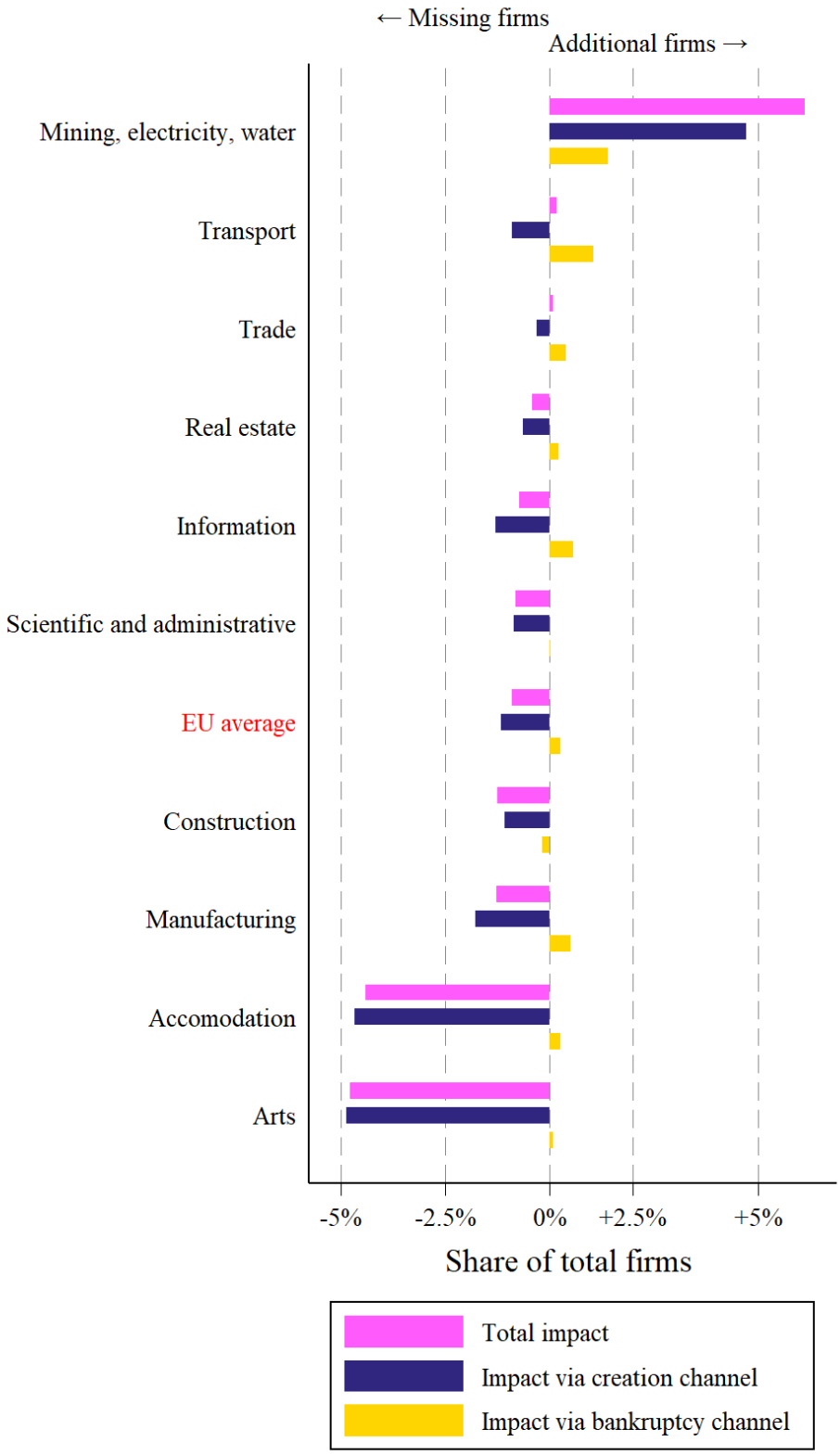
In contrast, the Netherlands experienced a modest negative impact on its SME population before leading the ranking in SME population size with a 3.3% rate of additional firms, achieved by a decrease in the bankruptcy rates. The Netherlands' Centraal Bureau voor de Statistiek (CBS, 2023) confirmed the existence of a positive change but highlighted the role of notable firm creations in SMEs, especially one-person businesses in the construction sector.

By Sector

The impact of COVID-19 on the SME population also varied across sectors (***Figure 14***), but to a lesser extent compared to the heterogeneity across countries. While a few sectors experienced an increase in SME population during the pandemic – mainly the Mining, Electricity & Water and the Transport sectors –, most sectors experienced a reduction in the number of SMEs following the COVID-19 shock in March 2020. Among all the sectors with missing SMEs, the negative impact primarily results from a decline in firm creations, despite fewer bankruptcies than usual.

The proportion of missing SMEs relative to the corporate population by December 2022 ranges from approximately 1% in the Real Estate sector to nearly 5% in Accommodation and Arts. Accommodation and Arts as the hardest-hit sectors aligns with the literature, which finds sectors reliant on human contact and customer interactions among the most vulnerable to the pandemic and containment measures such as lockdowns (Vet et al., 2021).

Figure 14. Impact of COVID-19 on SME Population, By Industrial Sector (by Dec 2022)



Source: Own elaboration with EIF collaboration

The Mining, Electricity & Water sector experienced the most significant decline in bankruptcies and an upturn in business creation by the end of December 2022. However, by March 2021 the same sector experienced a decline in its SME population (***Figure F3*** in Appendix F). Thus, the sector's expansion in SME population may partially result from the geopolitical aftermath following Russia's invasion of Ukraine. This event led to a steep increase in electricity prices from December 2021 amid the EU's embargo on most Russian oil imports and sanctions on Russia's energy sector (Falkner, 2023). This required a rapid reduction in the EU's energy reliance on Russia and prompted an urgent shift to source and produce energy within the EU (e.g., Accelerating Renewables Permitting program) (European Council, 2024).

The Information sector also showed a positive shift from March 2021 to December 2022, although to a lesser extent than the Mining, Electricity & Water sector. Initially impacted by a lack of firm creation, the Information sector managed to offset the lack of firm creations on its SME population. This improvement can be attributed to post-COVID-19 innovations and subsequent entrepreneurship, particularly within IT, which began materialising after approximately one year. This outcome aligns with McKinsey's (2020) argument that the COVID-19 pandemic significantly accelerated the digital transformation of businesses, particularly in the IT sector. This acceleration led to a rapid increase in IT firm creation and transformation, driven by the need to adapt to new ways of working and changing customer expectations.

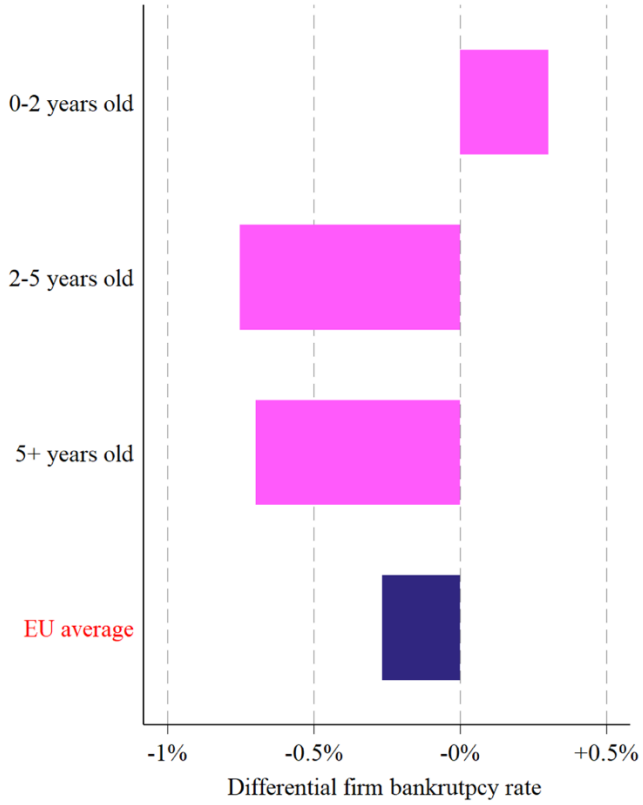
The Transport sector initially experienced a significant increase in the number of firms following the COVID-19 shock, but this impact diminished by December 2022. The initial rise in the Transport sector may have resulted from changes in mobility patterns following lockdowns and state-supported corporations, which adapted to new pandemic-related demands like the growth in delivery services and transportation of medical supplies and personnel. Then, in 2022, factors such as the war in Ukraine, high energy and fuel prices, and the worsening shortage of skilled workers (PwC Deutschland, 2023) presented barriers to entry for new actors in the industry, mitigating the initial positive effect on SME population.

By Firm Age

Finally, COVID-19 did not affect all SMEs equally. ***Figure 15*** shows the changes in bankruptcy rates during the pandemic, depending on SMEs' age – 0-2 years old, 2-5 years old, and over 5

years old. After March 2020, only the youngest SMEs aged 0-2 years old, i.e., the start-ups, experienced higher bankruptcy rates. By December 2022, the bankruptcy rate of the youngest SMEs shrank by 0.3% compared to the expected bankruptcy rate without COVID-19. Older SMEs, by contrast, experienced fewer bankruptcies during the pandemic, reflecting the public policy focus on protecting SMEs against default. This result emerged only after applying cell calibration and obtaining more representative data on SME bankruptcy rates, thus demonstrating the usefulness of the cell calibration technique (*Figure F4* in Appendix F).

Figure 15. Impact of COVID-19 on SME Bankruptcy Rates, by Firm Age (by Dec 2022)



Source: Own elaboration with EIF collaboration

This finding aligns with the OECD consideration of start-ups as the most affected SMEs during the COVID-19 pandemic. This result is particularly concerning, as the youngest firms create almost half of all new jobs, and thus contribute significantly to long-term productivity and economic growth (OECD, 2021). Moreover, higher bankruptcy rates among the youngest SMEs likely further disincentivized firm creation during the pandemic. This key finding underscores

that the pandemic-induced decline in the EU's SME population primarily resulted from the absence of firm creation (see section 6.2.1).

6.3. Fiscal Policy Response on EU SME Bankruptcy and Creation Rates

This section analyses the results from the two-way panel data linear regression model described in sub-section 5.3 of Methodology. The regression model descriptively isolates the correlation between fiscal policy deployment and SME bankruptcy and creation rates in the EU during the pandemic, while controlling for the COVID-19 intensity, as well as the containment measures and law amendments implemented across countries. Within this model, we distinguish between corporate fiscal policies, which aid enterprises, and non-corporate fiscal policies, which target individuals such as the unemployed or pensioners. First, we evaluate the relationship between fiscal policy deployment and SME bankruptcy rates, and how it differs by industry, firm age, and type of fiscal measure. Then, we assess the effects on SME creation rates, and how they differ by industry.

We mainly consider four different specifications of the regression model. In Model 1, we include fiscal policy deployment only, expressed as a percentage of national GDP. In Model 2, we add control variables: the COVID-19 death rate, capturing the intensity of the pandemic; the Stringency Index, summarizing the 'strictness' of public containment measures, and a binary variable denoting the existence of a temporary amendment to the bankruptcy law. In Model 3, we include 1- and 2-week lagged values of the fiscal policy deployment. In Model 4, we include 3- and 4-week[6] lagged values of the bankruptcy or creation rate. When including lagged values of the dependent variable, the R-squared coefficient increases substantially, suggesting that a change in SME bankruptcy or creation rates today is very likely to influence similar changes in the future. In other words, SMEs constitute an interdependent ecosystem.

In sum, the fiscal policy response between March 2020 and December 2022 appears to have better protected SMEs against bankruptcy, particularly through emergency lifeline measures. However, fiscal policies did not effectively stimulate SME creation. This finding supports the

[6] Including the 1 and 2 weeks lags would mirror the lags of the independent variable in Model 3, which are selected following the F-test approach. However, since the winsorization process artificially increases the correlation across the bankruptcy and creation rates within a 2-week span (see section 5.2), we decided not to include 1 and 2-week lags, and consider 3 and 4-week lags instead.

hypothesis of an excessive public focus on safeguarding incumbent SMEs, especially when considering the decline in the EU's SME population after March 2020 primarily resulted from a lack of firm creation. Moreover, not all SMEs benefited equally. Start-ups faced significant barriers in accessing fiscal aid, rendering them more susceptible to default. Consequently, this may have further discouraged firm entry. Additionally, certain industries with unusually low bankruptcy rates benefitted from fiscal aid, while others exhibited both lower bankruptcy and lower firm creation rates when fiscal support was high. These findings suggest poor targeting of the fiscal policy response in certain instances, potentially wasting resources on enterprises destined to exit the EU market instead of fostering the entry of new, more efficient SMEs.

6.3.1. Effect of Fiscal Policies on SME Bankruptcy Rates

Corporate Fiscal Policy Deployment

The fiscal policy response aimed at assisting enterprises during the pandemic seems to have been effective at reducing SME bankruptcy rates in the EU. Increasing the monetary amount of corporate fiscal policies is consistently associated with a decrease in SME bankruptcy rates, across the four model specifications (***Table 7***, first row). On average, a 1% increase in corporate fiscal policy deployment is associated with a 0.058 ppt decrease in SME bankruptcy rates (Model 4), holding everything else constant, which translates into a 2.4% decrease if evaluated at the average bankruptcy rate of 2.5%. This result, though modest in magnitude, is statistically significant at a 95% confidence level. The relationship is not contemporaneous; it occurs at least with a two-week delay (Model 3).

The suggested effectiveness of corporate fiscal policy deployment in mitigating SME bankruptcy rates holds across all industries (***Figure 16***). The estimated negative relationship between the two variables remains statistically significant for all sectors, either at a 99% or 95% confidence level. If the causality runs in the expected direction (i.e., from fiscal policies to bankruptcy rates, and not in the opposite direction), Transporting & Storage (6.4% decrease associated with a 1% increase fiscal policy amount) and Information & Communication (3.3%) seem to benefit the most from the fiscal policy response.

During the pandemic, governments across the EU supported the Transport & Storage sector, deeming it essential for the movement and storage of medical supplies, food, and other critical

products. Meanwhile, the Information & Communication sector, known for its innovation during this period, secured better access to bank loans and credit guarantees, thus reducing its likelihood of bankruptcy (Kaya, 2022). The analysis in section 6.2.2 confirms that both Transporting & Storage and Information & Communication experienced lower bankruptcy rates compared to the expected bankruptcy rates in the absence of COVID-19. This finding supports the hypothesis that, in certain instances, the EU's fiscal policy response inadequately targeted insufficiently productive enterprises. By allowing these enterprises to remain in the market, the fiscal policy response hindered the process of creative destruction.

Not all SMEs seem to have benefited equally from the corporate fiscal policies deployed during the pandemic (***Figure 17***). Middle-aged SMEs, aged between 2 and 5 years old, appear as the main beneficiaries. They show the largest, most statistically significant decrease in bankruptcy rates associated with fiscal aid; on average, a 1% increase in the amount of corporate fiscal policies is associated with a 6.7% decrease in middle-aged SMEs' bankruptcy rate, statistically significant at a 99% confidence level. This effect is larger and more statistically significant than the effect for both older firms (0.7%) and younger firms (1.7%). This seems intuitive as the oldest SMEs, aged over 5 years old, have had time to build up cash reserves and establish legal identities and relationships with banks, so they can weather economic downturns or low profit periods more easily.

Importantly, our results do not clarify why the fiscal policy response would protect middle-aged SMEs against bankruptcies better than the youngest SMEs. One explanation is that firms in their nascent stages, or start-ups, typically experience low overhead costs with few employees to pay, possibly rendering them less reliant on emergency fiscal support measures during economic downturns. However, as discussed in the previous section 6.2.2, the youngest SMEs were the only firm age group to suffer higher bankruptcy rates than usual during the pandemic. And still, they do not seem to benefit much from the fiscal policy response. This suggests an alternative explanation, based on the high barriers that the youngest enterprises faced to access fiscal aid during COVID-19. For example, many governments required proof of past profits, a requirement that start-ups simply could not meet (OECD, 2021).

Within corporate fiscal policies aimed at assisting enterprises, emergency lifeline measures, including loans, credit guarantees, and equity injections, drove the associated decline in SME

bankruptcy rates (***Table 8***, first row). By contrast, demand support measures – encompassing more direct support, like subsidies and tax deferrals and reductions – correlate with an increase in SME bankruptcy rates (***Table 8***, second row), even if the relationship is significant only at a 90% confidence level. However, this could reflect reverse causality, where countries experiencing higher bankruptcy rates during the pandemic may have prioritized demand support measures over emergency lifeline interventions. The literature supports the first explanation: according to Deb et al. (2021), emergency lifeline measures demonstrated greater effectiveness throughout 2020 by providing enterprises with crucial cash flow and liquidity support during periods of high containment measures and constrained economic activity.

Non-Corporate Fiscal Policy Deployment

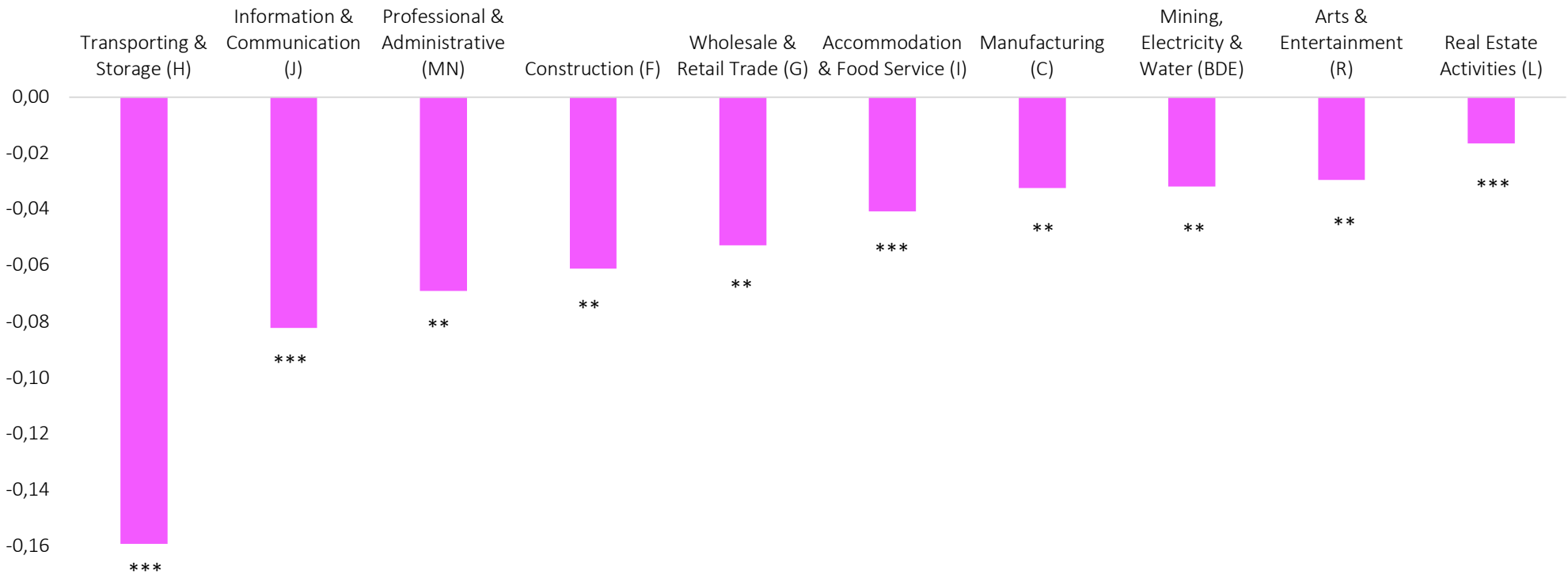
A trade-off seems to exist between assisting economic agents other than enterprises – i.e., individuals like homeowners, pensioners, and unemployed – and protecting SMEs against bankruptcy (***Table 7***, second row). An increase in the amount of non-corporate fiscal policies is associated with an increase in SME bankruptcy rates. This effect more than doubles the effect of corporate fiscal measures; on average, a 1% increase in non-corporate fiscal policy deployment is related to a 0.145 ppt increase in SME bankruptcy rates (Model 4), equivalent to a 5.8% increase if evaluated at the mean. The result is significant at the 95% confidence level. One possible explanation for this finding suggests that supporting individuals might have enabled them to cease working for their employers, potentially resulting in more bankruptcies. However, since these are correlations, countries plausibly deployed more generous fiscal aid to protect their SMEs because of higher bankruptcy rates during more severe stages of the pandemic.

Table 7. (Corporate vs Non-Corporate) Fiscal Policy Deployment on SME Bankruptcy Rates (Mar 2020 – Dec 2022)

SME Bankruptcy Rate	Model 1	Model 2	Model 3	Model 4
Corporate fiscal policies	-0.0803***	-0.0796**	-0.0200	-0.0588**
	(0.03)	(0.03)	(0.02)	(0.02)
L1 (Corporate)			-0.0209	
L2 (Corporate)			-0.0468**	
Non-Corporate fiscal policies	0.1781**	0.1929**	0.0143	0.1447**
	(0.08)	(0.07)	(0.07)	(0.05)
L1 (Non-Corporate)			0.0409	
L2 (Non-Corporate)			0.1547***	
COVID-19 death rate		1.7674	2.0157	1.4782
Stringency Index		-0.7359	-0.8712	-0.6688
Temporary amendments = 1		0.2768	0.4135	0.2717
L3 (Bankruptcy Rate)				0.9484***
L4 (Bankruptcy Rate)				-0.6449***
Constant	2.8106***	3.0414***	3.0755***	2.1716***
R-squared	0.030	0.032	0.037	0.294

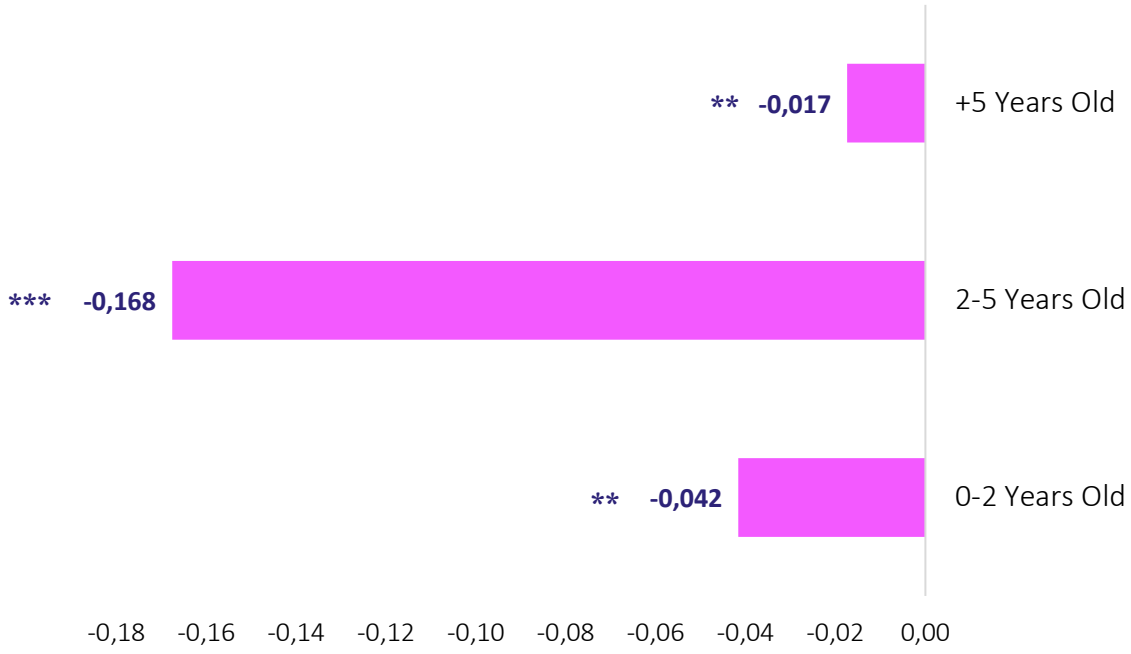
Robust standard errors in parenthesis (for main regressors)
*** p-value < 0.01, ** p-value < 0.05, * p-value < 0.1
L() denote lagged values

Figure 16. Estimated Coefficient of Corporate Fiscal Policy Deployment on SME Bankruptcy Rates, By Industry (Mar 2020 - Dec 2022)



Note: These estimated coefficients correspond to the first row in ***Table 7*** (Model 4), but considering only data on each industry at a time

Figure 17. Estimated Coefficient of Corporate Fiscal Policy Deployment on SME Bankruptcy Rates, By SME Age (Mar 2020 - Dec 2022)



Note: These estimated coefficients correspond to the first now in *Table 7* (Model 4), but considering only data on each firm age category at a time.

Table 8. (Emergency Lifeline vs Demand Support) Corporate Fiscal Policy Deployment on SME Bankruptcy Rates (Mar 2020 – Dec 2022)

SME Bankruptcy Rate	Model 1	Model 2	Model 3	Model 4
Emergency Lifeline fiscal policies	-0.0938**	-0.0849**	-0.0387**	-0.0653**
	(0.04)	(0.04)	(0.02)	(0.03)
L1 (Emergency Lifeline)			-0.0087	
L2 (Emergency Lifeline)			-0.0443	
Demand Support fiscal policies	0.2048	0.2339*	0.2017*	0.1704*
	(0.13)	(0.12)	(0.11)	(0.09)
L1 (Demand Support)			-0.0408	
L2 (Demand Support)			0.0794	
COVID-19 death rate		0.0316**	0.0272*	0.0219**
Stringency Index		-1.0240*	-0.9100	-0.7496
Temporary amendments = 1		-0.0698	-0.1137	-0.0861
L3 (Bankruptcy Rate)				0.9158***
L4 (Bankruptcy Rate)				-0.6399***
Constant	2.8224***	3.2878***	3.2936***	2.4332***
R-squared	0.046	0.051	0.054	0.297

Robust standard errors in parenthesis (for main regressors)
*** p-value < 0.01, ** p-value < 0.05, * p-value < 0.1
L() denote lagged values

6.3.2. Effect of Fiscal Policies on SME Creation Rates

The deployment of fiscal policies aimed at mitigating the effects of the COVID-19 pandemic in the EU shows no correlation with changes in the creation of SMEs, regardless of whether the target audience is firms or individuals. After including control variables, the statistically significant relationship between fiscal policies and firm creation disappears (***Table 9***), first and second rows). This finding supports our hypothesis in section 6.2.1: the absence of firm creations that precipitated the decline in the EU's SME population during the pandemic suggests that the fiscal policy response in the EU prioritized protecting enterprises against bankruptcy, while neglecting the potential benefits of stimulating firm creation.

The relationship between corporate fiscal policy deployment and SME creation across different industries (***Figure 18***) is either negative or not statistically significant for most sectors. The exception to this trend is the Transporting & Storage sector. This sector needed to adapt to new pandemic-related demands, such as a rise in online shopping, prompting the use of public funds for an expansion of the sector (Khaliq, Khan, & Niazi, 2021; Gu et al., 2021). This sector also received significant assistance from the EU to sustain operations, notably through initiatives like the Green Lane Initiative, aimed at ensuring uninterrupted road freight transport flows across the EU (Rodrigues et al., 2021).

Furthermore, some sectors, mainly Information & Communication and Professional & Administrative Activities, simultaneously experienced declines in SME creation rates (***Figure 18***) and some of the largest declines in SME bankruptcy rates (***Figure 16*** above) associated with the fiscal aid deployed during the pandemic. These same sectors faced a loss in SME population after March 2020, compared to the expected reduction in SME population without COVID-19, because of a lack of enterprise creation (***Figure 14*** above). Policymakers allocated public funds to firms that did not require assistance, inhibiting creative destruction and business dynamism, and ultimately contributing to the decrease in the overall SME population in the EU.

Table *9* (fourth main row) shows the SME creation during the pandemic is positively associated with the intensity of governmental containment measures, including lockdowns, captured by the Stringency Index. On average, a 0.1 ppt increase in the Stringency Index (which ranges between 0 and 1, and has a standard deviation of 0.27), is associated with an increase of 0.073

ppt in the SME creation rate, at a 95% confidence level, holding everything else constant. If evaluated at the average SME creation rate of 1.96%, this translates into an increase of 3.7% in the firm creation rate. Different possible explanations exist for this finding. The result could reflect that the EU governments who implemented serious containment measures increased public confidence in the state's ability to control the pandemic, which in turn encouraged firm creation. Alternatively, the finding may reflect the entrepreneurs that emerged from the lockdowns.

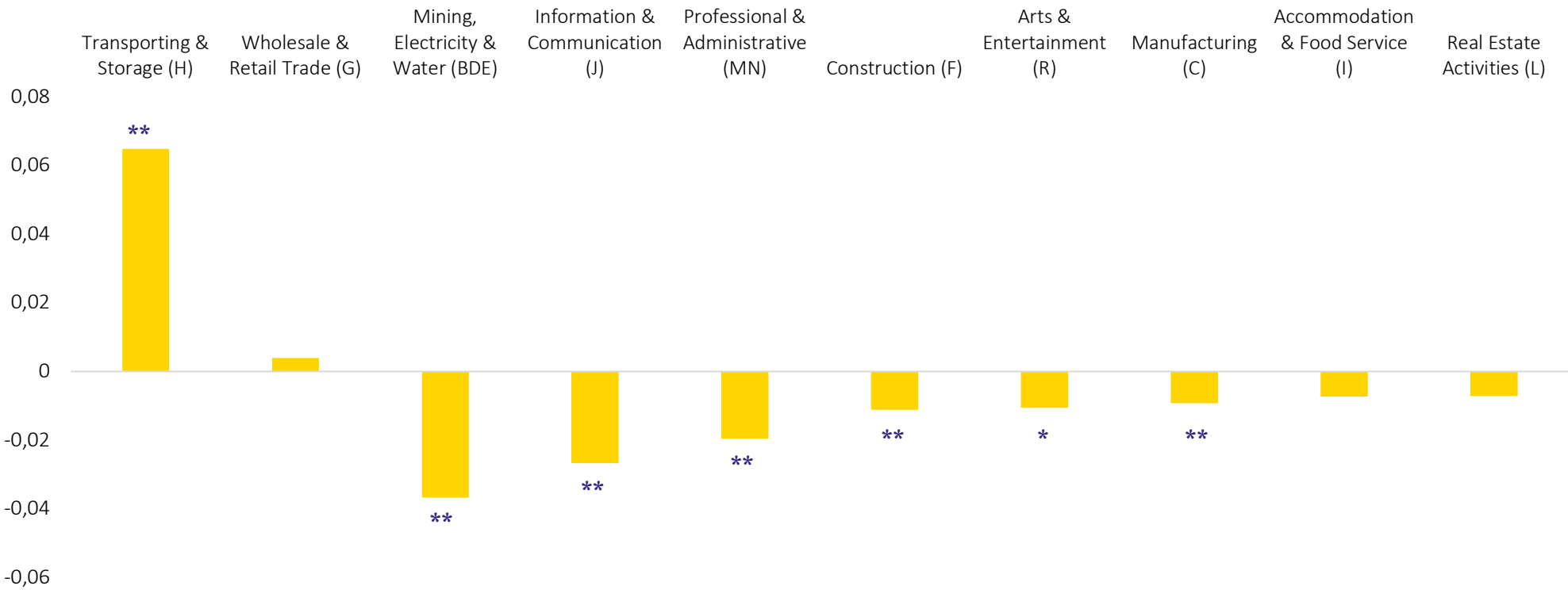
By contrast, SME creation during the pandemic is negatively associated with the presence of temporary amendments to bankruptcy laws, aimed at deferring firm bankruptcy proceedings (***Table 9***, fifth main row). On average, a temporary bankruptcy law amendment is associated with a 17.7% decrease in SME creation rates, when evaluated at the mean. This coefficient is statistically significant at a 95% confidence level. This evidence further supports the hypothesis that preserving SMEs in the market, including less productive firms, hindered creative destruction and thereby inhibited the entry of new, more efficient enterprises. However, since the estimated coefficients reflect correlations only, it is also possible that countries severely impacted by the pandemic experienced reduced firm creation rates and increased bankruptcy rates, prompting them to amend national bankruptcy laws.

Table *9. (Corporate vs Non-Corporate) Fiscal Policy Deployment on SME Creation Rates (Mar 2020 – Dec 2022)*

SME Creation Rate	Model 1	Model 2	Model 3	Model 4
Corporate fiscal policies	-0.0105**	-0.0084	-0.0397***	-0.0055
	(0.00)	(0.01)	(0.01)	(0.01)
L1 (Corporate)			-0.0036	
L2 (Corporate)			0.0388***	
Non-Corporate fiscal policies	0.0230**	0.0067	0.0016	0.0022
	(0.01)	(0.01)	(0.03)	(0.01)
L1 (Non-Corporate)			-0.0008	
L2 (Non-Corporate)			0.0123	
COVID-19 death rate		-0.8472	-0.9804	-0.8842
Stringency Index		0.7976**	0.6451**	0.7291**
Temporary amendments = 1		-0.4137**	-0.4286**	-0.3473**
L3 (Creation rate)				0.7528***
L4 (Creation rate)				-0.5153***
Constant	2.0122***	1.7486***	1.7847***	1.2905***
R-squared	0.003	0.025	0.031	0.249

Robust standard errors in parenthesis (for main regressors)
*** p-value < 0.01, ** p-value < 0.05, * p-value < 0.1
L() denote lagged values

Figure 18. Estimated Coefficient of Corporate Fiscal Policy Deployment on SME Creation Rates, By Industry (Mar 2020 - Dec 2022)



Note: These estimated coefficients correspond to the first now in **Table *9*** (Model 4), but considering only data on each firm age category at a time.

7. Conclusions and Policy Implications

7.1. Conclusions

This report aimed to understand the impact of COVID-19 and the fiscal policy response effects on SME bankruptcy and creation rates, as well as the resulting evolution of the EU's SME population. Expanding upon Brault (2023)'s analysis, we improved our dataset's representativeness through cell calibration, and we applied difference-in-differences and two-way panel data linear regression models to evaluate the overall impact of COVID-19 and the effectiveness of fiscal policy deployment between March 2020 and December 2022 on SME bankruptcy and creation rates. Below, we summarise the main conclusions of our analysis.

Cell calibration improved data representativeness with limited success

To improve the data representativeness of the data on SME bankruptcy and creation rates from the Orbis database, we applied a cell calibration technique and obtained mixed results. SME creation rates became more representative of the true EU population (captured by Eurostat database), and this improvement remained consistent across all years in our analysis. However, Orbis SME bankruptcy rates remained low even after cell calibration, compared to the true rates observed in the EU. Selection bias in Orbis explains this finding, as the database provider surveys enterprises less likely to go bankrupt than non-surveyed firms. In turn, this limits the accuracy and external validity of our results.

This exercise underscores data limitations as the first main challenge for cross-national analyses assessing the COVID-19 impact on enterprises. Different countries provide limited and partialized information subject to national regulations. International organizations obtain comparable data, but often experience significant lags and lose detail during the data harmonization phase. Although the Orbis dataset offered an intriguing alternative, particularly due to its weekly and detailed nature, our analysis reveals its inherent limitations. Future research should leverage this understanding of the limitations to mitigate the bias during the data collection stage and achieve greater accuracy in results.

The absence of firm creation drove the decline in the EU SME population during COVID-19

During the pandemic, SME creation and bankruptcy rates decreased in the EU. However, the decline in SME creation surpassed the reduction in bankruptcies, leading to an overall decrease in the EU's SME population by 0.9%. This decline translates to approximately 430,000 fewer SMEs – equivalent to the entire sector of French manufacturing SMEs. The continued decline in the SME population until December 2022, despite lower bankruptcy rates, highlights a sustained, long-term negative impact on business dynamism across the EU. Notably, the existing academic literature overlooks this significant conclusion, due to its narrow focus on SME bankruptcies during the pandemic and neglect of the trends in SME creation.

The fiscal policy response to COVID-19 in the EU effectively protected SMEs from bankruptcy, but did not promote firm creation

The fiscal policy response aimed at assisting enterprises within the EU during the pandemic appears effective at reducing SME bankruptcy rates, particularly through the implementation of emergency lifeline measures such as loans, credit guarantees, and equity injections. However, the deployment of fiscal policies does not seem to have stimulated SME creation during the pandemic. This finding supports the hypothesis of an excessive public focus on safeguarding incumbent SMEs, especially when considering the decline in the EU's SME population after March 2020 primarily resulted from a lack of firm creation.

In line with this hypothesis, existing academic literature highlights that some fiscal policies deployed in the EU wasted money on firms that did not need the support or on insufficiently productive firms. This, in turn, prevented creative destruction and thus the entry of new, more efficient enterprises (Gourinchas et al., 2021; Demmou et al., 2021, among others). Moreover, our study identifies a negative association between SME creation and the presence of temporary amendments to bankruptcy laws during the pandemic, further supporting this hypothesis.

The COVID-19 impact was highly heterogeneous across countries, sectors, and firm age groups

The impact of COVID-19 on the SME population in the EU varied significantly across countries. Approximately two-thirds of EU member witnessed a decline in their SME population, while one-third experienced an increase in the presence of SMEs. The impact of COVID-19 was also heterogeneous across sectors, though to a lesser degree. While certain sectors, mainly Mining,

Electricity & Water and Transport & Storage, experienced an increase in the number of SMEs during the pandemic, most industries experienced a loss in SME population.

Furthermore, COVID-19 did not affect all SMEs equally. The youngest SMEs (0-2 years old), or the 'start-ups', were the only group with higher bankruptcy rates during the pandemic, compared to what would be expected without the COVID-19 shock. Older SMEs, by contrast, experienced fewer bankruptcies. This finding is especially relevant, as start-ups are major contributors to job creation, accounting for nearly half of new jobs and playing a crucial role in long-term productivity and economic growth (OECD, 2021). Also, the heightened bankruptcy rates among start-ups likely exacerbated the challenges in SME creation during the pandemic.

The fiscal policy response did not address the uneven distribution of the COVID-19 impact

The heterogeneity of the COVID-19 impact across countries, sectors, and firm age remained similar or intensified from March 2021 to December 2022. This suggests that the fiscal policy response to the pandemic in the EU inadequately addressed the uneven distribution of the COVID-19 impact. In line with this finding, the results obtained by our panel data regression models show poor targeting of fiscal policies in some cases. In particular, some sectors experienced simultaneous reductions in SME bankruptcy and creation rates attributable to fiscal aid during the pandemic, and experienced a decline in the SME population after March 2020 solely because of a lack of firm creation.

Furthermore, SMEs did not benefit equally from the fiscal policy response. Compared to middle-aged SMEs (2-5 years old), the youngest SMEs (0-2 years old) did not meaningfully benefit from EU fiscal aid measures, despite experiencing substantially higher bankruptcy rates during the pandemic. This disparity may partly result from the high barriers that young SMEs encountered in accessing fiscal assistance, including regulatory requirements to prove past profitability – a criterion often unattainable for start-ups.

Opportunities for further research

Our analysis possesses certain limitations. The difference-in-differences assessment of the overall impact of COVID-19 does not conclusively support the parallel trends assumption. Furthermore, the diff-in-diffs model lacks the inclusion of covariates like fiscal policy

deployment or containment measures, due to endogeneity concerns. Moreover, the explanatory variables in our regression models are not exogenous, as they may correlate with the error term via simultaneous causality and omitted variable bias.

Moving forward, future research should prioritize the inference of causality in the context of COVID-19's impact and the effects of fiscal policy interventions on SME bankruptcy and creation rates. To better justify a causal inference, opportunities for future research include micro-level data analysis examining the implementation of specific policies in selected countries and the exploration of alternative methodologies such as regression discontinuity or synthetic controls.

7.2. Policy Implications

Our analysis offers lessons for policymakers to enhance pandemic recovery efforts and better respond to other current and future crises, including the energy crisis triggered by the Russian Federation's invasion of Ukraine in February 2022. Considering that SMEs are the backbone of the EU economy, enhancing SMEs' dynamism and resilience becomes crucial to meet the EU's objectives in innovation, research and development, entrepreneurship, growth, and employment. While our findings do not establish causality, they offer key insights into the impact of COVID-19 and the effectiveness of the consequent fiscal policy response that inform how policymakers may focus their attention and resources.

We distill our implications into four primary policy lessons. The first two focus on policies aimed at mitigating the enduring repercussions of the COVID-19 crisis. Policymakers should consider the final two policy implications to address both the current challenges faced by SMEs and future unprecedented economic shocks.

1. Devote recovery funds to promote entrepreneurship and the creation of SMEs

The fiscal policy response to mitigate the impact of the COVID-19 pandemic in the EU proved effective at protecting SMEs from going bankrupt, but did not promte the creation of new SMEs. The public focus on safeguarding incumbent SMEs likely kept less productive businesses in the market, and hindered the process of creative destruction, preventing the entry of new, more efficient enterprises. Three years after the onset of the pandemic, the population of SMEs

in the EU remains small due to a lack of firm creation. The persistent struggle with the enduring effects of the pandemic on the culture of entrepreneurship in the EU poses a threat to innovation and economic growth, both in the present and in the future.

EU countries should prioritize entrepreneurship and innovation among SMEs. Policymakers can adapt the OECD's (2021) recommendations to their respective country context. These recommendations include devoting recovery funds towards SMEs, facilitating the transition of SMEs into the formal economy, encouraging disadvantaged groups like minority and women entrepreneurs to participate, eliminating barriers of entry to the market, and providing incentives and financing instruments targeted toward new SMEs. To directly support start-ups, legislation can provide loan subsidies that reduce the excess cost of credit for new firms – identified by academic research at the Bank of Spain as the most efficient policy in promoting the entry of high-growth startups in the aftermath of COVID-19 in the EU (Albert, Caggese, & González, 2020). Following these guidelines, both national authorities and European institutions, including the EIF, could revitalise the stagnant entrepreneurial SME ecosystem.

2. Reduce information and access barriers to improve take-up of fiscal policies, especially among younger firms

Disproportionately affected by the pandemic, younger SMEs in the EU, particularly start-ups aged 0-2 years old, experienced increased bankruptcy rates during the crisis while benefiting the least from implemented fiscal policies. Part of the explanation for this disparity lies in the information and access barriers faced by these enterprises, such as stringent eligibility requirements and proof of prior profitability, that hinder uptake of fiscal aid (OECD, 2021).

Resolving these access and information barriers would improve policy targeting and promote a more even distribution of the fiscal policies in the EU, ultimately stimulating the entry of more start-ups into the market. A key mandate of the Recovery and Resilience Fund (RRF) within the Next Generation EU package requires EU member states to alleviate the barriers, such as administrative burdens SMEs face when accessing financial aid. However, the midterm evaluation of the RRF, which covers the period from 2021 to 2023, showed that countries have not made progress in this area, and SMEs criticized the ineffective disbursement of RRF funds

allocated to them (European Commission, 2024). Our findings reinforce the need to improve the institutional efforts on this issue.

3. Enhance policy targeting towards the most vulnerable countries, sectors, and firms, mitigating the unequal impact of economic shocks such as COVID-19

Despite the success of the COVID-19 fiscal policy response in reducing SME bankruptcies, the impact remains relatively modest given the substantial amount of public funds spent, which contributed to a significant rise in government deficits within the EU. This finding suggests poor targeting of the fiscal policy response in the region. Furthermore, the fiscal policies deployed did not address the heterogeneous impact of COVID-19 across countries, sectors, and firms. These shortcomings can be attributed to the fact that many universal fiscal policies were hurriedly implemented in order to address an unprecedented and rapidly evolving crisis. Relying on such indiscriminate spending levels to tackle future crises is neither sustainable nor equitable; policymakers should pursue more flexible and better targeted policies instead.

The EU SMEs Relief Package (European Commission, 2023) exemplifies better targeted policies by employing a variety of regulatory tools to ensure that SME considerations and competitiveness remain central to the policymaking process. However, this is not the sole effort required. Additional recommendations include enhancing governments' practice and culture of monitoring and evaluation to regularly identify regions and sectors most affected by crises (European Commission, 2021), and a reduction in the use of uniform fiscal support programs, both at the national and the EU level. This approach could help address the energy crisis caused by the Russia-Ukraine war in Europe.

4. Find a balanced approach between safeguarding firms from bankruptcies and implementing policies that promote firm creation

A large amount of the fiscal policies implemented within the EU to mitigate the COVID-19 impact helped enterprises, not individuals. A missed opportunity, safeguarding individuals can also benefit the SME ecosystem by promoting entrepreneurship and firm creation. For example, one of our findings reveals a positive association between public health containment measures and SME creation. This partly captures entrepreneurs emerging from lockdowns, only to the extent that public policy adequately supports these individuals during the crisis.

The United States took a markedly different approach, primarily concentrating on individuals and implementing consumer-oriented support measures. According to Fikri and Newman (2024), this approach contributed to an increase in firm creation rates by 59% compared to pre-pandemic levels. In contrast, the EU continues to grapple with a persistent deficiency in entrepreneurship and firm creation.

Understanding both the advantages and disadvantages of these alternative strategies is essential for striking the right balance to effectively address future crises. This balance must continue to protect enterprises while also fostering a culture of entrepreneurship among citizens, to maximise business dynamism, employment opportunities, and sustainable economic growth in the medium and long-term. While defining the precise balance falls outside the scope of this research, it remains a crucial step for policymakers within the EU.

References

Albert, C., Caggese, A., & González, B. (2020). *The short- and long-run employment impact of covid-19 through the effects of real and financial shocks on new firms* (Bank of Spain Documentos de Trabajo N.2039) Retrieved from https://www.bde.es/f/webbde/SES/Secciones/Publicaciones/PublicacionesSeriadas/DocumentosTrabajo/20/Files/dt2039e.pdf

Adian, I., Doumbia, D., Gregory, N., Ragoussis, A., Reddy, A., & Timmis, J. (2020). *Small and medium enterprises in the pandemic: impact, responses, and the role of development finance*. (Policy Research Working Paper 9414). Retrieved from the World Bank website: https://doi.org/10.1596/1813-9450-9414

Arellano, M. (1987). Computing robust standard errors for within-group estimators. *Oxford Bulletin of Economics and Statistics*, *49*, 431-434. https://doi.org/10.1111/j.1468-0084.1987.mp49004006.x

Bajgar, M., Berlingieri, G., Calligaris, S., Criscuolo, C., and J. Timmis, (2020), C*overage and representativeness of Orbis data*. (OECD Science, Technology and Industry Working Papers, No. 2020/06), OECD Publishing, Paris. Retrieved from https://www.oecd-ilibrary.org/docserver/c7bdaa03-en.pdf?expires=1710967392&id=id&accname=guest&checksum=3FA6DB0404386D297425106BBFDC271B

Beck, N., & Katz, J. N. (2011). Modeling dynamics in time-series–cross-section political economy data. *Annual Review of Political Science*, *14*, 331-352. Retrieved from https://www.annualreviews.org/content/journals/10.1146/annurev-polisci-071510-103222

Brault, J. (2023). *Recent trends in EU corporate demography and policy: COVID and beyond* (EIF Working Paper 2023/90). European Investment Fund (EIF). Retrieved from http://hdl.handle.net/10419/273570

Brick, J. M., & Kalton, G. (1996). Handling missing data in survey research. *Statistical Methods in Medical Research*, *5*(3), 215–238. https://doi.org/10.1177/096228029600500302

Cameron C., A., & Miller, D. L. (2015). A Practitioner's Guide to Cluster-Robust Inference. *Journal of Human Resources*, *50*(2), 317–372. https://doi.org/10.3368/jhr.50.2.317

Camonita, F., Dantas, C., Tageo, V., Moreira, A., Corsello, A., Louceiro, J., (2022). *Crisis costs for European SMEs: How COVID-19 changed the playing field for European SMEs.* European Economic and Social Committee. Retrieved from https://www.eesc.europa.eu/en/our-work/publications-other-work/publications/crisis-costs-european-smes

Coad, A., Bauer, P., Domnick, C., Harasztosie, P., Pál, R., & Teruel, M. (2023). *Which European firms were hardest hit by COVID-19?* (EIB Working Papers 2023/05). European Investment Bank (EIB). https://doi.org/10.2867/551079

Coutinho, L., Kappeler, A., & Turrini, A. (2023). *Insolvency frameworks across the EU: Challenges after COVID-19.* (European Commission discussion paper 182). https://doi.org/10.2765/524729

Deb P., Furceri. D., Ostry. J. D., Tawk. N.; Yang. N. (2021) *The Effects of Fiscal Measures During COVID*-19. (IMF Working Paper No. 2021/262). Retrieved from https://www.imf.org/en/Publications/WP/Issues/2021/11/05/The-Effects-of-Fiscal-Measures-During-COVID-19-504347

Debrun, X., Masuch, K., Vansteenkiste, I., Ferdinandusse, M., Von Thadden, L., Hauptmeier, S., Alloza, M., Bańkowski, K., Semeano, J. D., Eisenschmidt, J., Bletzinger, T., Bouabdallah, O., Galati, G., Burriel, P., Gardó, S., Checherita-Westphal, C. D., Hammermann, F., Haroutunian, S. K., Cimadomo, J., … Penciu, A. (2021). *Monetary-Fiscal Policy Interactions in the Euro Area*. (European Central Bank Occasional Paper Series No 273). Retrieved from https://www.ecb.europa.eu/pub/pdf/scpops/ecb.op273~fae24ce432.en.pdf

Demmou, L., Calligaris, S., Franco, G., Dlugosch, D., McGowan, M.A., & Sakha, S. (2021), *Insolvency and debt overhang following the COVID-19 outbreak: Assessment of risks and policy responses*, (OECD Economics Department Working Papers, No. 1651). https://doi.org/10.1787/747a8226-en.

Dörr, J. O., Murmann, S., & Licht, G. (2021). *The COVID-19 insolvency gap: First-round effects of policy responses on SMEs*. (ZEW-Centre for European Economic Research Discussion Paper 21-18). Retrieved from https://www.zew.de/en/publications/the-covid-19-insolvency-gap-first-round-effects-of-policy-responses-on-smes-1

Đukić, A., Štaka, M., & Drašković, D. (2021). The Impact of the COVID-19 Pandemic on the Macroeconomic Aggregates of the European Union. *Economics*, 9(2), 91–108. https://doi.org/10.2478/eoik-2021-0023

Ebeke, C., Jovanovic, N., Valderrama, L., & Zhou, J. (2021). *Corporate Liquidity and Solvency in Europe during COVID-19: The Role of Policies*. (IMF Working Papers 21(278)). https://doi.org/10.5089/9781513570914.001

Echebarria F., J. (2021). A Critical Analysis on the European Union's Measures to Overcome the Economic Impact of the COVID-19 Pandemic*. European Papers- A Journal on Law and Integration*, (5), 1-25. https://doi.org/10.15166/2499-8249/437

Energy prices and security of supply. (2024, March 5). Retrieved from https://www.consilium.europa.eu/en/policies/energy-prices-and-security-of-supply/

European Commission. (2023). *Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions - SME Relief Package.* Retrieved from https://single-market-economy.ec.europa.eu/document/download/8b64cc33-b9d9-4a73-b470-8fae8a59dba5_en?filename=COM_2023_535_1_EN_ACT_part1_v12.pdf

European Commission. (2024). *Mid-term evaluation of the Recovery and Resilience Facility.* Retrieved from https://commission.europa.eu/document/download/17c82840-518c-4c3d-ba98-7dae436b3a70_en?filename=SWD_2024_70_1_EN_autre_document_travail_service_part1_v4.pdf

European Commission, Directorate-General for Economic and Financial Affairs, Canton, E., Colasanti, F., Durán, J. (2021). *The sectoral impact of the COVID-19 crisis: an*

unprecedented & atypical crisis, (European Economy Economic Briefs 069). Retrieved from https://data.europa.eu/doi/10.2765/982245

European Commission Press corner. (2023, September 12). *Questions and Answers: Communication on SMEs relief.* Retrieved from https://ec.europa.eu/commission/presscorner/detail/en/qanda_23_4411

European Stability Mechanism. (2020, November 26). *ESM Pandemic Crisis Support*. Retrieved from https://www.esm.europa.eu/content/europe-response-corona-crisis

Eurostat (2023, November 7). *Structural business statistics overview.* Retrieved from https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Structural_business_statistics_overview

Executive Agency for Small and Medium sized Enterprises., LE Europe., CARSA., PwC., & DIW econ. (2021). *Annual report on European SMEs 2020/2021: Digitalisation of SMEs.* Retrieved from https://data.europa.eu/doi/10.2826/56865

Falkner, R. (2023). Weaponized energy and climate change: assessing Europe's response to the Ukraine war. *LSE Public Policy Review*. https://doi.org/10.31389/lseppr.78

Fikri, K., & Newman, D. (2024, January 17). How the Pandemic Rebooted Entrepreneurship in the U.S. *Harvard Business Review*. Retrieved from https://hbr.org/2024/01/how-the-pandemic-rebooted-entrepreneurship-in-the-u-s

Gal, P. N. (2013). *Measuring Total Factor Productivity at the Firm Level using OECD-ORBIS*. *1049*. (OECD Economics Department Working Papers No. 1049). https://doi.org/10.1787/5k46dsb25ls6-en

Gertler, M., and P. Karadi (2015): Monetary Policy Surprises, Credit Costs, and Economic Activity. *American Economic Journal: Macroeconomics*, *7*(1), 44–76 Retrieved from https://www.aeaweb.org/articles?id=10.1257/mac.20130329

Gourinchas, P.-O., Kalemli-Özcan, Şebnem, Penciakova, V., & Sander, N. (2021). *Fiscal Policy in the Age of COVID: Does it 'Get in all of the Cracks?'* (National Bureau of Economic Research w29293). https://doi.org/10.3386/w29293

Gu, S., Ślusarczyk, B., Hajizada, S., Kovalyova, I., & Sakhbieva, A. (2021). Impact of the COVID-19 Pandemic on Online Consumer Purchasing Behavior. *Journal of Theoretical and Applied Electronic Commerce Research*, *16*(6), Article 6. https://doi.org/10.3390/jtaer16060125

Harasztosi, P., Maurin, L., Pál, R., Revoltella, D., & Wielen, W. van der. (2022). Firm-level policy support during the crisis: So far, so good? *International Economics*, *171*, 30–48. https://doi.org/10.1016/j.inteco.2022.04.003

Haziza, D., & Beaumont, J.-F. (2017). Construction of Weights in Surveys: A Review. *Statistical Science*, *32*(2), 206–226. Retrieved from http://www.jstor.org/stable/26408226

Hinterlang, N., Moyen, S., Röhe, O., & Stähler, N. (2023). Gauging the effects of the German COVID-19 fiscal stimulus package. *European Economic Review*, *154*, 104407. https://doi.org/10.1016/j.euroecorev.2023.104407

Office for National Statistics. (2021, February 1). *Impact of the coronavirus (COVID-19) pandemic on retail sales in 2020—Office for National Statistics*. Retrieved from https://www.ons.gov.uk/economy/grossdomesticproductgdp/articles/impactofthecoronaviruscovid19pandemiconretailsalesin2020/2021-01-28

Juergensen, J., Guimón, J., & Narula, R. (2020). European SMEs amidst the COVID-19 crisis: Assessing impact and policy responses. *Journal of Industrial and Business Economics*, *47*(3), 499–510. https://doi.org/10.1007/s40812-020-00169-4

Kalemli-Ozcan, S., Sorensen, B., Villegas-Sanchez, C., Volosovych, V., & Yesiltas, S. (2015). *How to construct nationally representative firm level data from the Orbis global database: new facts and aggregate implications* (National Bureau of Economic Research WORKING PAPER 21558). https://doi.org/10.3386/w21558

Kalton, G. and Flores-Cervantes, I. (2003) Weighting Methods. *Journal of Official Statistics,19*,81-97. Retrieved from https://www.scb.se/contentassets/ca21efb41fee47d293bbee5bf7be7fb3/weighting-methods.pdf

Kaya, O. (2022). Determinants and consequences of SME insolvency risk during the pandemic. *Economic Modelling, 115*, 105958. https://doi.org/10.1016/j.econmod.2022.105958

Khaliq, A., Khan, F., & Niazi, A. A. K. (2022). Effects of the COVID-19 Pandemic on the Success of Traditional Small and Medium Enterprises (SMEs): An Investigation of the Footprints of Economic Crisis Attributable to COVID-19. *Frontiers in Psychology*, *13*, 924340. https://doi.org/10.3389/fpsyg.2022.924340

Lindner, V. (2022). Solidarity without conditionality. Comparing the EU covid-19 safety nets sure, pandemic crisis support, and European guarantee fund. *SSRN Electronic Journal*. https://doi.org/10.2139/ssrn.4000612

Mileusnic, M. (2023, September). *Transparency in the implementation of the Recovery and Resilience Facility*. (Briefing Next Generation EU (NGEU) delivery – Governance). Retrieved from https://www.europarl.europa.eu/RegData/etudes/BRIE/2023/751471/EPRS_BRI(2023)751471_EN.pdf

McKinsey & Company. (2020, October 5). *How COVID-19 has pushed companies over the technology tipping point—and transformed business forever.* Retrieved from https://www.mckinsey.com/capabilities/strategy-and-corporate-finance/our-insights/how-covid-19-has-pushed-companies-over-the-technology-tipping-point-and-transformed-business-forever

OECD. (2021). *One year of SME and entrepreneurship policy responses to COVID-19: Lessons learned to "build back better"*. Retrieved from https://www.oecd.org/coronavirus/policy-responses/one-year-of-sme-and-entrepreneurship-policy-responses-to-covid-19-lessons-learned-to-build-back-better-9a230220/

Pareto, A., & Pavone, A. (2010, May). *Balancing and Calibration in Survey Sampling: A Simulation Study. Paper presented at the 45th Scientific Meeting Italian Statistical Society Conference.* Retrieved from *https://www.researchgate.net/profile/AdrianoPareto/publication/313551224_Balanci*

ng_and_Calibration_in_Survey_Sampling_A_Simulation_Study/links/589dcd3e92851c7fb4bb11ae/Balancing-and-Calibration-in-Survey-Sampling-A-Simulation-Study.pdf

Pesaran, M. H. (2006). Estimation and inference in large heterogeneous panels with a multifactor error structure. *Econometrica*, *74*(4), 967–1012. https://doi.org/10.1111/j.1468-0262.2006.00692.x

PwC. (2023, January 24). *Deals-Geschehen in der Transport- und Logistikbranche bricht 2022 ein.* Retrieved from https://www.pwc.de/de/pressemitteilungen/2023/deals-geschehen-in-der-transport-und-logistikbranche-bricht-2022-ein.html

Rodrigues, M., Teoh, T., Sandri, Emilia., Lozzi, G., Marcucci, E., Gatta, V. (2021). *Research for TRANCommittee – Relaunching transport and tourism in the EU after COVID-19 – Freight transport.* European Parliament, Policy Department for Structural and Cohesion Policies, Brussels. Retrieved from https://www.europarl.europa.eu/RegData/etudes/STUD/2022/699608/IPOL_STU(2022)699608_EN.pdf

Solon, G., Haider, S. J., & Wooldridge, J. M. (2015). What Are We Weighting For? *Journal of Human Resources*, *50*(2), 301–316. https://doi.org/10.3368/jhr.50.2.301

Stock, J. H., & Watson, M. W. (2020). *Introduction to econometrics*. Pearson.

The Organisation for Economic Co-operation and Development (OECD). (2022). *2022 Update OECD G20 High Level Principle on SME Financing*. Retrieved from https://www.oecd.org/cfe/smes/2022-Update-OECD-G20-HLP-on-SME-Financing.pdf

Thombs, R. P. (2022). A Guide to Analyzing Large N, Large T Panel Data. *Socius*, *8*, 23780231221117645. https://doi.org/10.1177/23780231221117645

Tipton, E., & Mamakos, M. (2023). *Designing Randomized Experiments to Predict Unit-Specific Treatment Effects* (arXiv:2310.18500). Retrieved from http://arxiv.org/abs/2310.18500

Vet, J. M. D., Nigohosyan, D., Ferrer, J. N., Gross, A.-K., Kuehl, S., & Flickenschild, M. (2021, March). *Impacts of the COVID-19 pandemic on EU industries*. Retrieved from

https://www.europarl.europa.eu/RegData/etudes/STUD/2021/662903/IPOL_STU(2021)662903_EN.pdf

World Economic Forum (2020), *Discovering the real impact of COVID-19 on entrepreneurship*. Retrieved from https://www.weforum.org/agenda/2020/06/how-covid-19-will-change-entrepreneurial-business/

World Health Organization. (2020, March 11). *WHO Director-General's opening remarks at the media briefing on COVID-19 - 11 March 2020*. Retrieved from https://www.who.int/director-general/speeches/detail/who-director-general-s-opening-remarks-at-the-media-briefing-on-covid-19---11-march-2020

APPENDICES

Appendix A. Descriptive Statistics

This section describes the key variables we utilise to examine the effects of COVID-19 and the fiscal policy response on the EU SME population.

- SME Bankruptcy and Creation Rates

The weekly evolution of the SME bankruptcy rate and creation rates at the national level is essential to capture the evolution of EU corporate demography across countries. We constructed these two variables using Orbis data – SME bankruptcies and SME creations over the number of active SMEs, for the bankruptcy and the creation rate, respectively. We smooth the outliers of these variables following the winsorization process described by Brault (2023).

The average bankruptcy rate is 2.5%, with a variance of around 17 ppt, ranging from 0% (where in some countries and weeks, there is no registration of SMEs going bankrupt) to 63.1%- the highest value and corresponding to the last week of 2022 in Luxembourg. The average firm creation rate is equal to 1.9%, with a variance of around 2 ppt, ranging from 0% to 25.6%, with the highest values corresponding to Romania and Poland, during the transition periods from one year to another.

- Fiscal Policy Deployment

We consider two alternative classifications for the fiscal policies aimed at mitigating the COVID-19 impact, expressed in annualised percentages. First, we distinguish between corporate and non-corporate fiscal measures, based on the policies' target audience (**Table A*1***). Corporate fiscal measures involve all measures explicitly directed towards firms. Non-corporate fiscal measures target economic agents other than firms – i.e., households, renters, unemployed, employees, pensioners, etc. In our dataset, corporate fiscal policies explicitly directed towards firms average 4.35% of national GDP (in 2019), almost three times as large as non-corporate policies directed toward agents other than firms, equal to 1.15% of In part, this is because a great deal of corporate policies are emergency lifeline measures like loans and guarantees, which account for a larger amount of registered help, while many non-corporate policies are demand support measures, in particular subsidies.

Table A1. Fiscal Policies Included in Corporate and Non-Corporate Categories

Corporate Fiscal Policies
Investments in equity in enterprises, Credit guarantees to enterprises, Export guarantees, Loans to enterprises, Loans and Guarantees, Subsidies to enterprises (to cover lost revenues, to cover fixed costs, to support digitalisation…; firms affected by social distancing, firms helping fight the virus, social firms, firms in the hospitality sector, in the touristic sector, in the cultural sector…), Tax cuts (to corporate tax, to late payment penalties, to pensions contributions, to taxes of firms, to VAT and tariffs…), Tax delays (to corporate tax, to income tax, to social security contributions…)
Non-Corporate Fiscal Policies
Unemployment insurance, Credit guarantees to households, Loans to support renters and owners, Cuts to social contributions, Sick pay, Cuts (to social contributions, to real estate tax, to taxes of households, to taxes of real estate owners), Subsidies (to employees, home buyers, pensioners, renters, insurers…), Minimum income scheme, Parental support, Support (to education system, to local governments, to local promotional institutes)

Source: Own elaboration based on Brault's (2003) version of ESRB database

We also apply a second policy classification to differentiate the fiscal measures into emergency lifeline and demand support fiscal measures, following Deb et al. (2021). Emergency lifeline measures constitute an average of 3.5% of national GDP (in 2019), while the latter averages around 1.9% of GDP. Within the emergency lifeline support, the highest value is approximately 31% and corresponds to the fiscal deployment in France during the first weeks of the pandemic. Within the demand support policies, the highest values, around 15.2% and 19.1%, correspond to Cyprus and Latvia in 2020 and 2021, respectively.

- Temporary Amendments to Bankruptcy Laws

To mitigate the adverse impact generated by COVID-19, national authorities took various measures to prevent massive bankruptcies caused by the recession, including the suspension of bankruptcy filing and easing of notification obligations. We incorporate this insolvency amendment into our econometric analysis as a dummy variable, mainly using information from

ISOL Europe and the LexisNexis COVID-19 Tracker of Insolvency Reforms. Of the 27 EU countries, 19 implemented temporary suspension of insolvency filing to debtors, creditors, or both. The eight countries that did not implement these insolvency amendments include Croatia, Cyprus, Denmark, Greece, Ireland, Malta, the Netherlands, and Sweden (**Table A*2***).

Table A2. Presence of Temporary Amendment to Bankruptcy Law Across EU Countries

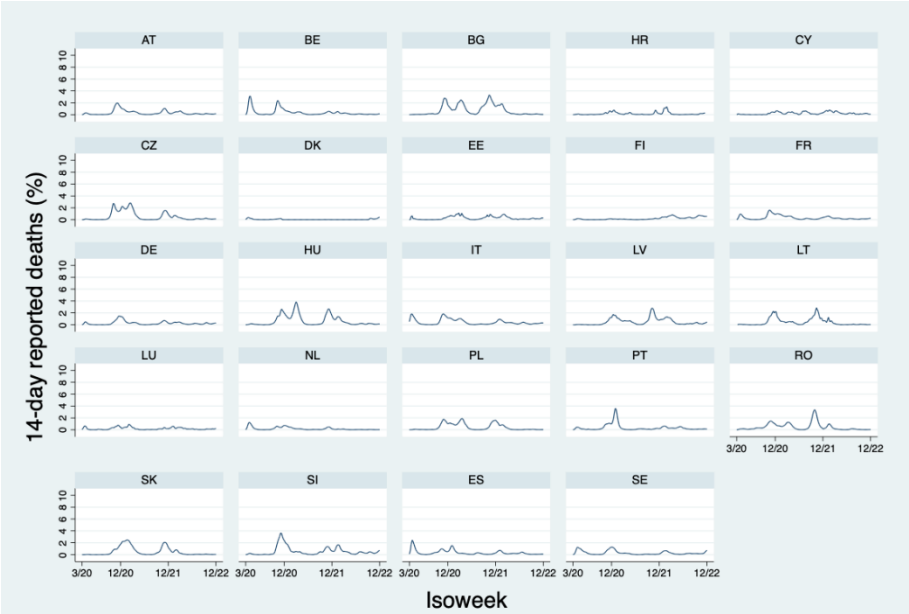
Country	Law Amend.	Start date	End date
Austria	1	1/3/20	1/31/202
Belgium	1	24/4/20	17/6/20
Bulgaria	1	13/3/20	28/4/20
Cyprus	0	-	-
Czechia	1	24/4/20	31/8/20
Germany	1	1/3/20	30/4/21
Denmark	0		
Estonia	1	12/3/20	17/5/20
Spain	1	14/3/20	31/12/21
Finland	1	28/4/20	31/10/20
France	1	12/3/20	24/8/20
Greece	0	-	-
Croatia	0	-	-
Hungary	1	11/4/20	31/12/22
Ireland	0		
Italy	1	17/3/20	30/9/21
Lithuania	1	16/3/20	31/12/20
Luxembourg	1	26/3/20	24/12/20
Latvia	1	12/3/20	1/9/20
Malta	0	-	-
Netherlands	0	-	-
Poland	1	18/4/20	1/7/23
Portugal	1	9/3/20	2/5/20
Romania	1	16/3/20	18/5/20
Sweden	0	-	-
Slovenia	1	13/3/20	30/9/20
Slovakia	1	12/3/20	28/2/21

Source: Own elaboration using ISOL Europe and LexisNexis COVID-19 Tracker

- COVID-19 death rate

To control for the differing magnitude of the COVID-19 shock across EU countries, we included the weekly evolution of the COVID-19 death cases by country. We considered the European Centre for Disease Prevention and Control's (ECDC) 14-day notification rate of COVID-19 deaths over 100,000 population, reported on a weekly basis by the EU Member States to the European Surveillance System (TESSy). We express the COVID-19 death rate as annualized percentages. The variable has an annualised mean value of 0.37% of COVID-19 deaths in a given week. This average takes values from 0.77% and 0.67% in countries like Bulgaria and Hungary, to 0.04% and 0.17% in Denmark and the Netherlands.

Figure A1. COVID-19 Death Rate Variable - Time Evolution Across Countries



Source: Own elaboration (Stata)

- COVID-19 Policy Stringency Variable

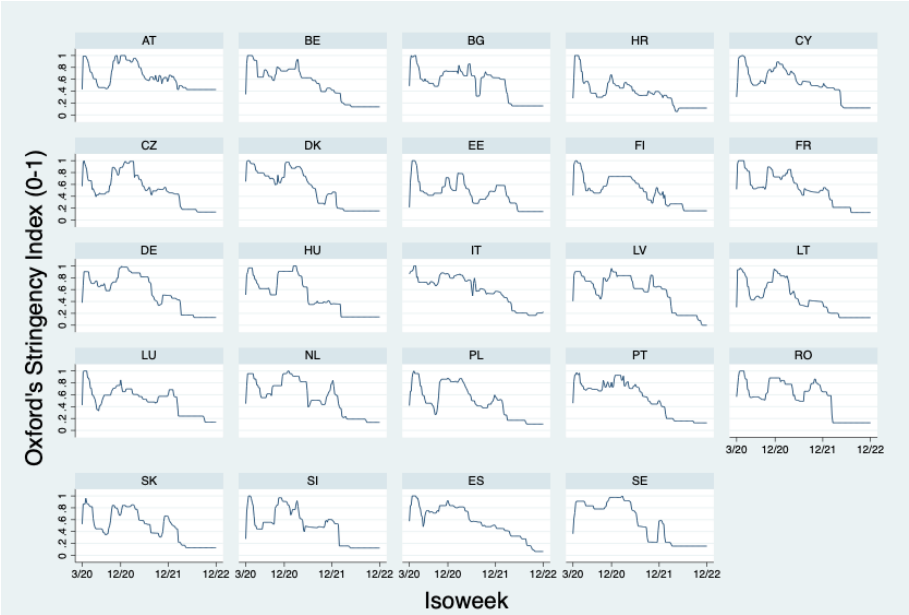
We also constructed a COVID-19 Policy Stringency variable, to capture the 'strictness' of COVID-19 policy measures, such as travel bans, school and workplace closures, and other restrictions on movement. For its construction, we used Oxford's COVID-19 Government Response Tracker (OxCGRT). The OxCGRT compiled data on pandemic policy responses implemented by governments into a series of containment measures, generating a daily score from 0 to 100

that reflects the level of restrictions between 2020 and 2022 for each country. The higher the score, the more 'strict' or 'stringent' the government's public health containment response.

To compute the weekly stringency score average, we followed the normalization approach in Deb et al. (2021) to ensure the daily stringency scores fall between 0 and 1. We re-scale, or normalize, the OxCGRT stringency scores by ensuring the lowest and highest daily stringency scores map to 0 and 1, respectively. Then, we identify the distance of each country's daily stringency score from the minimum and divide this by the range of scores. Then, we calculate the seven-day mean of the normalized daily stringency scores, across isoweeks and for each EU member nation.

The resulting variable has a mean value of approximately 0.49, ranging from the lowest average values of 0.36 and 0.43 in Croatia and Estonia, to the highest average values of 0.63 and 0.57 in Austria and Italy. 6). This seems intuitive, as governments learned which public health policies best 'flatten the curve' of deaths and infection rates as time passed during the pandemic.

Figure A2. COVID-19 Policy Stringency Variable - Time Evolution Across Countries



Source: Own elaboration (Stata)

Appendix B. Identifying Common Clusters for Orbis and Eurostat Databases

To implement a cell calibration strategy, both the Orbis and Eurostat databases must share identical clusters. In our research, we identified the clusters common to both databases and made necessary adjustments to create our final dataset. Orbis data is presented in **Table B*1***, while Eurostat data is shown in **Table B*2***, with categories displaying all available information.

Table B1. Orbis Data - Clusters

COUNTRIES (25 EU)
Austria, Belgium, Bulgaria, Croatia, Republic of Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, and Sweden.
INDUSTRIAL SECTORS (NACE Rev. 2 European Commission Statistical Classification)
Agriculture, Forestry, and Fishing (A); Mining, Electricity and Water (BDE); Manufacturing (C); Construction (F); Wholesale and Retail Trade (G); Transportation and Storage (H); Accommodation and Food Service Activities (I); Information and Communication (J); Real Estate Activities (L); Professional, Scientific, Technical, Administration and Support Service Activities (M-N); Public Administration, Defence, Education, Human Health and Social Service Activities (O-P-Q); Arts, Entertainment and Recreation (R); Other Service Activities (S); Activities of Households (T); Activities of Extraterritorial Organizations (U)
FIRM AGE CATEGORIES
0-2 years old; 2-5 years old; 5-10 years old; 10 years or older

Source: Own elaboration based on Orbis dataset

Table B2. Eurostat Data – Clusters

COUNTRIES (24 EU)
Austria, Belgium, Bulgaria, Croatia, Republic of Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Hungary, Italy, Latvia, Lithuania, Luxembourg, Netherlands, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, and Sweden.
INDUSTRIAL SECTORS (NACE Rev. 2 European Commission Statistical Classification)
Mining, and Quarrying (B); Manufacturing (C); Electricity, Gas, Steam and Air Conditioning Supply (D); Water Supply, Sewerage, Waste Management and Remediation Activities (E); Construction (F); Wholesale and Retail Trade (G); Transportation and Storage (H); Accommodation and Food Service Activities (I); Information and Communication (J); Real Estate Activities (L); Professional, Scientific, and Technical Activities (M); Administration and Support Service Activities (N); Education activities (P); Human Health and Social Service Activities (Q); Arts, Entertainment and Recreation (R)
FIRM AGE CATEGORIES
0-1 years old; 2 years old; 3 years old; 4 years old; 5 years old; 6 years or older

Source: Own elaboration based on Eurostat dataset

We observed that both databases provided similar, but not identical, information. To address this, we excluded Ireland, Greece, and Malta due to incomplete data from Eurostat. Regarding economic sectors, we excluded the Agriculture (A), public administration, education, and health sectors (O-P-Q), Other Service Activities (S), Activities of Households (T), and Activities of Extraterritorial Organizations (U) sectors from Orbis. In Eurostat, we combined the Mining and Quarrying (B), Electricity, Gas, Steam, and Air Conditioning Supply (D), and Water Supply, Sewerage, Waste Management, and Remediation Activities (E) sectors. Additionally, we grouped the Professional, Scientific, and Technical Activities (M), and Administration and Support Service Activities (N) sectors together and excluded the Education Activities (P) and Human Health and Social Service Activities (Q) sectors. Finally, we consolidated firms aged 5-10 years old and 10 years or older into a new category of 5 years or older in Orbis, while Eurostat was also grouped into three categories of 0-2 years old, 5-10 years old, and 10 years or older.

Appendix C. Common Correlated Effects (CCE) Estimator

The CCE model accounts for slope heterogeneity (i.e., the effect of fiscal policy deployment differs across EU countries) and cross-sectional dependence (i.e., there's at least one common shock, the pandemic, affecting all countries), both of which appear in our data. **Figure C*1*** and **Figure C*2*** show the Stata results when applying the test for slope homogeneity (Bersvendsen & Ditzen, 2021) and weak cross-sectional dependence (Pesaran, 2015), respectively. In both cases, we reject the null hypothesis and accept the alternative hypothesis is accepted, meaning both slope heterogeneity and strong cross-sectional dependence exist.

Figure C1. Stata Test for Slope Homogeneity (Ho)

```
Testing for slope heterogeneity
(Blomquist, Westerlund. 2013. Economic Letters)
H0: slope coefficients are homogenous
```

	Delta	p-value
	25.622	0.000
adj.	26.392	0.000

```
HAC Kernel: bartlett
with average bandwith 3.5833333
Variables partialled out: constant
```

Figure C2. Stata Test for Weak Cross-Sectional Dependence (Ho)

```
Testing for weak cross-sectional dependence (CSD)
   H0: weak cross-section dependence
   H1: strong cross-section dependence
```

	CD
birth_share~w	71.26
	(0.000)
sum_corpo~100	17.11
	(0.000)
sum_nonco~100	36.67
	(0.000)
COVID_deat~14	84.63
	(0.000)
wkly_avg_st~m	177.60
	(0.000)

```
p-values in parenthesis.
```

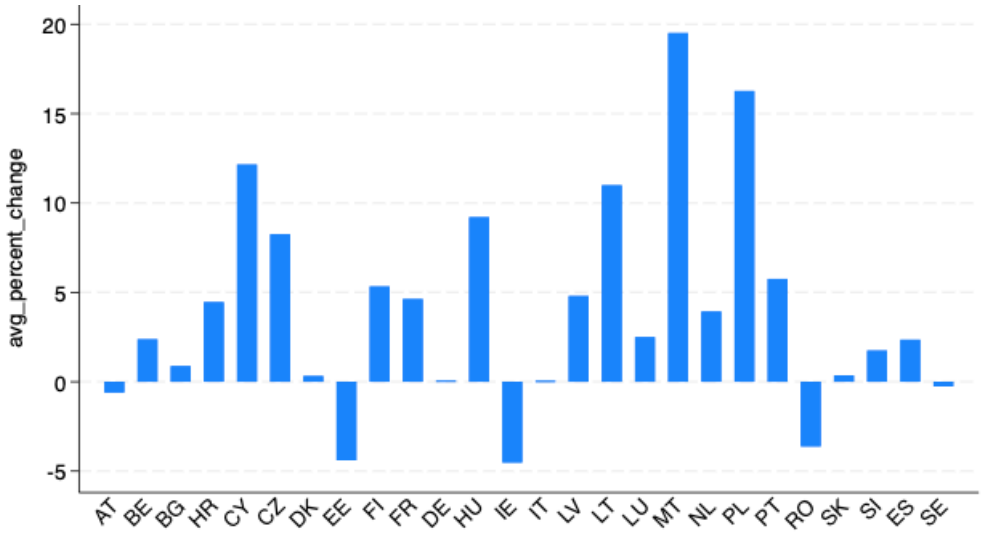
Source: Own elaboration (Stata)

When accounting for slope heterogeneity and cross-sectional dependence, most of the statistically significant relationships disappear, because our data does possess enough variability. One exception exists: the positive relationship between non-corporate fiscal policies (targeting individuals, not firms) and firms' bankruptcy rates, which emphasises the potential trade-off between corporate and non-corporate help. Nevertheless, if we disaggregate by industry, this positive relationship holds for sectors that experienced a decline in firm creation during the pandemic, not an increase in bankruptcies. Therefore, this potential trade-off seems less relevant than initially considered.

Appendix D. Weight Stability Analysis, by Cluster

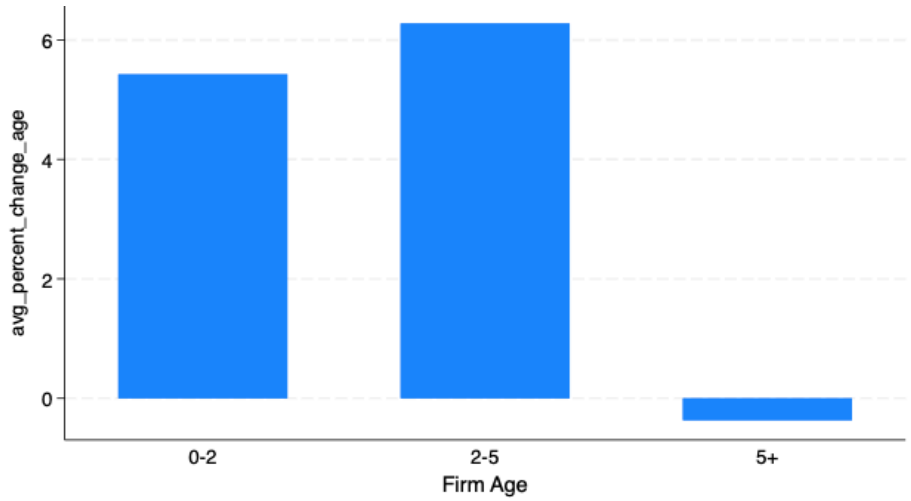
We tested the assumption of weights remaining stable by comparing the yearly variation of weights for each cluster. The average results by country, firm age, and economic sector appear in **Figure D*1***, **Figure D*2*** and **Figure D*3***. We observe that the weight stability presented in the analysis holds true when considering the different categories of data.

Figure D1. Average Yearly Variation of Weight, by Country



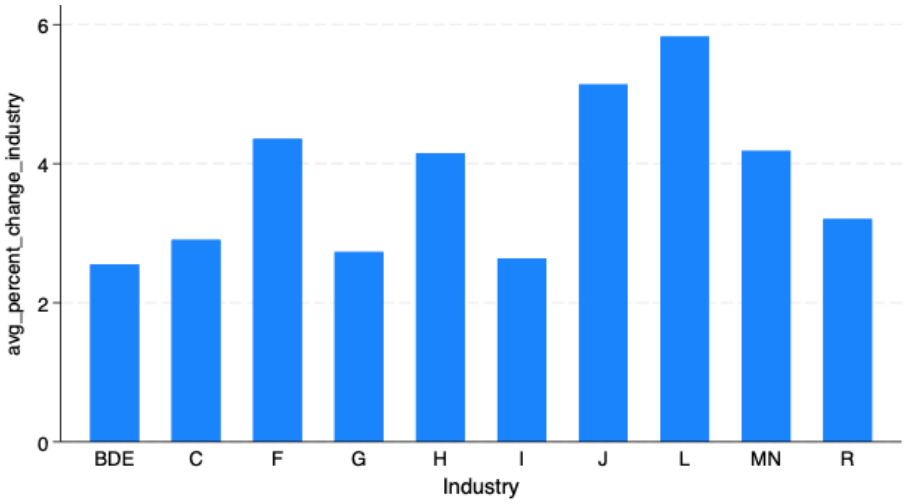
Source: Own elaboration

Figure D2. Average Yearly Variation of Weight, by Firm Age



Source: Own elaboration

Figure D3. Average Yearly Variation of Weight, by Economic Sector



Source: Own elaboration

Appendix E. COVID-19 Impact: Time Evolution Graphs

Figure E 1. COVID-19 Impact: Time Evolution – SME Bankruptcy Rate

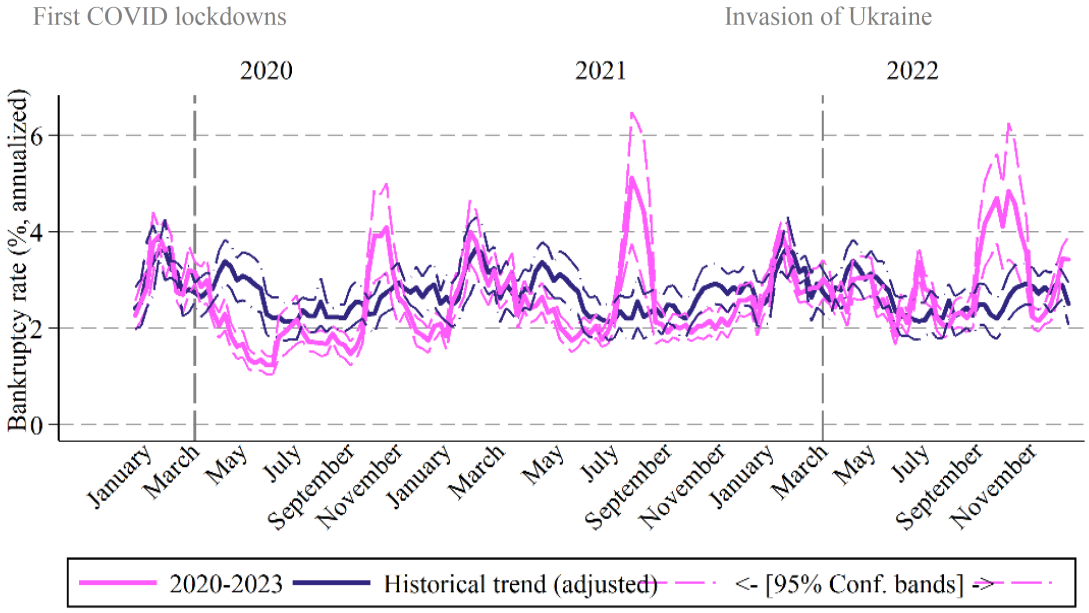
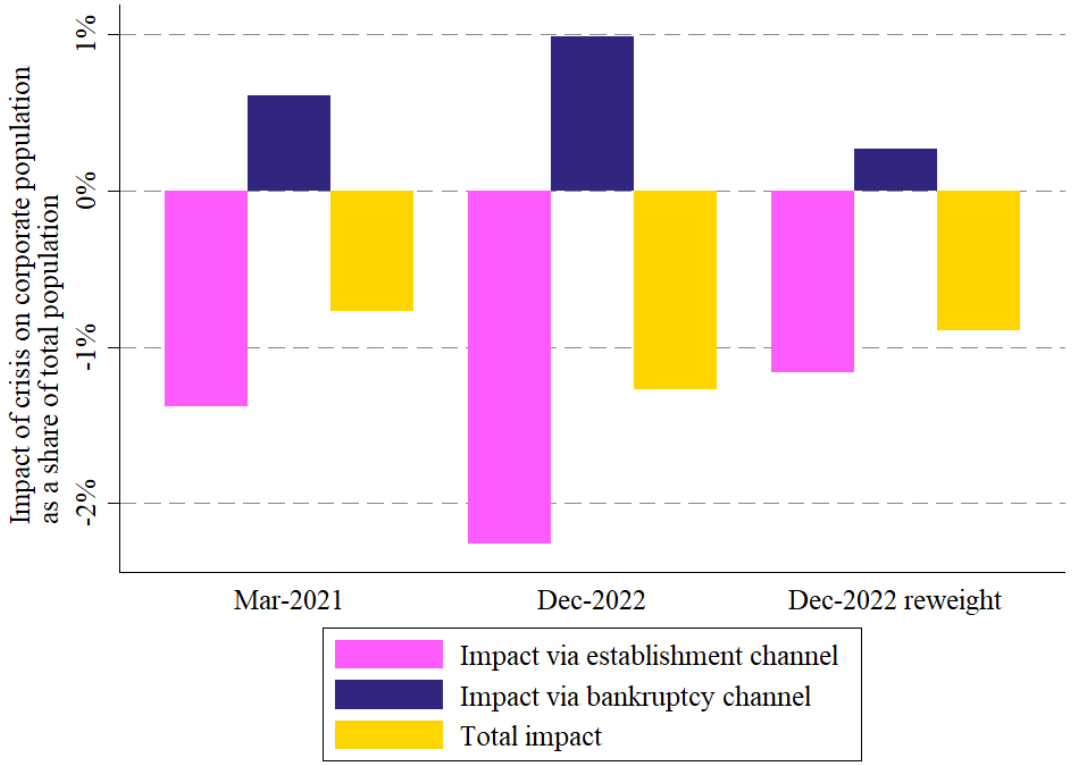


Figure E2. COVID-19 Impact: Time Evolution – SME Creation Rate

Source: Own elaboration with EIF collaboration

Appendix F. COVID-19 Impact: Comparison Graphs (March 2021, before cell calibration; December 2022, before and after cell calibration)

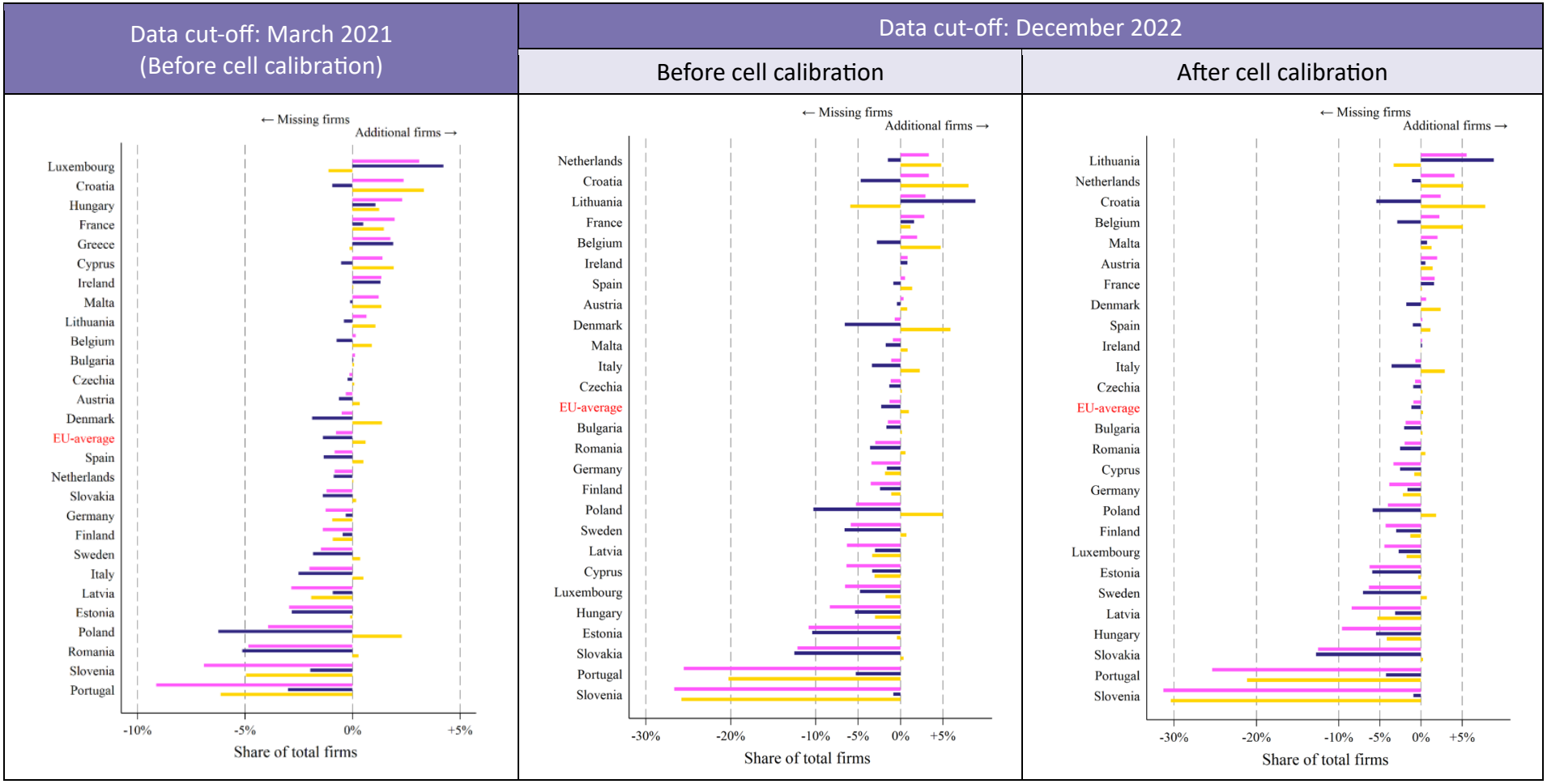
Figure F1. Overall COVID-19 impact on SME population



Source: Own elaboration with EIF collaboration

Figure F2. COVID-19 Impact by Country

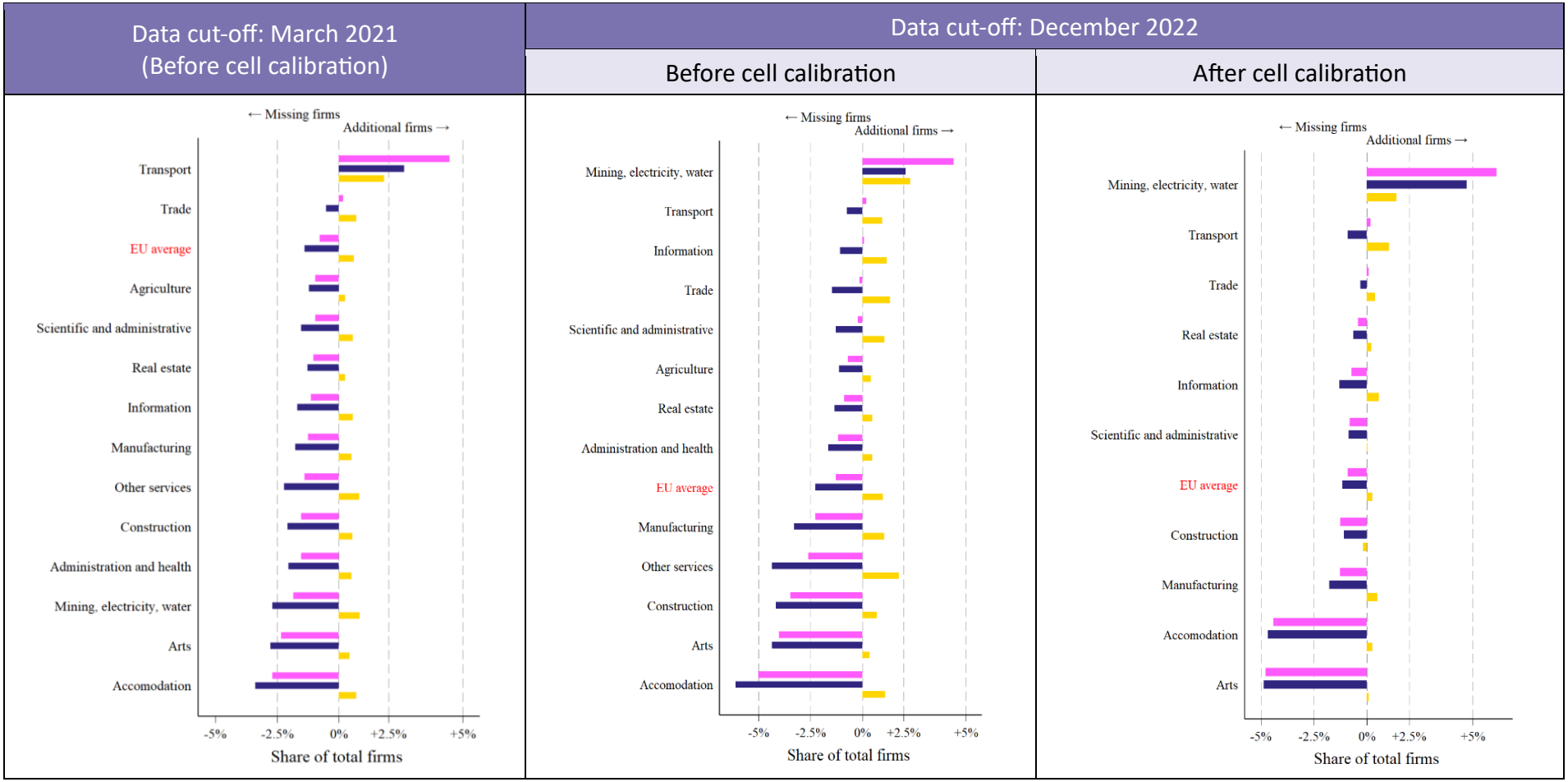
Note: Total impact (pink), Impact via creation channel (purple), Impact via bankruptcy channel (yellow)



Source: Own elaboration with EIF collaboration

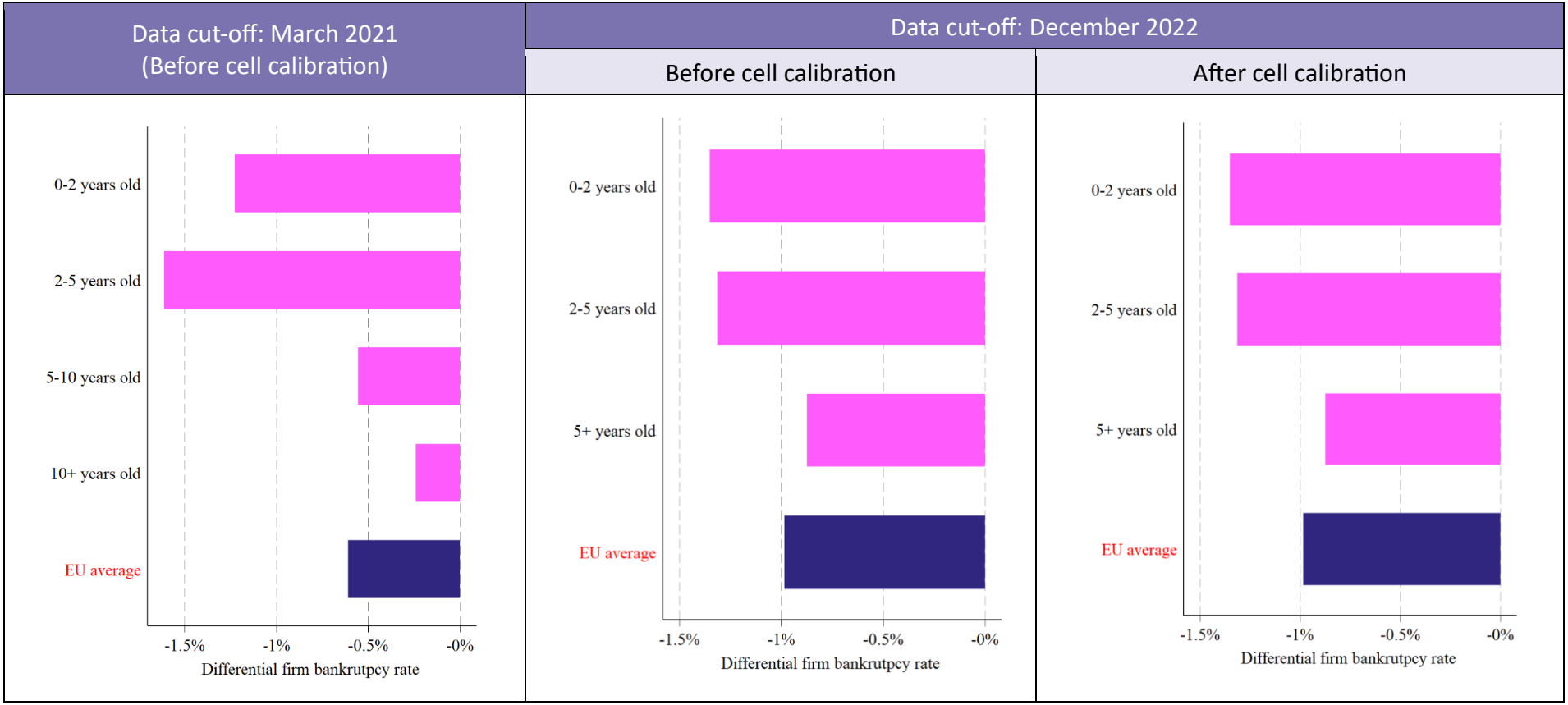
Figure F3. COVID-19 Impact by Sector

Note: Total impact (pink), Impact via creation channel (purple), Impact via bankruptcy channel (yellow)



Source: Own elaboration with EIF collaboration

Figure F4. COVID-19 Impact by Firm Age



Source: Own elaboration with EIF collaboration

Final Terms of References (TORs)

EIBI-LSE CAPSTONE PROJECT, ACADEMIC YEAR 2023-2024

TITLE

EU SMEs: impact of COVID-19 crisis and policy response

CLIENT

Research & Market Analysis (RMA) division of the European Investment Fund (EIF), part of the European Investment Bank group.

MENTORS

Julien Brault (email: j.brault@eif.org),

Camila Carlos Ballerini (joining the EIF on the 3rd of July 2023),

Simone Signore (email: s.signore@eif.org)

BACKGROUND

The COVID crisis had a big impact on EU SMEs. Business creations decreased significantly in the new environment. At first shielded by policy measures, SMEs now risk rising defaults. EU institutions and member States deployed massive policy responses. However, there are ongoing debates about their efficiency, targeting, and impact on sectoral reallocation.

PROJECT DESCRIPTION

Against this background, the proposed project plans to extend the analysis led in the recent 2023 EIF Working Paper: "Recent trends in EU corporate demography and policy: COVID and beyond." It seeks to develop an understanding of 1) the impact of the COVID-19 crisis on EU SME bankruptcy and business creation rates, and 2) the mitigating impact of fiscal policy responses.

Phase 1: Measuring the impact of the COVID-19 crisis on EU bankruptcy and business creation rates

This phase will use an Orbis dataset provided by the EIF. This dataset provides weekly EU corporate demography by country, sector, and firm age, from 2015 to March 2021, thus including the whole of the Covid crisis. This dataset could be extended to December 2022. This Orbis dataset will first have to be compared to Eurostat corporate data and re-weighted to improve its representativeness.

Phase 2: Measuring the mitigating impact of the policy response

This phase will examine the relationship between bankruptcy/business creation rates and different types of policy responses. These policy responses were gathered by the EIF based on the ESRB[7] fiscal responses database. This phase will first produce descriptive statistics, and second, will explore econometrically the link between policy support and the mitigation of the crisis's impact on corporate demography.

EXPECTED OUTCOME AND DELIVERABLES

1) A report containing a description of the different elements of this research project: research objectives, literature review, analysis of the Orbis representativeness and its improvement methods, analysis of COVID-19 impact on corporate demography, analysis of fiscal policy impacts on corporate demography, conclusions and policy recommendations.

2) A companion dataset and Stata do-file that allows to reproduce all descriptive and quantitative analyses contained in the report, without the need for intervention of the team participants.

[7] European Systemic Risk Board, hosted by the European Central Bank.

PROPOSED RESEARCH ELEMENTS / METHODOLOGICAL STEPS[8]

A) A brief investigation into the impact of the crisis on EU SMEs will describe the historical evolution and present the drivers of variations between countries, sectors, and ages of firms. The aim is to develop a better understanding of what drove EU corporate demography after the COVID-19 pandemic, and to guide students in their interpretation of results in subsequent phases. *The students will have access to existing EIF datasets, methodologies, and working papers related to the project.*

B) A literature review of relevant theoretical and empirical frameworks (*a selection of literature is provided in the Annex, although students are encouraged to also consider relevant studies beyond this compilation*), containing a discussion of a selection of prominent studies covering different aspects of the research questions, will guide the students in their selection of an appropriate empirical framework.

Non-exhaustive list of suggested topics to be covered:

- COVID-19 crisis impact on corporate demography,
- Data calibration/reweighting,
- Estimating policy impact.

C) An exploration of available, relevant databases (Orbis, Eurostat corporate demography data, ESRB fiscal policy support database, etc.) will inform students about the feasibility of different empirical frameworks (to be executed parallel to phase B).

D) Borrowing from the results of A., B., and C., to apply an empirical model to the data, analyzing the COVID-19 impact on SME bankruptcy/creation rates. In addition, the team will examine whether policy support measures were able to exert a mitigating impact on the effect of the crisis on SME bankruptcy/creation rates. We highly encourage further differentiation of the results by country, sector, and ages of firms, and, if possible, by policy type.

E) A final phase concludes and discusses the policy relevance of the results obtained under D.

[8] Due to the presence of synergies between the different steps, these are not to be interpreted as strictly chronological phases of the project.

LOGISTICS

EIF RMA communicates with the research team via e-mails and video calls. The frequency of video calls depends on the needs of the participants and availability of the mentor. Participants are encouraged to request a meeting with sufficient prior notice and to submit the meeting agenda points in written form a few days prior to the meeting.

EDUCATIONAL CONTENT

This project will allow participants to apply data analysis techniques to a topic that is highly relevant to EU policy makers. Participants are expected to critically assess existing academic studies and formulate proposals for improvement and by doing so, will develop a thorough understanding of the relevant empirical methodologies. This exercise will provide students with an opportunity to: a) Contribute to EU objectives, as the output of a successful project can serve as an input in the strategic orientation process within EIF, which aims to identify policy priorities through data-driven analyses. b) Stimulate their consultancy and technical skills.

BACKGROUND ON THE EIF

This project is conducted in cooperation with the Luxembourg-based European Investment Fund (EIF). The EIF, part of the European Investment Bank (EIB) Group, is specialised in risk financing for small and medium-sized enterprises (SMEs). In this role, the EIF fosters EU objectives in support of innovation, research and development, entrepreneurship, growth, and employment. EIF works with a wide range of selected financial intermediaries across Europe and primarily designs, promotes and implements equity and debt financing instruments that specifically target SMEs. EIF's internal counterpart for this specific project is the Research & Market Analysis (RMA) division. Within EIF, RMA is acts as an internal advisor and is responsible for market monitoring, as well as ex-ante and ex-post market assessments.

NON-EXHAUSTIVE SELECTION OF RELEVANT BACKGROUND READING MATERIAL

- Brault, J. (2023). Recent trends in EU corporate demography and policy: COVID and beyond. EIF Working Paper.
- Deb, P., Furceri, D., Ostry, J., Tawk, N., and Yang, N. (2021). The effects of fiscal measures during COVID-19. IMF Working Paper.
- Decker, R., and Haltiwanger, J. (2022). Business entry and exit in the COVID-19 pandemic: a preliminary look at official data. FEDS Notes.
- Demmou, L., Franco, G., Calligaris, S., Dlugosh, D. (2022). Liquidity shortfalls during the COVID-19 outbreak: assessment and policy responses. Economics and Statistics.
- Dörr, J. O., Murmann, S. and Licht, G. (2021). Small firms and the COVID-19 insolvency gap. Small Business Economics.
- Ebeke, C., Jovanovic, N., Valderrama, L., and Zhou, J. (2021). Corporate liquidity and solvency in Europe during COVID-19: the role of policies. IMF Working Paper.
- Gourinchas, P., Kalemli-Ozcan, S., Penciakova, V., and Sander, N. (2021). Fiscal policy in the age of COVID: does it 'get in all of the cracks'?. ECB Working Paper.
- Hinterlang, N., Moyen, S., Rohe, O., Stahler, N. (2022). Gauging the Effects of the German COVID-19 Fiscal Stimulus Package. Discussion Paper of the Deutsche Bundesbank.
- Lalinski, T., and Pal, R. (2021). Efficiency and effectiveness of the COVID-19 government support: evidence from firm-level data. EIB Working Paper.
- Wang, J., Yang, J., Iverson, B., and Kluender, R. (2021). Bankruptcy and the COVID-19 crisis. Harvard Business School Working Paper.