EUROPEAN INVESTMENT FUND

The real effects of EU loan guarantee schemes for SMEs:

A pan-European assessment

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Abstract[1]

This paper provides a pan-European assessment of EU credit guarantees to SMEs. Synthesizing past research, it investigates the firm-level economic impact of over 360,000 guaranteed loans under the EU MAP and CIP programmes from 2002 to 2016. These loans represented a total amount of EUR 22bn spanning 19 European countries – approximately 60% of all loan amounts guaranteed under these programmes. The paper reports estimates of the average treatment effect on the treated of these loans on the financial growth and survivability of firms, through a comparison against SMEs that were not supported by these programmes. Guaranteed loans are found to positively affect the growth of firms' assets (by 7 to more than 35%), the share of intangible assets (by one third of the initial share in Italy and the Nordic countries), sales (by 6 to 35%), employment (by 8 to 30%), and lower their probability to default (by 4 to 5%). The paper decomposes these effects by size, age, industry, and discusses implications.

Keywords: EIF; credit guarantees; credit constraints; real effects; small and medium-sized enterprises

JEL codes: G2, H25, O16

Executive summary

The aim of this paper is to summarise previous research investigating the effects on the growth of small and medium sized enterprises (**SMEs**) of guaranteed loans granted between 2002 and 2016 under the **SME Guarantee Facility of the European Union's MAP and CIP programmes.** This study focuses on 19 European countries served by the facility, managed by the **European Investment Fund (EIF)**: Belgium, Bulgaria, Czechia, Denmark, Estonia, Finland, France, Hungary, Italy, Latvia, Lithuania, Luxembourg, the Netherlands, Norway, Poland, Romania, Slovakia, Slovenia, Sweden. To keep the analysis tractable, this work aggregates countries in the **following five macro-regions: France, Italy, Benelux, Nordic countries**, and Central, Eastern and South-Eastern Europe (**CESEE**).

Empirical strategy

This paper considers **360,867 guaranteed loans** for a total amount of **EUR 22.18bn.** It synthetizes and compares three previous studies, which gave way to three EIF working papers – Asdrubali and Signore (2015); Bertoni, Colombo and Quas (2018); Bertoni, Brault, Colombo, Quas and Signore (2019). This paper provides a **policy-oriented perspective** based on the econometric work from the aforementioned studies. For additional details on the methodology and data, the reader is referred to the specific technical works.

We provide reliable estimates of the firm-level **economic additionality** of guaranteed loans in terms of total assets, sales, employment, innovativeness (approximated through intangible capital), profits, productivity, and the survival of firms. Estimates are based on a rigorous econometric approach to estimate the **"treatment effect"** of guaranteed loans. To this end, studies compare the evolution of beneficiaries' performance following the receipt of the loan against a **control group** of non-beneficiary firms. The control group is composed of firms that, while not receiving MAP- and/or CIP-guaranteed loans, exhibited very similar characteristics to the beneficiaries before the time of receipt of the guaranteed loan. Therefore, control companies simulate the conditions of beneficiaries had they not received the treatment, i.e. the MAP/CIP-guaranteed loan.

Results

The **main results** of this meta-analysis can be summarised as follows:

- After receiving a guaranteed loan, beneficiaries grew more rapidly than non-beneficiaries in terms of total assets, sales and employment. The additional effect on growth is economically significant: it typically ranges from **7 to more than 35 percentage points for total assets, 6 to 35% for sales (or turnover), and 8 to 30% for employment levels.**
- One study analyses the effects of guarantees on intangibles, finding that in Italy and the Nordic countries guaranteed loans led to an **increase of one percentage point in intangible-to-total assets** five years after receipt of the loan. The economic magnitude is significant, as it corresponds to one third of the average share of intangible-to-total assets in the sample.
- Beneficiaries were **more likely to survive** following the guaranteed loan and, again, the magnitude of the effect is quite large: by the fifth year after receipt of the loan, **the probability to default is lower by between 4% (Italy, Benelux, Nordics) and 5% (France) for beneficiaries** compared to twin non-beneficiaries.

- The magnitude of the economic additionality of guaranteed loans **varies quite considerably according to the characteristics of the beneficiary firms**. Guaranteed loans have larger positive effects on **smaller and younger companies**. This is consistent with the tenet that these firms are the most subject to financial constraints. In France, Italy, the Benelux, and Nordic countries, effects were slightly **larger for firms in services** than in manufacturing industries, but do not seem to be larger in high-tech and knowledge-intensive sectors vs. low-tech sectors. As expected, **larger guaranteed loans** trigger **larger positive effects** on growth.
- We find that **guaranteed loans have no significant treatment effect on profitability** in the first five years after loan receipt. The estimated treatment effect on productivity – which could only be assessed in France and CESEE – points to a short-term dip for treated firms, followed by a medium-run recovery and a **positive long-term effect on the productivity of guaranteed firms** (long-term effects were not assessed in CESEE).
- Lastly, our study highlights the differences in the magnitude of the economic impact across the geographical areas under consideration. These differences are due to the **industrial landscape** of the different economies as well as the **characteristics of the beneficiary pool**. Once these characteristics are controlled for – as made possible for the case of Italy, the Nordic countries, and the Benelux – differences in the treatment effects are largely reduced. Residual deviations are brought by differences in the loan origination strategy of national and/or regional financial intermediaries.

In conclusion, our analysis shows that guaranteed loans provided by the EIF under the MAP and CIP programmes effectively **boosted firm growth and increased survival chances of beneficiaries**. The effects are particularly visible for SMEs that, as predicted by theory, are the most likely to face financing constraints. These results, however, **should not be extrapolated to recommend targeting guarantee programmes exclusively towards these SMEs.** In fact, further research would be necessary to shed light on the trade-off between the economic benefits of guarantees and the implied financial risk and cost, which are likely to be higher for younger and smaller SMEs.

Table of Contents

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List of Figures

1   Introduction

Small and medium-sized enterprises (SMEs) suffer from the existence of a structural lending gap, i.e. some SMEs have no access to bank financing, even at high interest rate, which negatively influences their economic performance (Beck *et al.* 2008; Kraemer-Eis *et al.*, 2015). To address, inter alia, these market failures and/or imperfections, the European Union (EU) provides loan portfolio guarantees to financial intermediaries serving SMEs.

The CIP and MAP programmes represent EU-level policy instruments to support, among others, the allocation of financing to SMEs. EU programmes co-exist with and complement a wide range of national guarantee schemes, diverse in scope and instruments (Chatzouz *et al.*, 2017). Coordinated by the European Commission (EC), they are implemented by the European Investment Fund (EIF), which provides either counter-guarantees to public and mutual guarantee institutions, or direct guarantees to financial intermediaries. Financial intermediaries then either guarantee loans or lend to SMEs according to a set of criteria defined by the CIP and MAP programmes and set forth by the guarantee agreement with the EIF.

Despite their policy relevance, credit guarantee schemes have seldom been the subject of rigorous academic research, also due to the lack of appropriate data and methods (Vogel and Adams, 1997). Against this background, this work combines three previous econometric studies published in the EIF Working Paper Series (Asdrubali and Signore, 2015; Bertoni *et al.*, 2018; Bertoni *et al.*, 2019): the first, focusing on Central, Eastern and South-Eastern European (CESEE) countries; the second, focusing on France, and the third covering Italy, the Benelux, and Nordic countries.

The combined studies investigate the impact on SMEs of EU loan guarantees granted between 2002 and 2016 under the MAP and CIP programmes across 19 European countries.[2] The pooled analyses consider over 360,000 guarantees supporting loans for a total volume of EUR 22bn, approximately 60% of total loan volumes under MAP and CIP. Using a treatment-and-control econometric approach, the studies estimate the firm-level economic impact of guaranteed loans on SMEs' assets, sales, employment, intangibles, profits, productivity, and survival. The goal of this paper is to present, compare, and reflect upon the findings from this strand of research.

To assess the economic impact of the public policy, the reference studies employ a combination of propensity score matching (Rosenbaum and Rubin, 1983) and difference-in-differences estimation (Ashenfelter, 1978). The joint use of these methods, both popular in the policy evaluation literature, provides desirable properties in terms of bias reduction and identification of the causal effects.

In a nutshell, the econometric approach entails comparing firms which received the guaranteed loans – the treatment group – against firms which did not receive such guaranteed loans – the control group. The difference in outcome across both groups identifies the causal effect of guaranteed loans. The studies first explore the impact on the size growth of SMEs, measured via assets, number of employees, and sales. Secondly, the studies look at the impact on the

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[2] Belgium, Bulgaria, Czechia, Denmark, Estonia, Finland, France, Hungary, Italy, Latvia, Lithuania, Luxembourg, The Netherlands, Norway, Poland, Romania, Slovakia, Slovenia, Sweden.

innovativeness of firms by looking at the evolution of the share of intangible assets to total assets. Thirdly, studies also look at the evolution of profits and productivity. Finally, the three studies focus on the ability of beneficiaries to improve their resilience and avoid default. It is important to note here that it is not always meaningful to compare point estimates from across the three studies. This is a key contribution of this analysis, i.e. to provide a detailed guide to the comparability of results.

The paper is organised as follows. Section 2 presents the CIP and MAP programmes, laying out the rationale for SME credit guarantees and their implementation mechanism. Section 3 provides a theory of change of guarantee instruments. Section 4 discusses data and methods used by the referenced studies, focusing on the characteristics of SMEs that benefitted from EU guaranteed loans. Section 5 presents the key econometric estimates, by region and type of outcome variable, comparing them with findings from relevant studies, and discussing the role of moderating factors (e.g. firms' characteristics). Section 6 concludes, providing implications for research.

2   The CIP and MAP programmes

2.1.   The economic rationale for SME credit guarantees

SMEs are often recognised as the backbone of the EU economy: they represent 99.8% of all firms, almost 60% of value added and nearly 70% of the total workforce (Kraemer-Eis *et al.*, 2018). Yet, despite their economic importance, SMEs face greater challenges than larger firms in several respects. One of those important issues is access to finance. SMEs face financing constraints as financial institutions are usually reluctant to extend uncollateralised credit to SMEs, even at high interest rates, in part because of the high costs of obtaining and assessing adequate information on the true creditworthiness of small, typically young companies.

In addition, many of these firms cannot satisfy the strict collateral requirements for the loan. Financial intermediaries are wary of investing in or lending to young/new SMEs which are perceived as a high-risk client group. As a result, many SMEs with economically viable projects cannot obtain the necessary financing from the conventional financial intermediation channels. This is especially true in the context of an economic downturn, which might weaken the capital and liquidity positions of banks, thus leading to reduced credit availability (Kraemer-Eis and Van Steensel, 2016).

To address this market failure, (pan-)national governments and organisations in the EU have long adopted a variety of financial measures aimed at supporting SME finance, including grants, direct lending, guarantee and counter-guarantee schemes, equity financing and support to securitisation of SME loans. The use of Credit Guarantee Schemes (CGSs) is particularly widespread across both OECD and non-OECD economies. CGSs are "used widely across economies as important tools to ease financial constraints for SMEs and start-ups" (OECD, 2013), in order to alleviate the consequences of market failures in SME financing. CGSs are an important pillar of financial intermediation, both in Western (Chatzouz *et al.*, 2017) and Eastern Europe (EBCI, 2014). This is because guarantee mechanisms, "whereby should the borrower default the guarantor compensates a pre-defined share of the outstanding loan" (OECD, 2015), reduce the risk of lenders and favour the provision of financing to viable businesses that are constrained in their access to finance. The use of CGSs as policy response has intensified during financial crises, with multiple schemes currently provided by national/local organisations and, on a pan-European level, by the EIF.

2.2.   EU SME credit guarantees

Supporting small businesses is one of the pillars of the European Union strategy to, inter alia, enhance competitiveness, catalyse investment opportunities and foster job creation. This strategy was pursued through various generations of flagship programmes. These programmes deployed financial instruments to support SMEs, notably credit guarantees, under one of their main axes, the "Entrepreneurship and Innovation Programme":

> "[The Entrepreneurship and Innovation Programme] will specifically target small and medium sized enterprises, from hi-tech "gazelles" to the traditional micro- and family firms which make up the large majority of enterprises in Europe. It will cover industrial and services sectors. It will also encourage entrepreneurship and potential entrepreneurs both generally and in particular target groups, paying special attention to gender issues. It will contribute to encouraging young people to develop an entrepreneurial spirit and promoting the emergence of young entrepreneurs as promoted by the European Pact for Youth. It will be an important, but not the only instrument for implementing the key actions in the strategic policy areas set out in the "European Agenda for Entrepreneurship and for providing Community level support for Member States' actions in pursuit of the European Charter for Small Enterprises." (CEC, 2005)

A prominent policy tool within the aforementioned programmes is the SME credit Guarantees (SMEG) facility.[3] This policy encompasses itself different types of schemes, or "windows". For instance, under the MAP programme there were four windows: *a)* the loan guarantee window, *b)* the micro-credit window, *c)* the equity guarantee window, *d)* the ICT window. Under the CIP programme, the ICT window was dismissed, and a new window for SMEs securitisation was introduced (Granieri and Renda, 2012).

The credit guarantees to SMEs analysed in this work concern the loan guarantee window. This window aims at "(providing) counter and co-guarantees to guarantee schemes operating in eligible countries, and direct guarantees to financial intermediaries" (CEC, 2005). It is aimed at addressing market failures in the access to debt financing of SMEs with growth potential, to reduce the difficulties they face "due to the perceived high risk associated with investments in certain knowledge-related activities such as technological development, innovation and technology transfer, or due to a lack of sufficient collateral" (ECA, 2011). In this context, "particular attention (should be) given to financing for the acquisition of intangible assets" (CEC, 2005). The main objectives of growth and innovation are hence broadly defined (ECA, 2011), and co-exist with the parallel objective of compensating for insufficient collateral. Drawing on the Lisbon objectives, the principles of selection of SMEs have also been extended with the view of stimulating job creation.

Four generations of flagship programmes of EU credit guarantees were implemented to date. In 1998, the EC established the first SME Guarantee facility ("SMEG 1998") under the "Growth and

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[3] The SME Guarantee Facility originates from Decision 98/347/EC of the European Council. The support for this facility continued under the subsequent Multi-Annual Programme for Enterprise and Entrepreneurship (MAP) as per the Council Decision 2000/819/EC, as well as under the Competitiveness and Innovation Framework Programme (CIP) as per the Decision No 1639/2006/EC of the European Parliament and of the Council. The SME Guarantee Facility currently operates under Regulation (EU) No 1287/2013 of the European Parliament and of the Council of 11 December 2013.

Employment Initiative (GEI), 1998-2000" programme. The guaranteed nominal amount under the Loan Window was EUR 2.4bn. The cost of the losses and of running the programme was EUR 0.14bn. The total supported loans amounted to EUR 6.17 b (ECA, 2017).

The first facility was followed by the "SMEG 2001", implemented under the 2001-2006 Multi-Annual Programme for enterprises and entrepreneurship for SMEs (MAP). The guaranteed nominal amount was EUR 4.68bn. The cost of the losses and of running the programme, was EUR 0.27bn. The total supported loans amounted to EUR 10.22bn.

The third generation "CIP SMEG" facility was implemented under the Competitiveness and Innovation Framework Programme (2007-2013). Its objectives were to improve access to finance for the start-up and growth of SMEs and investment in innovation activities. Specifically, loan guarantees were to target companies in different phases of their life cycles, and support investments in technological development, innovation, technology transfer, and international expansion. The total guaranteed nominal amount was EUR 7.34bn. The cost of the losses and of running the programme was EUR 0.64bn. The total supported loans amounted to EUR 14.4bn.

The current Loan Guarantee Facility (LGF) started in 2014 as the fourth generation of SME Guarantee facilities, under the new "Programme for Competitiveness of Enterprises and small and medium-sized enterprises (COSME) 2014-2020", which benefits from the support of the European Fund for Strategic Investments (EFSI). The facility is currently in its implementation period, which will last until 2020. Thanks to this programme, over 414,735 SMEs have already benefitted from improved financing conditions as of December 2018. The expected guaranteed amount at completion of the programme is EUR 7.31bn. The cost of the losses and of running the programme was at launch expected to be EUR 0.72bn over the entire period. The total supported loans are envisaged at EUR 14.89bn, EUR 20.59bn when accounting for the fact that guarantee institutions receiving EIF's counter-guarantees use those to offer guarantees to other financial intermediaries.

Using current COSME projections and combining the four programmes, the total guaranteed nominal amount stands at EUR 21.73bn, for total supported loan volumes of EUR 45.68bn, or EUR 51.38bn including the re-use of EIF's guarantees by guarantee institutions. The cost of the losses, borne by the EIF/EC (including management costs) stands at EUR 1.77bn. If we only consider the two programmes analysed in this paper (MAP and CIP), the total expected guaranteed amount of the four programmes was EUR 12.02bn. The total supported loans represented EUR 24.62bn. The cost of the losses and of running the programme was EUR 0.91bn. The amounts refunded, plus the administrative costs, represented 7.6% of these counter-guarantees, i.e. 3.7% of total loan volumes.

Along these EU programmes, we find a wide range of other core guarantee schemes, e.g. the "InnovFin SME Guarantee Facility" programme, aimed at innovative SMEs and small mid-caps, the Cultural and Creative Sectors (CCS) Guarantee Facility, the Employment and Social Innovation (EaSI) programme, and the EU SME Initiative.[4]

Note that the EUR 12bn of loan guarantees granted under the MAP and CIP programmes in the considered countries represent a small portion vis-à-vis the outstanding loan guarantees from main national guarantee institutions, e.g. as provided by the member of the European Association of

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[4] See http://www.eif.org/what_we_do/guarantees/index.htm for additional information.

Guarantee Institutions (AECM). To put the EUR 12bn into perspective, the total amount of SME lending in the biggest Eurozone countries (Germany, France, Spain and Italy) for 2014 alone was EUR 838bn. (Deutsche Bank, 2014), and the total loan portfolio of the Eurozone (including large firms) was EUR 4.5 tr. in 2017 as reported by the European Central Bank (ECB). Against this backdrop, the total amount of loans guaranteed by the EIF is estimated at 0.5% of total SME lending in Europe during the period 2007-2014 (ECA, 2017).[5]

The relatively small size of EU programmes compared to the overall SME lending activity is a consequence of the specific policy targeting of the programmes and the overarching subsidiarity principle. According to the subsidiarity principle, in areas in which the EU does not have exclusive competence, it is generally deemed preferable for action to be taken by the Member States.

2.3.   Governance of the MAP and CIP guarantee facilities

The Directorate-General for Internal Market, Industry, Entrepreneurship and SMEs is the coordinator of these programmes and evaluates them. The DG Economic and Financial Affairs manages the programme and negotiates the Fiduciary and Management Agreement with the EIF. It also approves Financial Intermediaries, monitors cash movements and ensures that the funds are spent in line with the objectives of the programmes (ECA, 2011).

The SME Guarantee Facility is operated by the European Investment Fund (EIF) on behalf of the European Commission.[6] Under the MAP and CIP programmes, fiduciary, management and monitoring aspects related to the SME Guarantee Facility are regulated by a cooperation agreement between the European Commission and the EIF. The cooperation agreement includes a number of incentivising clauses, ensuring an adequate implementation of the programme.[7] The EIF identifies, evaluates and selects the financial intermediaries, decides to commit funds, executes, manages and terminates the EU guarantees, including reporting and monitoring (ECA, 2011).

Carefully designed guarantee products that are continuously evaluated have a greater potential to contribute to the achievement of public policy objectives. This entails several design challenges, which determine the extent to which the financial incentives of the guaranteeing and the guaranteed counterpart are aligned. Box 1 discusses a number of design issues.

The financial intermediaries are selected according to their financial standing, operational capabilities, ability to manage risk, their geographic coverage, and their acceptance of the criterion for enhanced access to finance laid out in the SMEG programme (ECA, 2011). The selected financial intermediaries either issue those loans directly, or guarantee the loans issued by other institutions lending to SMEs.

Upon the application and following the selection of the intermediary, a Guarantee Agreement defines the relationships between the EIF and the financial intermediary. It defines target volumes,

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[5] This calculation factors in loan guarantees under the InnovFin programme. See Footnote 4 for additional information.
[6] As set out by Council Decision 2000/819/EC for MAP and Decision No 1639/2006/EC of the European Parliament and of the Council for CIP.
[7] For instance, the CIP programme foresees: a) a Start-Up Fee, conditional to the setting-up of the programme within 12 months; b) a Signature Fee, conditional to a broad geographical coverage of the programme and the use of the specific windows; c) an Implementation Fee, conditional to achieving additional volumes, and to daily operations; d) a Monitoring Fee, conditional to the assurance of sound financial management.

Box 1: Incentive mechanisms for EU loan guarantee schemes

Optimal guarantee designs leverage on a number of parameters: these parameters will impact the prevalence of moral hazard in the relationship between the borrower and the lender on the one hand, or between the lender and the guarantor on the other. Selected design issues are (Chatzouz *et al.*, 2017):

1. *Loss-sharing,* i.e. the distribution the losses in case of the borrowing SME's default.

2. *Coverage ratio,* determining the extent to which credit risks is transferred from the guarantor to the financial intermediary. Guarantors must ensure that this parameter does not lead to excessive risk-taking.

3. *Guarantee assignment process*, i.e. the role the scheme has in the guarantee assignment process, including e.g. credit appraisal.

4. *Pricing.* Pricing is a crucial part of the guarantee design, as it affects the behaviour and incentive of borrowers. Public CGSs, striving for self-sustainability, generate revenue through guarantee fees and administrative fees.

thresholds, loss-sharing and the coverage ratio (through guarantee caps). First, target volumes for the global amount of loans to be granted by the intermediary are defined. Second, a guarantee share defines the share of the financial intermediary's loan/guarantee which is counter-guaranteed by the EIF, i.e. the amount which will be disbursed by the EIF in case of a single loan default. Lastly, the Guarantee Agreement defines the guarantee cap, i.e. the maximum aggregate net amount which the EIF may be liable to pay to the intermediary in the case of loan defaults (EC, 2000).

To incentivise the granting of new loans to SMEs – thus mitigating the shortage of credit financing for SMEs – Guarantee Agreements under the MAP and CIP programmes specify that the loss-sharing incentive is conditional to the fulfilment of a pre-determined volume of new loans to SMEs. The typical Guarantee Agreement distinguishes between:

1. The maximum target volume;
2. The minimum target volume;
3. The reference guarantee volume.

Failure by the intermediary to reach the maximum target volume would trigger a proportionate reduction of the guarantee cap amount. Failure to reach the minimum target volume would trigger a more than proportionate reduction of the guarantee cap amount. Finally, failure to reach the reference guarantee volume would cause the EIF guarantee to be completely withdrawn. The reference guarantee volume represents the EIF's assumption on the volume of loans that, *ceteris paribus,* the intermediary would have achieved anyway in the absence of the EIF guarantee. In the case the intermediary chooses to undertake a higher risk profile following the EIF guarantee, the reference guarantee volume is adjusted accordingly.

In terms of loss sharing, the EIF negotiates the share of default costs to be borne by the intermediary, which usually falls around 50%. Lastly, the amount counter-guaranteed by the EIF is capped at between 4 and 20% of the total volume of loans, depending on the diverse agreements with intermediaries.

Concerning the SMEs, EIF-guaranteed loans are disbursed conditional to the SME's eligibility under the SMEG facility. The eligibility criteria are determined individually for each intermediary based on

their activities, with the aim of reaching as many SMEs as possible and reflecting market conditions and practices in the relevant territory. The SME must fit into the European Commission's definition of Small and Medium Enterprise, as set out in the Recommendation 2003/361/EC. In case of default on a loan, the EIF pays the agreed share of losses suffered by the intermediary (EC, 2000).

3　　　Guaranteed loans: a theory of change

The economic and financial impact of credit guarantee schemes to beneficiary SMEs leans on two main axes. First, CGSs might allow credit-rationed firms to access bank financing. Second, CGSs might enable risky, but creditworthy firms, to obtain improved access to financing conditions, e.g. larger financing, longer maturities, lower costs (Kraemer-Eis et al, 2018). The two axes rely on the economic mechanism that sees credit guarantees acting as a substitute to increased collateral. In turn, increased collateral minimises moral hazard, reducing credit rationing due to asymmetric information (Stiglitz and Weiss, 1981; Berger and Udell, 1992). This function becomes critical at times of heightened risk and/or risk aversion, e.g. during a credit crunch (Hancock *et al.*, 2008).

CGSs also provide benefits to financial intermediaries. By sharing their credit risk with the guarantor, intermediaries such as banks are able to optimise their regulatory capital. Once again, this feature becomes particularly relevant at a time where credit risk is very high and the capital requirements for the banks are increasing (De Blasio *et al.*, 2017).

In addition to the economic rationale of information-based market failure, Honohan (2010) identifies also externalities and distributional arguments in favour of credit guarantee schemes: supporting the activities of a segment of the population excluded from credit could lead to significant economic externalities, which would potentially offset the costs incurred in the implementation of the policy. Moreover, credit rationing is most acute for low wealth individuals and groups of people, and for poorer geographical areas, which implies that credit guarantees might correct for unequally distributed endowments, thus positively affecting the overall distribution of wealth.

Against this background, Figure 1 presents the theory of change of credit guarantees under the SMEG Facility. Figure 1 provides a "causal" chain that links the activities under the facility, and the overarching goals of the policy measure. The goal of economic impact assessment exercises is to provide quantitative as well as qualitative evidence as to whether the primary outcomes of the policy measures have been met. This leads to three main hypothesis about MAP and CIP beneficiary SMEs that needs to be tested against the data:

- Did SMEs grow faster (than they would otherwise have) because of the guaranteed loan?
- Did SMEs become more resilient (than they would otherwise have) after the guarantee?
- Did SMEs improve their long-term development (e.g. in terms of innovation, productivity)?

The evaluation process of the SMEG Facility involves regular assessment exercises led by the European Investment Fund, the European Commission, and external audits by the European Court of Auditors. The present study contributes to this relevant strand of work.

Figure 1: SME Guarantee Facility theory of change

Impact	Improving economic output and welfare distribution, supporting the creation of new jobs through SME development, including financially fragile segments of the population				
Primary outcomes	Existing SMEs grow faster	Emerging SMEs develop and grow	Improved SME resilience	Improved SME long-term development	Spillover effects from SME activity
Intermediate outcomes	Increased lending to risky, but creditworthy, SMEs	New tailored debt financing product for SMEs	Improved use of regulatory capital	Financially vulnerable segments of the population are reached	
Outputs	FIs provided with risk sharing mechanisms		New financial infrastructure created		
Activities	• Provision of an SME loan risk sharing facility based on a) capped aggregate guarantee amount, and b) targeted volumes of new loans to SMEs • Develop credit reporting infrastructure based on the needs of EIF mandators				

Source: Authors, based on IFC (2015).

4 Data and methods

The information included in the MAP and CIP database is aimed at satisfying EIF's requirements in terms of sound administration and reporting. Consequently, it does not typically contain ex-post data on the performance of SMEs following the granting of the guaranteed loan. The lack of longitudinal data makes the internal source of data unsuitable for full-fledged econometric analyses.

Therefore, in a preliminary step of the analysis, we combine the information contained in the EIF MAP/CIP database with firm-specific financial accounts data provided by the Bureau Van Dijk's Orbis Database. Orbis is an aggregator of firm-level data gathered from over 75 national and international information providers. Data is sourced from national banks, credit bureaus, business registers, statistical offices and company annual reports. For the case of French MAP/CIP beneficiaries, data on financial accounts is sourced from Bureau Van Dijk's Diane Database – the French localised version of Bureau Van Dijk's suite of financial account databases.[8] Financial figures, expressed in Euro nominal values, are deflated using harmonised country- and NACE Rev. 2 sector-level producer price indices (collected from Eurostat). In addition, to mitigate the incidence of outliers, studies winsorise each outcome indicator at the 1st and 99th percentile.

Beneficiary SMEs supported by MAP and CIP guarantees are identified in the Orbis database following a rigorous entity-matching methodology, controlling for fiscal identifier, name, location, sector and date of incorporation. The overlap between the two data sources is typically incomplete, which can cause significant sample shrinkage – notably to 57% of the initial population for France and 47% for Italy. Data loss can also introduce sample selection bias: for this reason, each study under scrutiny integrates sample representativeness analyses, as well as other robustness tests.[9]

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[8] As opposed to Orbis, the Diane database and other localised versions only provide financial accounts for firms that were active at the time of the data extraction. This might have an effect on the comparability of results (see section 4.3).
[9] Interested readers can find out about the rationale of such data choices and sampling in the referenced studies.

4.1.   The population of treated companies

The three studies constituting the core of this meta-analysis (Asdrubali and Signore, 2015; Bertoni *et al.*, 2018; Bertoni *et al.*, 2019) cover recipients from MAP- and CIP-guaranteed loans in five macro-regions: France, Italy, Benelux, Nordic countries, and Central, Eastern and South-Eastern Europe (CESEE). In the case of the CESEE region, only MAP recipients were considered in the respective study, given that at the time the available data could not allow for a thorough assessment of CIP guaranteed loans for this particular region. In the case of the Nordic countries, no financial intermediary applied to the loan guarantee window of this programme, therefore no recipients of CIP-guaranteed loans were observed for this particular region.

Overall, about one million loan guarantees were granted under the two EU programmes in the macro-regions under analysis. In terms of allocation by programme, about 55% guaranteed loans were provided under MAP, and 45% under CIP. In terms of geographical distribution, France (47% of the loans) and Italy (42%) represent the vast majority of allocations, while the three remaining macro-regions (CESEE, Benelux, and Nordics) account for 2 to 3% of total guaranteed loans each. The distribution of transactions in the CESEE macro-region – whether in terms of volumes or number of guaranteed loans – is concentrated in four countries (BG, CZ, PL, RO), which alone represent two thirds of all the loans issued under MAP in CESEE. Figure 2 illustrates the geographical allocation of guaranteed loans analysed by the three studies in this meta-analysis. The geographical distribution reflects at least partially the different sizes of the guaranteed loans markets in each respective region (e.g. see Kraemer-Eis *et al.*, 2018).

Figure 3 breaks down the total number of guaranteed loans under analysis by macro-region, programme and year of loan origination. Guaranteed loans were allocated in France at a relatively constant rate throughout the observed period. Similarly, the rate of new guaranteed loans in Benelux is rather stable over time. Conversely, the number of guaranteed loans disbursed in Italy – more than in all other countries combined between 2004 and 2007 – concentrates in the years 2004 to 2011. For the case of the Nordic countries no guaranteed loans can be observed in the period 2007-2014, as per the reasons stated above. Finally, the bulk of the loan origination in CESEE takes place in the years 2005 – 2007.

Figure 4 showcases the distribution of guaranteed loans macro-regions and selected characteristics of the beneficiary SME. As further discussed in section 5.4, these SME attributes can "moderate" upwards or downwards the overall effect of the policy instrument, revealing instances in which guaranteed loans have been the most impactful. Figure 4 highlights how the number of loans increases with the age of the SME in France and Italy. This suggests a different rationale in the administration of the policy instrument across regions. Loans to manufacturing firms (i.e. NACE Rev. 2 section "C") tend to be most prevalent in Italy, the Nordic countries and CESEE compared to France and Benelux. Conversely, the retail trade industry (NACE Rev. 2 section "G") is less prevalent in Italy compared to other regions.

Figure 4 also remarks the high share of sole traders across macro-regions. This raises data availability issues: in most European countries, sole proprietorships and partnerships either do not file financial accounts or, if they do, they file simplified accounts that do not include the variables that allow carrying out the econometric work. However, the relevance of sole traders is substantially

Figure 2: Geographical allocation of guaranteed loans analysed in this meta-analysis[10]
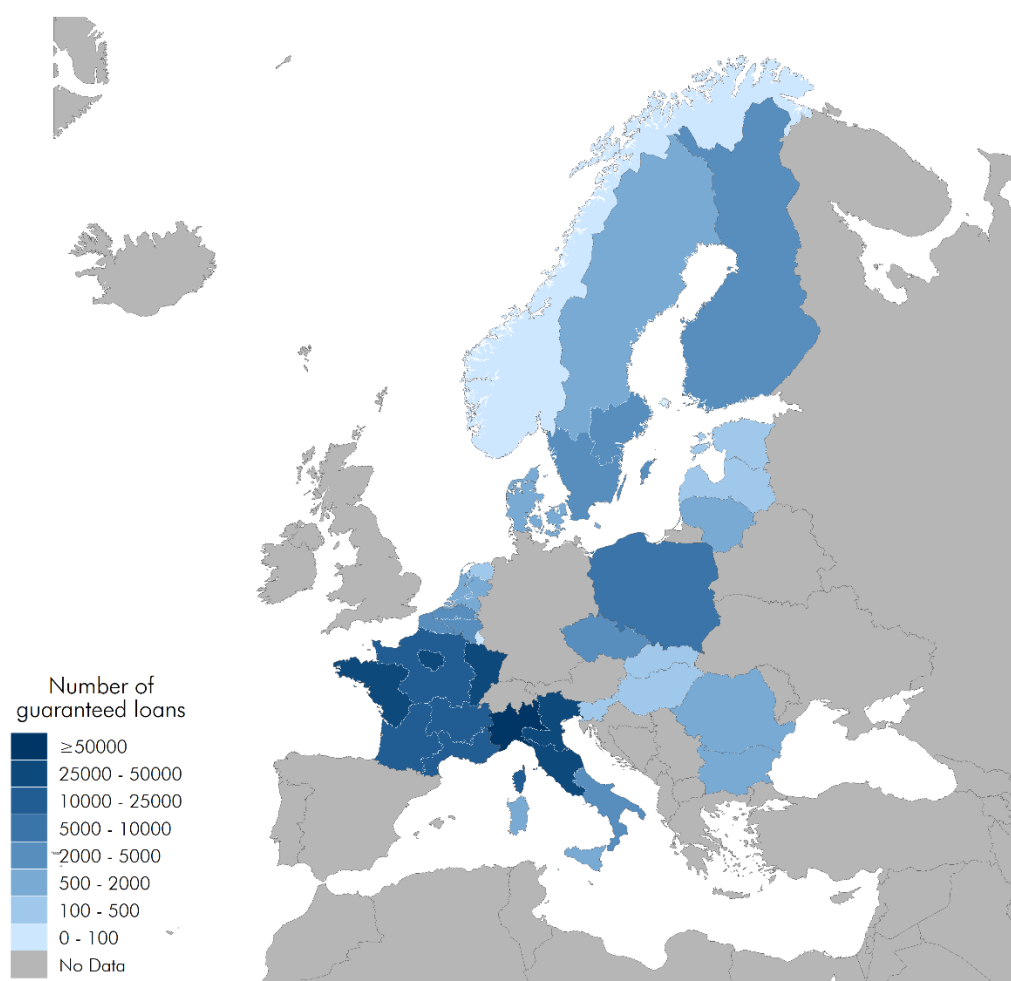
reduced when we look at the Euro-weighted distribution. For instance, Bertoni *et al.* (2019) show that limited liability companies, which are responsible for 34.8% of loans, receive 64.5% of the total loan amount in Italy, Benelux, and Nordics countries. Conversely, sole proprietorships, representing 40.5% of beneficiaries, receive only 17.3% of the total amounts. Therefore, this meta-analysis does not address the potential treatment effect of guaranteed loans on sole traders.

Looking at the average loan amount, guaranteed loans in France are the smallest across all macro-regions, followed by CESEE countries, Italy, Nordic countries and Benelux. This "ranking" is broadly in line with general statistics on the guarantee market (see e.g. Kraemer-Eis *et al.*, 2014), and reflects the different strategies and policy objectives pursued by the national/regional financial intermediary. It should be noted, however, that the spread between median loan amounts across macro-region is much narrower, hinting that the "typical" beneficiary SME, as well as the "typical" financing needs, are comparable across geographies once we account for the different macro-economic context.

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[10] Unless stated otherwise, all figures are an elaboration of the authors based on Asdrubali and Signore (2015), Bertoni et al. (2018) and Bertoni et al. (2019).

Figure 3: MAP- and CIP-guaranteed loans by biennium of granting and macro-region
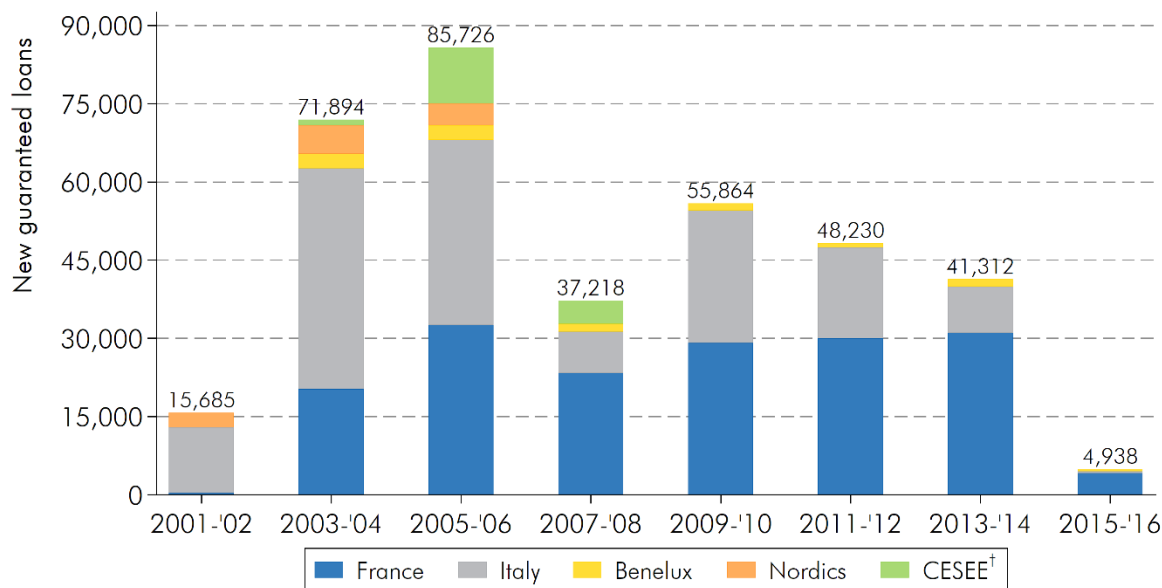
Note: *multiple loans to the same SME within the same year counted once. † Only MAP-guaranteed loans.*

Figure 4: Number of loans, by macro-region and feature (programme, size, SME age, industry)

Figure 2a: loans by programme

Figure 2b: loans by size (in EUR 2010 prices)

Figure 2c: loans by SME age (in years)

Figure 2d: loans by SME industry (NACE Rev. 2)
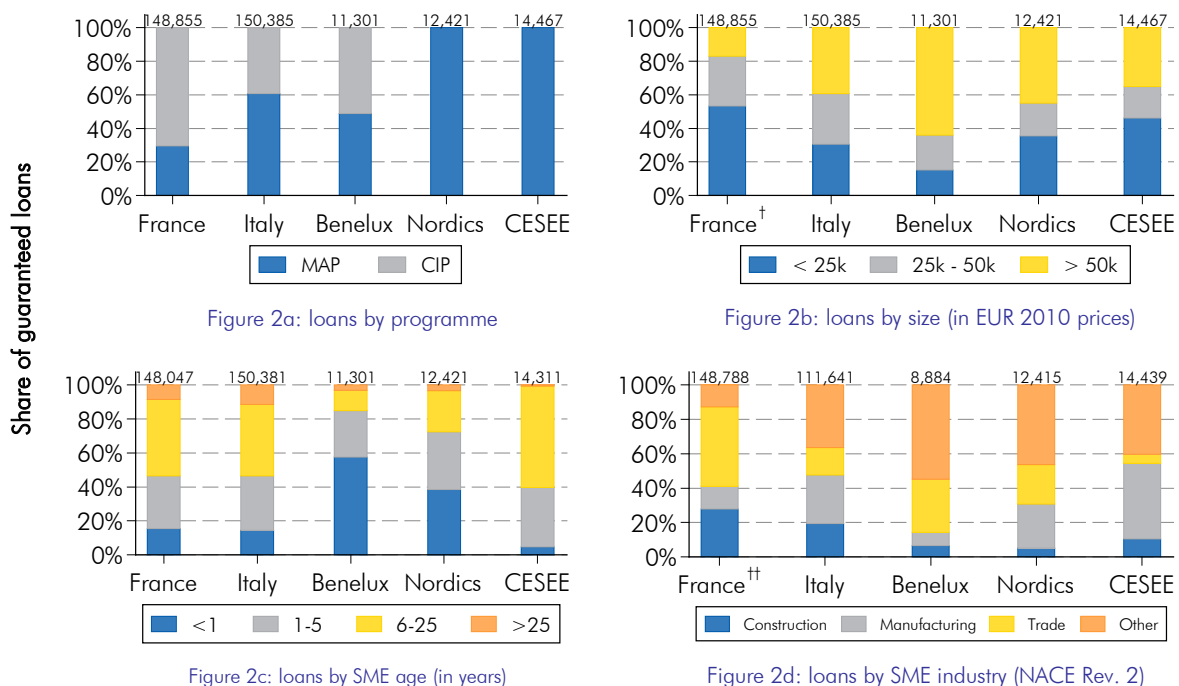
Note: *the number above each bar indicates the sample size used in the breakdown. †Loan size in nominal terms, see Bertoni et al. (2018) for the exact breakdown. ††Trade plus services (G-O).*

Table 1 reports the general features of beneficiary SMEs at the time they received the MAP- or CIP-guaranteed loan. Italian firms tend to have larger assets, sales, and employees, which is consistent with the fact that they are also, on average, older. In France, loans were granted to companies that on average were nine years old and had about three employees (MAP loans were granted to slightly younger, smaller companies). Firms from the Benelux have the smallest average employee costs and sales. Beneficiary SMEs located in the Nordic countries rank in the middle of the observed geographies, save for assets, where they are on average the second-smallest, after France.

Table 1: Average characteristics of treated firms before obtaining a guaranteed loan

SME characteristic		France	Italy	Benelux	Nordics	CESEE
Age (in years)		8.98	6.11[†‡]			7.99
Assets (EUR k)		170.31[†]	835.17[†]	223.10[†]	210.11[†]	930.08[a]
Sales (EUR k)		286.47[†]	886.81[†]	218.69[†]	307.24[†]	1,774.92[a]
Employment	Staff size	2.77	n.a.	n.a.	n.a.	24.25
	Staff costs (EUR k)	70.64[†]	151.05[†]	35.08[†]	82.90[†]	n.a.

Note: all monetary values deflated by producer price indices (at the level of NACE Rev. 2 sections) and expressed in 2010 prices. [†] Value extrapolated from the geometric mean, using the AM–GM inequality and an assumed AM-to-GM ratio of 1.30. [‡] Value only available for all macro-regions combined. [a] Original values expressed in 2005 prices, restated in 2010 prices using the average price index for the region.

Beneficiaries from the CESEE region have more employees than in France – and possibly the other macro-regions. This is both linked to the average loan size and the differences in the cost of capital and labour. In addition, CESEE SMEs are the largest in terms of assets and sales. As in the case with Italian beneficiaries, this is likely due to a combination of their higher average age at loan granting as well as their concentration in the manufacturing sector – as opposed to the Trade and services sector in France. However, note that the average statistic for the CESEE region masks significant heterogeneity: for instance, Asdrubali and Signore (2015) note that the average Romanian borrowing SME features three times as many employees as the Czech average SME.

Overall, the sample characteristics not only mirror the respective SME population features across macro-regions, but also depend on the eligibility criteria as well as the policy objectives set forth by the guarantee agreements between the EIF and each financial intermediary. Indeed, the MAP and CIP programmes are not one-size-fits-all, but allow accommodating varied portfolios of diverse financial intermediaries within the set of predefined eligibility criteria. As discussed in section 2.3, eligibility criteria are set out in the guarantee agreements to maximise outreach and additionality.

4.2. Empirical approach

To assess causality, the studies in this meta-analysis rely on the Rubin Causal Model (RCM, Rubin 1974), a formal mathematical framework for causal inference. Under the RCM, causal inference is treated as a missing data problem. A carefully constructed control group – representing the status quo of treated firms *had they not received the guaranteed loan* – can be used to address the missing

data issue. Against this backdrop, the main measure of interest is the average treatment effect on the treated (ATT), i.e. the average difference between the treatment and control group.

The studies estimate the ATT of the receipt of guaranteed loans by beneficiary SMEs in the period following the year in which the loan was granted. This period was five years for Italy, the Benelux, the CESEE region, and the Nordic countries. It was ten years for France in the reference study. However, for reasons of comparability, we discuss here the treatment effect five years after the guaranteed loan was granted for all macro-regions. The reference studies mainly focus on the additional growth in total assets, sales, profits and employment triggered by the receipt of the guaranteed loan. In addition, one or more studies also tackle the effects of the receipt of the loans on firm productivity, intangible assets, and likelihood of survival. Finally, the studies typically decompose the main results across countries, firm size, loan size, and industry.

The detailed approach to constructing the control group varies slightly across studies – with recent works leveraging more on state-of-the-art techniques. Nevertheless, all studies follow the same baseline empirical strategy. First, a high number of control group candidates is sampled randomly from the Bureau Van Dijk' Orbis/Diane database. To mimic the initial distribution of MAP/CIP recipient in each region, the sampling is stratified, i.e. first aggregating treated SMEs into *buckets*, then randomly sampling a proportionally high number of controls for each bucket.[11]

Appropriate control group SMEs are further identified using model-based matching techniques that combine coarsened exact matching (CEM, Iacus *et al.*, 2012) and propensity-score matching (PSM, Rosenbaum and Rubin, 1983). The choice of the matching characteristics is heavily inspired by the economic literature that models the provision of credit financing – see e.g. Kremp and Sevestre (2013) for the case of French SMEs. By construction, the matching characteristics simulate *the assignment process* of guaranteed loans, i.e. the set of factors that determine whether a borrower will ultimately obtain the guaranteed loan or not. Overall, the matching techniques allow obtaining comparability across studies, parsimony and balancing between treated and non-treated firms.

Box 2: Should the counterfactual approach exclude loans below the reference guarantee volume?

Against the background of section 2.3, it might be argued that loans falling below the reference guarantee volume, as set forth by the Guarantee Agreement, should be excluded from the counterfactual analysis. After all, this reference amount typically represents the volume of loans that the financial intermediary would have achieved anyway, i.e. even in the absence of the EIF (counter-)guarantee.

However, there are several reasons why this argument is misguided. First, it is practically unfeasible to separate borrowers with a risk profile that is aligned with the intermediary's typical financial activity from borrowers that are riskier – thus allowing for a decrease of the reference guarantee volume.

Second and most importantly, the risk profile is an important determinant of the assignment process, thus duly accounted for in the set of matching characteristics used in most studies. In other words, borrowing SMEs whose loans would naturally fall below the reference guaranteed volume, will present a set of characteristics (e.g. lower risk profile) that will allow them to be matched with control companies with an equally high likelihood to obtain credit financing, even in the absence of the EIF (counter-)guarantee.

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[11] The initial control-to-treatment ratio was set at 10 for France, 11 for CESEE, and 15 for Italy, Benelux and the Nordics.

Lastly, the exclusion of a subset of guaranteed loans entails sample size reduction, as well as the loss of representativeness vis-a-vis the true economic effect of guarantees. Thus, it would introduce avoidable and unnecessary challenges to the econometric work.

Following the construction of the appropriate counterfactual group, the baseline empirical approach entails the comparison of MAP- and CIP-supported SMEs against the closest firm(s)[12] in terms of pre-treatment characteristics, simulating the scenario treated SMEs would face in the absence of the MAP/CIP guaranteed loan. The comparison is carried out by means of a *difference-in-differences* analysis (dif-in-dif, Ashenfelter, 1978): first, the pre-treatment performance is subtracted from post-treatment outcome for all firms; second, the control group outcome is deducted from treatment group performance. The *dif-in-dif* effect is estimated with a conventional ordinary least squares (OLS) regression, which allows controlling for additional SME characteristics.

4.3. Comparability across studies

The three studies covered in this meta-analysis differ, often substantially, in terms of sample sizes, empirical approach, and the characteristics of beneficiary SMEs. Consequently, a number of caveats must be accounted for when comparing results across these studies. This section lists and discusses the main reasons why strict quantitative comparisons of the effects across macro-regions might yield inaccurate conclusions. Therefore, a qualitative approach, based on the general direction and scale of the treatment effects, is broadly superior.

A first caveat could be explained by the different choices of the three studies in terms of matching strategy between treated and "twin" firms – the reader may refer to section 4.2 and the reference studies for further details. However, as per section 4.2, there is no compelling reason to believe that these methodological differences would greatly affect cross-country comparability.

A second, more impactful caveat that affects the comparability of results is the differences in sample sizes across macro-regions. The reliability of a statistical analysis relies on the "strength", i.e. the magnitude of the studied effect, but also on the statistical power of the analysis. In other words, small sample sizes might lead to statistical tests not powerful enough to *a)* detect significant deviations between treated and controls, and *b)* provide reliable estimates of such difference.

To address this potential issue, we undertake a statistical power analysis, which allows calculating the minimum effect that can be detected with a certain sample size (see Whitley, 2002 for details about the methodology). The results of this additional analysis is that all but one significant estimated ATTs are found to be above the minimum detectable effect.[13] Similarly, all non-significant ATTs benefit from sample sizes large enough to significantly detect variations of the observed magnitude.

A third caveat pertains to the different characteristics of the pool of beneficiary SMEs across macro-region. The features of the SMEs under scrutiny vary considerably across (and often within) macro-region, in terms of e.g. economic size, industry and age. The root of this large heterogeneity is

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[12] In Asdrubali and Signore (2015), the authors select three control firms for one treated firms in the CESEE region. The other studies select only one "twin" firm.
[13] The only exception is the estimated ATT on intangible assets for the Benelux region.

twofold. First, the features of the beneficiary SME pool is shaped by the credit granting strategy of financial intermediaries. The general criteria under the MAP and CIP guarantee programmes allow for diverse credit allocation strategies depending on the nature and the mission of the financial intermediary, their risk taking appetite, the local economic and regulatory environment. Second, the industry composition, the entrepreneurial and technological environment also affect the pool of final SME beneficiaries. As observed in section 4.1, these result in the different distribution of treated SMEs in terms of sector specialization and stage of business growth. The latter influences both the credit allocation as well as financial performance of SMEs (e.g. economic size, age, risk profile).

All in all, there is compelling evidence that the difference in the magnitude of treatment effects across macro-region is at least partially explained by such significant heterogeneity. For instance, Bertoni *et al.* (2019) tries to control for this for the case of Italy, the Benelux, and Nordic countries. The authors estimate the residual "unexplained" difference in the effects across macro-region after controlling for several confounding factors: the amount of the guaranteed loan (scaled by total assets), economic size of the beneficiary, industry and signature year.

The result of this analysis is that, after accounting for these different compositions, the differences in magnitude of the policy impact across macro-region is sharply reduced. For instance, the magnitude of the higher economic effects on sales and employment observed in the Nordic countries compared to Italy is greatly – although not completely – reduced, while differences in the effect on total assets are cancelled out.

Lastly, we should be wary of potential differences in the effects across the two EU programmes. The three studies in this meta-analysis jointly assess the effects of both programmes within a specific macro-region – the sole exception being the CESEE macro-region, where due to data constraints only the effects of the MAP programme could be assessed. As a consequence, it is not possible, based on the considered studies, to compare the economic impact of the two programmes. At the same time, a comprehensive assessment might be infeasible, due to the vastly different economic conditions under which the two EU guarantee programmes took place. We leave it to future research to shed additional light on this important question.

5   Results

We now introduce and discuss the estimated average treatment effect on the treated (ATT) on several key performance indicators analysed by the various studies. Treatment effects are measured up to five years following the granting of a MAP-/CIP-guaranteed loan.[14] ATTs are based on the logarithm of various financial indicators, and represent the instantaneous change in the rate of growth due to a shift in the treatment status (i.e. treated *vs* untreated). For instance, an estimated ATT of 7% for assets means that the average value of total assets for SMEs receiving a guaranteed loan stands at 7% above the level of the control group. The following sections summarise the effect of guaranteed loans on the economic size of SMEs (assets, sales, and employment), their profits, productivity, share of intangibles and survival up until five years after granting of the guaranteed loan. We then turn to the crucial role of moderators in the shaping of the observed effects.

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[14] It is worth remembering, when comparing those results, of the caveats mentioned in section 4.3, and one above all: the effects for CESEE and Nordic countries only pertain to the MAP programme.

5.1. Economic size of SMEs

We first address a series of variables related to the economic size of beneficiary SMEs. To this end, Figure 5 summarises the main results on economic size variables across studies and macro-region.

Figure 5: Average treatment effect on the treated (ATT) on economic size, by macro-region
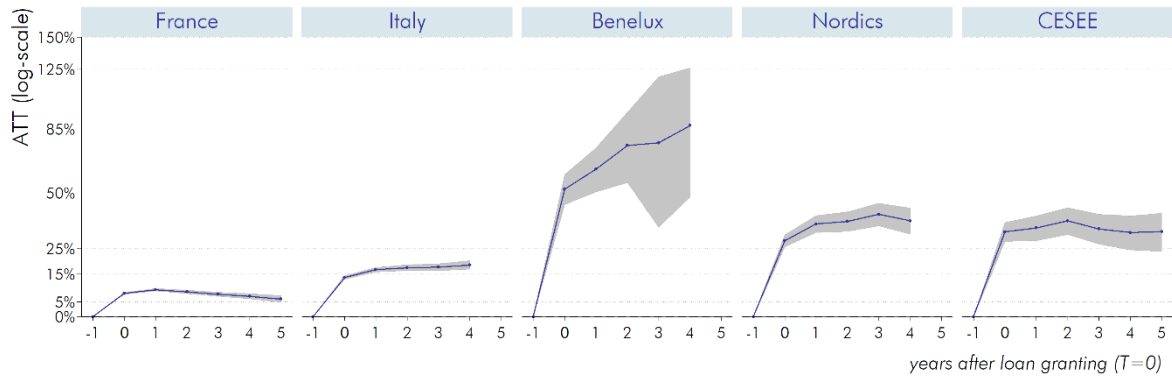
Figure 5a: ATT on total assets
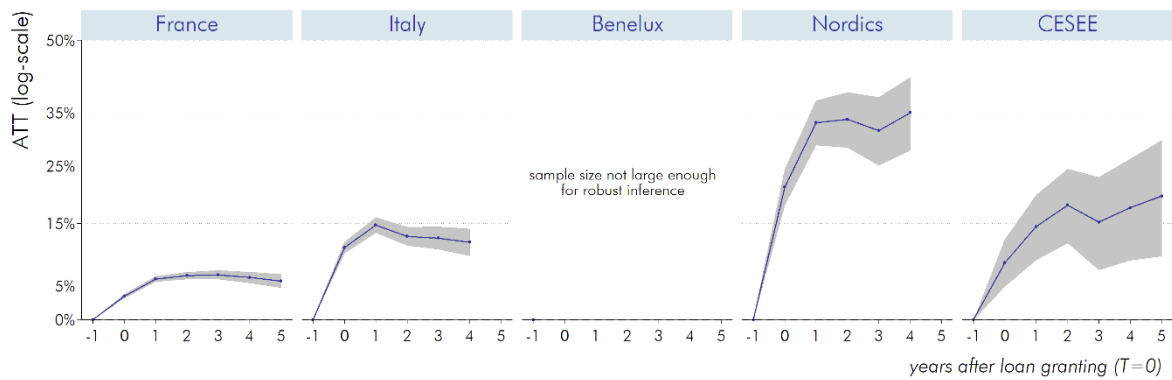
Figure 5b: ATT on turnover
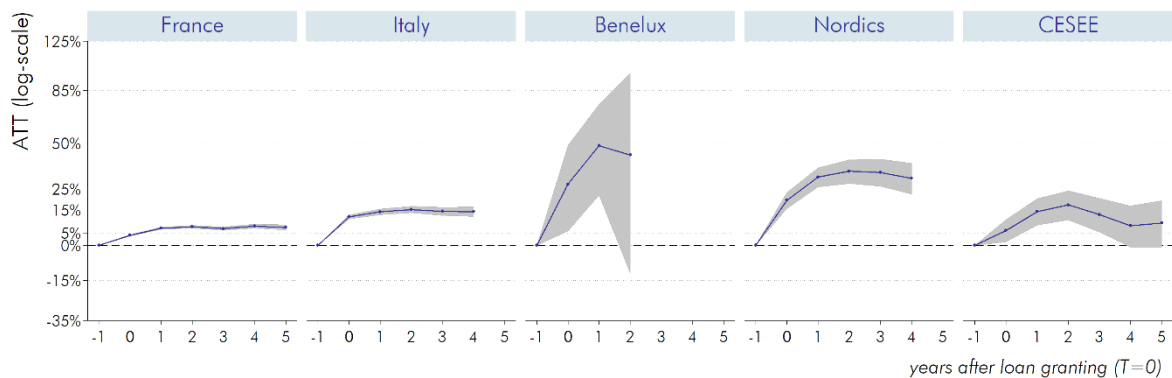
Figure 5c: ATT on employment costs

Note: the figures display the estimated treatment effect of guaranteed loans on economic size, from treatment year to the fourth year after treatment. A log-scale is used due to the different orders of magnitude. For the precise methodology used in each study, see section 4.2. The figure reports the point estimate of the treatment effect (blue line) as well as its 95% confidence interval (shaded region).

5.1.1. Assets

SMEs benefitting from guaranteed loans under the MAP and CIP programme experience significant size growth – as measured in terms of assets. The results strongly confirm that guaranteed loans have a positive and significant ATT. The ATT is positive already at the loan granting year (p-value<1%) and remains positive and significant until five years later (p-value<1%). The confidence interval is relatively narrow around the point estimates for most of the results. It is wider in the case of Benelux due to the small size of the sample, although the effect remains positive and significant.

The magnitude of the treatment effect measured five years after loan granting varies considerably: the effect ranges from +7% (for France) to +87% (for Benelux). As discussed in section 4.3, these large differences are mostly due to the diverse pool of beneficiary SMEs and the credit allocation strategy of national/regional financial intermediaries.

For instance, the larger effect in Benelux is partly due to recipient SMEs being much younger than in the other regions – 85% of SMEs have five or less years of activity at the time of the loan granting. Small and young SMEs, with a relatively higher risk profile, are typically more affected by credit rationing than the more mature SMEs, which in turn is likely to moderate "upwards" the magnitude of the effect on assets. Section 5.4 investigates the role of such moderating factors.

Box 3: Asset growth: an accounting effect or a true policy effect?

From an accounting perspective, the growth in total assets is somewhat granted once a company receives a guaranteed loan. This is because the loan will increase current assets (on the asset side of the balance sheet) and financial debt (on the liability side).

Does this imply that the positive effect on assets cannot be attributed to the policy instrument, i.e. the guaranteed loan? No, under the key assumptions of Rubin's Causal Model, treated companies would not have been able to make up for the "lost" MAP- and CIP-guaranteed loan through other financing means (e.g. a non-guaranteed loan, a loan guaranteed by other financial intermediaries, equity investments, grants).

Nevertheless, it is well justified to check whether the total asset growth we observe is larger than the mere accounting effect. This would highlight potential indirect, additional growth brought by the guaranteed loan. This issue is discussed in Bertoni *et al.* (2019) for the case of Italy, the Benelux, and Nordic countries. In short, the analysis supports the existence of growth above and beyond the mere increase in assets/liability linked to the loan itself.

5.1.2. Revenues

SMEs benefitting from guaranteed loans under the MAP and CIP programme also experience significant increase in revenues. The positive and significant effect varies across countries, from +6% for France to +35% for the Nordic countries. Results are significant at 95% confidence level for at least the first two periods in all regions, i.e. when sample sizes are sufficiently large.

Once again, the usual caveats (stated in section 4.3) concerning the comparability across macro-regions apply here. Bertoni *et al.* (2019) compare the economic impact in the Nordic countries to Italy, controlling for the initial firms' and loans' characteristics reduces the spread between the two ATTs to +16%, down from the +25% difference portrayed in Figure 5b.

5.1.3. Employment

In addition to assets and revenues, guaranteed loans under the MAP and CIP programme positively affect employment levels. The magnitude of the effect ranks from +8% in France to above +40% for Benelux. Concerning the effects on employment costs for the Benelux and CESEE countries, the effect is significant and positive at the beginning of the treatment period, up until three years following the granting of the loan for the CESEE countries, and one year for the Benelux.

Towards the end of the observed treatment effect window, the lower bound of the estimates in CESEE and Benelux goes below zero. This indicates that sample sizes become too low to perform precise inference. Once again, the distances across the magnitude of treatment effects shrink significantly when accounting for cross-country differences in firms' characteristics. [15]

5.2. Intangibles, productivity and profits of SMEs

In addition to conventional economic size indicators, the studies in this meta-analysis address other dimensions of SME performance related to intangible assets to total assets, productivity and profits. Figure 6 summarises the relevant results across studies and macro-region.

Bertoni *et al.* (2019) examine the effects of guaranteed loans on the ratio of intangible assets over total assets, which can be seen as a bland proxy for the innovativeness of firms. Intangible assets encompass investments in immaterial goods, which tend to be linked to, e.g., innovations. The effect is positive across all macro-regions, consistently around +1%. [16] The economic significance of this effect is high, since a one percentage point increase represents around one third of the average initial share of intangible-to-total assets in the sample.

Asdrubali and Signore (2015) and Bertoni *et al.* (2018) look at the effects of guaranteed loans on productivity. To measure productivity, the studies estimate the firm-level total factor productivity (TFP) using the procedure by Levinsohn and Petrin (2003). TFP measures the efficiency of a firm in using its inputs (capital and labor) in producing output.

Bertoni *et al.* (2018) find that for the case of France, TFP slightly decreases in the short term after receiving a guaranteed loan, recovers in the medium term (fourth/fifth year after treatment) and significantly increases in the longer term compared to the control group. Similarly, Asdrubali and Signore (2015) find that in the CESEE region, the MAP-guaranteed loan has an immediate negative impact on firms' productivity, consisting in a reduction in TFP of 9%-11% in the first three years, compared to the control group. However, the negative impact is then partially absorbed: during the analysed five-year period, the magnitude and significance of this negative shock become weaker.

In addition to assets intangibility and productivity, all studies also consider the treatment effect on some measure of firm's profits. However, one technical issue with profit measures is their very skewed distribution, stretching towards both the negative and positive domain. To address this challenge, Asdrubali and Signore (2015) only consider the subset of SMEs with positive profits,

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[15] Bertoni *et al.* (2019) shows that spread in the ATT between the Nordic countries and Italy reduces to +12% (down from +16%) after controlling for such differences.
[16] As discussed in section 4.3 and Footnote 13, the ATT for Benelux is not significant due to the test's low statistical power.

Figure 6: ATT on intangible assets to total assets, productivity and profits, by macro-region
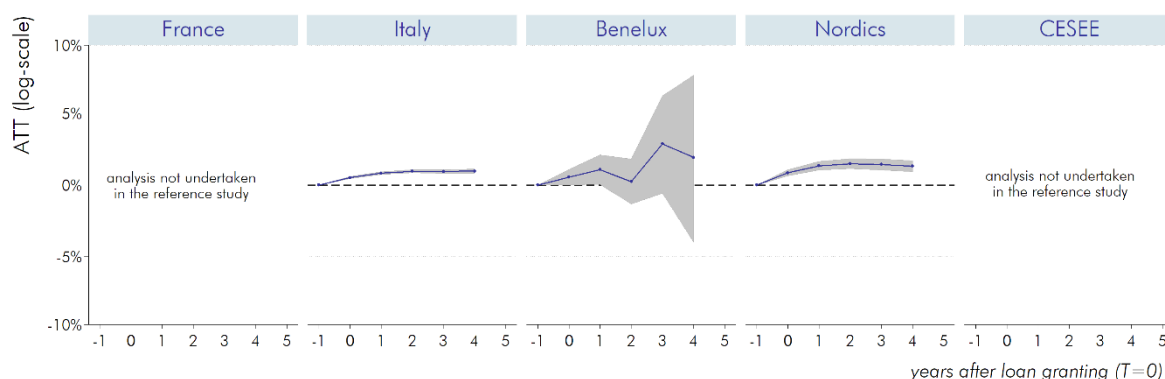
Figure 6a: ATT on assets intangibility
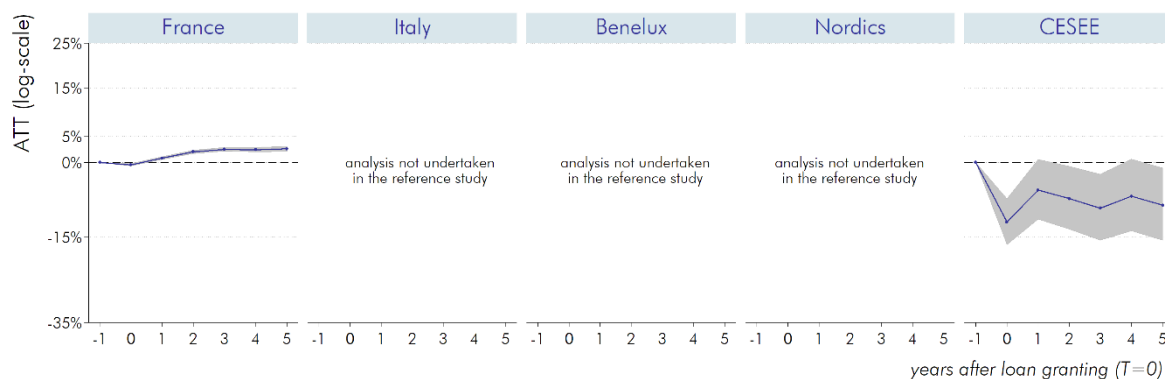
Figure 6b: ATT on total factor productivity
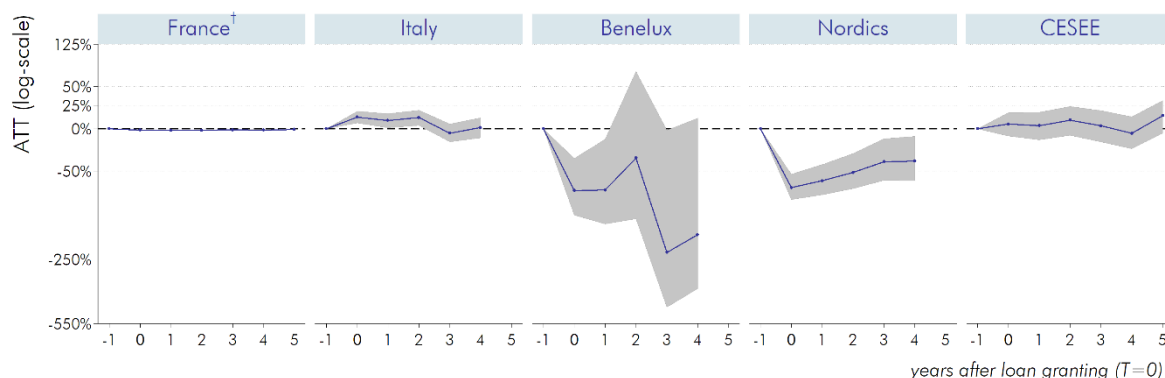
†Profitability measured with return on assets (ROA).

Figure 6c: ATT on profits and profitability

Note: the figures display the estimated treatment effect of guaranteed loans on innovation, productivity and profits, from treatment year to the fourth year after treatment. A log-scale is used sometimes due to the different orders of magnitude. For the precise methodology used in each study, see section 4.2. The figure reports the point estimate of the treatment effect (blue line) as well as its 95% confidence interval (shaded region).

deriving results that potentially do not represent the overall population of treated firms. Bertoni *et al.* (2018) rescale profits by the amount of firm assets (i.e., measuring return on assets, ROA), without using log-transforms of the variables. Despite the winsorisation, the drawback of this approach is that outliers still likely affect estimated ATTs. Finally, Bertoni *et al.* (2019) use a neglog transformation (Whittaker *et al.*, 2005). A drawback of neglog transformations is that the resulting ATTs do not precisely represent the instantaneous change in the rate of growth due to a shift in the treatment status. Thus, the direction of the treatment effect on profits can be identified, while the magnitude of the ATTs on profits cannot be easily estimated.

Studies find mixed results. Asdrubali and Signore (2015) find no significant effect on profits for SMEs in the CESEE region, arguing that this is likely due to companies privileging short-term expansion over cost minimisation. Bertoni *et al.* (2018) find that guaranteed loans reduce by one percentage point the return on assets of beneficiary firms in France. Similarly to the shock to productivity, the authors observe a stronger short-run dip in profitability, and a medium-to-long-run convergence between the two evaluated groups – although the difference still remains negative and significant. Bertoni *et al.* (2019) observe a similar pattern for beneficiary SMEs in Benelux and the Nordic countries. However, in these regions treated firms fully converge to the control group, so that by the fifth year after investment there is no statistical difference between the two groups. Interestingly, Bertoni *et al.* (2019) also find that beneficiary SMEs in Italy experience an opposite trend following the guaranteed loan: a short-run significant increase in profits, followed by a medium-run convergence to the average profit level in the control group.

5.3.   SME survival

Bertoni *et al.* (2018) and Bertoni *et al.* (2019) include an examination of the effects of guaranteed loans on the survival of firms. To this end, both studies estimate the treatment effect on the probability of default. Bertoni *et al.* (2018) consider the default probability as at end 2016 (with vintages of beneficiary SMEs potentially experiencing shorter/longer time periods). Bertoni *et al.* (2019) consider default probability during the five years around the granting of the guaranteed loan. Both studies use a probit specification to model the probability of default of SMEs.

Overall, guaranteed loans are found to lower the probability of default by between 4% - for Italy, Benelux, and the Nordic countries – and up to 5% – for France. The magnitude of the effect is economically important: Bertoni *et al.* (2019) find that, in the second year after treatment, the probability reduction brought by the treatment effect is 3.35 percentage points, against a baseline default probability of 5% for untreated firms in the same time span.

5.4.   The fundamental role of moderating variables

As discussed in section 4.3, a significant portion of the variation in the ATTs across macro-region can be attributed to the diverse pool of beneficiary SMEs within each geography. To understand the role of these factors, capable of "moderating" upwards or downwards the magnitude of the overall effect, all analysed studies estimate a series of *conditional* ATTs, by singling out subsets of beneficiary SMEs and their associated control groups. Table 2 summarises the findings of this meta-analysis.

Table 2: Moderators of the guaranteed loan's treatment effect

Moderator variable	Direction of moderation	Description	Examples
SME age	↓	The treatment effect is larger for younger companies.	In Asdrubali and Signore (2015), younger SMEs in CESEE experienced an extra boost in employment and turnover. In Bertoni *et al.* (2018), SMEs with age below the median value (7 years) experienced a larger treatment effect. This only applies to employment growth (+2.3 percentage point, p-value<0.1%), not to sales and assets growth. In Bertoni *et al.* (2019), the treatment effect on total assets is 6.0 percentage points smaller in companies aged 5-16 years than in companies younger than 5 years, and 13.4 percentage points smaller in companies aged 16+ years than in companies younger than 5 years.
SME size	↓	The treatment effect is larger for smaller companies.	In Asdrubali and Signore (2015), micro- and small-sized enterprises – as per the European Commission Recommendation 2003/361/EC – reap the largest treatment effects. Micro-SMEs benefit from the largest net increase in turnover. Micro companies are also found to face a more significant drop in their productivity levels, which is then recovered over the medium term. In Bertoni *et al.* (2018), the treatment effect is larger on smaller companies – defined as companies with sales below the median asset value. Smaller SMEs experience higher sales growth (+2.7%), employment growth (+4.4%) and assets growth (+5.6%). In Bertoni *et al.* (2019), treatment effects are larger for smaller SMEs – in terms of quartiles of asset values. The extent of these differences is considerable: assets growth is 29.4% higher for SMEs in the first vs. last quartile.
Loan size	↑	The treatment effect is larger for larger loans.	In Bertoni *et al.* (2018), larger loan amounts correspond to larger treatment effects. An increase in the loan size from EUR 10,000 to EUR 40,000 leads to: a) a 10% increase in assets growth, a 6% in sales growth and a 6% increase in employment growth. In Bertoni *et al.* (2019), larger guaranteed loans are associated to a larger ATT in terms of total assets, sales, employment costs and intangible assets/total assets growth. The effect is consistent in the five years after the loan and is of large magnitude.
Industry	↔	The average treatment effect on the treated does not depend strongly on the industry, with a few exceptions.	Asdrubali and Signore (2015) find that the ATT does not depend strongly on the industry. The sole exception being that manufacturing SMEs in CESEE benefitted more than SMEs in retail. In Bertoni *et al.* (2018), the ATT does not depend strongly on the industry, with a few exceptions. Notably, the ATT for sales, assets and labour growth is significantly higher in the services industry (e.g. +6.95% for sales) than in advanced knowledge sectors (+2.77% in sales). Similarly, Bertoni *et al.* (2019) observe little difference in the ATT across sectors. Interestingly, guaranteed loans are typically less effective at boosting growth in the most high-tech manufacturing industries, in which asymmetries of information are supposedly higher and a greater effect should in principle be observed.

Moderator variable	Direction of moderation	Description	Examples
Economic cycle	↔	<u>The average treatment effect on the treated does not strongly depend on the economic cycle.</u>	Asdrubali and Signore (2015) do not find strong differences among loans granted in different years. All loan granting periods overlap with the years of the global financial crisis, thus providing evidence of a counter-cyclical effect of guaranteed loans. In Bertoni *et al.* (2018), macroeconomic conditions turn out to have a limited influence on the performance effects of guaranteed loans, independently of the specific performance measure. If anything, the authors detect an anti-cyclical effect on assets, but the economic significance of the effect is small.

Guaranteed loans have much larger positive effects on smaller and younger companies, which according to the academic literature are the companies most subject to financial constraints. Bertoni *et al.* (2019) show that younger SMEs in France, Italy, Benelux and the Nordic countries experience higher treatment effects in terms of total assets, sales, and employment costs. In France, younger companies exhibit more sustained sales growth, which is consistent with the results of the so called "Gibrat literature" (Sutton, 1997; Santarelli *et al.*, 2006). Approximated by the asset size, Bertoni *et al.* (2018) and Bertoni *et al.* (2019) also observe that smaller companies benefit more from guaranteed loans in Italy, Benelux, and the Nordic countries. This result is confirmed in Asdrubali and Signore (2015) for the CESEE region, this time measuring size in terms of number of employees: micro-SMEs benefited the most from guaranteed loans.

Consistently with expectations, larger guaranteed loans are associated to larger ATTs. Bertoni *et al.* (2018) and Bertoni *et al.* (2019) find that larger loans increase estimated ATTs for economic size, innovation and profits. Since Asdrubali and Signore (2015) do not investigate this particular aspect, we do not have sufficient evidence as to whether the same applies in the CESEE region, although it would seem reasonable to assume so. The studies find no evidence of loan size effects on profits.

Bertoni *et al.* (2018) and Bertoni *et al.* (2019) examine the role of industries as moderators of the treatment effect. In the case of France, Italy, the Benelux, and Nordic countries, the ATT of guaranteed loans on economic size is larger in services than in manufacturing, but does not seem to be larger for high-tech and knowledge intensive sectors vis-à-vis low tech sectors. In the CESEE region, the opposite is true, with retail SMEs experiencing lower ATTs than in manufacturing.

The studies also examine the role of additional moderating factors. We do not report the full results here, but provide the main conclusions. In France, *macroeconomic conditions* turn out to have a very limited influence on the ATT of guaranteed loans. If anything, there seems to be an anti-cyclical effect on assets, but the magnitude of the effect is extremely small. We do not have sufficient evidence as to whether the same applies in Italy, Benelux and the Nordic countries, although it would seem reasonable to assume so. Asdrubali and Signore (2015) find mixed results, with guaranteed loans issued in 2005 and 2006 generating the highest impact. Lastly, Bertoni *et al.* (2018) find no evidence that the local availability of *credit or venture capital* in the regions where treated firms are located influences the ATT of guaranteed loans.

5.5.   Comparison with the relevant literature

Table 3 compares the result of the three studies under analysis (Asdrubali and Signore, 2015; Bertoni *et al.*, 2018; Bertoni *et al.*, 2019) against a number of other studies found in the academic literature. We screened a high number of studies related to credit guarantees, only retaining those that entailed a methodology at least qualitatively similar to the three studies in this meta-analysis. The reader may refer to OECD (2017) and Asdrubali and Signore (2015) for a more extensive review of the literature on the economic impact of credit guarantee schemes.

The direction of the treatment effects on employment, turnover, and survival in our meta-analysis is in line with other studies from the relevant academic literature. The effects on turnover of comparable studies are either non-significant, or with lower magnitude than the ones of the studies considered in this paper. The magnitudes of the effects for employment and survival are in line with other guarantee programmes that were subject to econometric impact assessment, with some studies achieving higher treatment effects than the studies in this meta-analysis. Moderating factors are likely to drive the difference in magnitudes, as explored in section 5.4.

6   Concluding remarks

Drawing on a meta-analysis of recent EIF working papers on the economic effects of guaranteed loans to SMEs, this paper provides the first pan-European assessment of the loan window of the SME Guarantee Facility under the MAP and CIP programmes. The analysis, encompassing more than 360,000 guaranteed loans for an aggregate volume of EUR 22bn in 19 European countries, represents approximately 60% of all disbursements under the referenced programmes.

To assess the real effects of the public policy, all studies adopt an econometric approach based on the comparison between firms that received guaranteed loans under MAP and CIP – the treatment group – against firms that did not receive such guaranteed loans – the control group. This approach – one of many available to researchers – is increasingly considered a de facto standard in the evaluation literature (World Bank, 2018; Arraiz *et al.*, 2011; Amamou *et al.*, forthcoming). Against this backdrop, this methodology represents a sound basis for the analysis of the economic additionality of public policy programmes targeting SMEs. Future research might leverage on this approach to provide comparable results for e.g., national guarantee schemes, EU structural funds and other type of financial support to European SMEs.

The combined studies conclude that guaranteed loans provided by the EIF under the MAP and CIP programmes effectively boosted firm growth and increased survival chances of beneficiaries. The effects are particularly visible for SMEs that, as predicted by theory, are the most likely to face financing constrains, i.e. smaller and younger firms. Given the ample coverage of this meta-analysis in terms of volumes, geography and loan granting years, it is not implausible to consider these conclusions applicable for all guaranteed loans issued under the MAP and CIP programmes.

However, these results should not be extrapolated to conclude that guarantee programmes should focus exclusively towards these SMEs. In fact, further research would be necessary to shed light on the trade-off between the economic benefits of guarantees and the implied financial risk and cost, which are likely to be higher for younger and smaller SMEs.

Table 3: Comparable results from the relevant literature

Study	Countries (Programme)	Loan granting period	Sample	Methodology	ATT			
					Employment	Sales	Profits	Survival
Allinson et al. (2013)	UK (EFG)[a]	2009	411 SMEs	OLS	n.s.	n.s.	n.a.	n.a.
Bah et al. (2011)	Macedonia (USAID)[b]	1992-2007	100 SMEs	Kernel PSM with calliper	+26%	n.a.	n.a.	n.a.
Blasio et al. (2017)	Italy (FdG)[c]	2009-2014	60,000 SMEs	Regression discontinuity design	n.a.	n.s.	n.a.	n.a.
Brown and Earle (2017)	US (SBA)[d]	1990-2009	930,200 loans	Kernel PSM + dif-in-dif	+10%[e]	n.a.	n.a.	n.a.
Cassano et al. (2013)	CESEE (EBRD-East)[f]	2001-2004	1,272 SMEs	Dif-in-dif	+14%	+8%	+9%	n.a.
Lelarge et al. (2010)	France (SOFARIS)[g]	1989-2000	26,000 SMEs	Matching model	+16%	n.a.	n.a.	+8%
Martin-Garcìa and Santor (2019)	Spain[h]	2009-2015	2,934 SMEs	OLS, PSM	n.a.	+4%	n.a.	n.a.
Asdrubali and Signore (2015)	CESEE (MAP)	2003-2008	14,467 loans	PSM + dif-in-dif	+17%	+20%	n.s.	n.a.
Bertoni et al. (2018)	France (MAP, CIP)	2003-2016	148,855 loans	PSM + dif-in-dif	+8%[i]	+6%	-0.6%[k]	+5%
Bertoni et al. (2019)	Benelux (MAP, CIP)	2001-2006	11,301 loans	PSM + dif-in-dif	n.s.	n.a.	n.s.	n.a.
Bertoni et al. (2019)	Nordics (MAP)	2001-2006	12,421 loans	PSM + dif-in-dif	+30%[i]	+35%	-36%	n.a.
Bertoni et al. (2019)	Italy (MAP, CIP)	2001-2014	150,385 loans	PSM + dif-in-dif	+14%[i]	+12%	n.s.	n.a.

Notes: n.s.: non significant effect for α=0.05; n.a.: not available; [a] Enterprise Finance Guarantee Programme of the British Business Bank; [b] SMEs supported with financial assistance by the United States Agency for International Development; [c] Loan guarantees provided by the Italian Fondo di Garanzia; [d] Loans supported by the Small Business Administration; [e] Calculated from the ATT on employment levels per USD 1mn of loan (+4.2), multiplied by the average loan share (33% of USD 1mn) and the average pre-treatment employment size (14.33); [f] SMEs supported by the EBRD in Bulgaria, Georgia, Russia and Ukraine; [g] Loan guarantees provided by the "SOFARIS" programme; [h] Loan guarantees provided by Avalmadrid; [i] Dependent variable is employment costs (instead of employment number); [k] Calculated on return-on-assets.

Further improvements to this relevant research strand could be envisaged along four main axes. A first axis would consist in deepening our understanding of the impact of guaranteed loans on firms' profits and productivity. As stated in section 5.2, the reasons for the fall in profits and productivity observed in some of the macro-regions are not clear-cut. Firms may reduce their short-to-medium term profitability for a wide range of reasons, not all necessarily negative. For instance, a company benefiting from the programme may initiate an ambitious investment plan, which would make it unprofitable in the short run, only for it to grow in the longer run.

There are several possible improvements to palliate these gaps in the analysis, such as increasing the time span for the measurement of the effects. In addition, further data-driven analyses, e.g. cluster analysis, could help profiling treated firms that experience a growth in profits following a guaranteed loan, in the perspective of identifying further moderators of profits growth.

A second axis consists in deepening our understanding of the role of financial intermediaries in the channelling of the main treatment effects. Learning more about the allocation criteria used by financial intermediaries would allow to dwell on the described (pan-)national differences, not only in terms of industry landscape, but also in terms of the implementation of the programme. Different practices and traditions in the allocation of loans across financial intermediaries may explain residual differences in the economic impact across regions of Europe.

A third axis entails extending our access to relevant data, incorporating additional dimensions of credit allocation as well as characteristics of the policy instrument. This would allow for improved impact assessment techniques. For instance, access to credit data from central banks' registries would allow assessing if targeted firms were more likely to obtain further credit financing because of the guaranteed loan. Moreover, information on whether beneficiary SMEs represent new clients to the financial intermediary would allow to know if the latter expand their client base following the participation to the guarantee programme. In order to limit the administrative burden of data collection for intermediaries, which could hamper the successful deployment of the programme, third-party data provision should be privileged. Finally, comparing beneficiary firms with businesses that experienced specific counterfactual scenarios (e.g., a non-guaranteed loan, a loan guaranteed by other financial intermediaries, equity investments and grants) would allow disentangling the various transmission channels of the guarantee's economic impact.

Lastly, this series of assessments allows reflecting on efficient organisational models to carry out such exercises. Bertoni *et al.* (2019) stems from the joint effort of three (independent) academic researchers and the EIF's Research & Market Analysis (RMA) team. The RMA team provided the necessary on-site support and guided the researchers through the intricacies of the data, programmes, as well as the analytical tools essential to carry out such complex assessment. This model, which proved successful, can and should constitute a viable approach for future research. Building on the benefits of this approach, RMA has set forth an ambitious roadmap for impact assessments, with a long-run goal to assess the entirety of EIF policy instruments.

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Annexes

Annex I: List of Acronyms

- AECM: European Association of Guarantee Institutions
- AM: Arithmetic Mean
- ATT: Average Treatment Effect on the Treated
- CCS: Cultural and Creative Sectors
- CEM: Coarsened Exact Matching
- CESEE: Central, Eastern and South-Eastern Europe
- CGS: Credit Guarantee Schemes
- CIP: Competitiveness and Innovation Framework Programme
- COSME: (Programme for the) Competitiveness of Small and Medium-Sized Enterprises
- EaSi: Employment and Social Innovation Programme
- EBCI: European Bank Coordination Initiative (i.e. Vienna Initiative 2)
- EC: European Commission
- ECA: European Court of Auditors
- ECB: European Central Bank
- EFSI: European Fund for Strategic Investments
- EIF: European Investment Fund
- EU: European Union
- FAFA: Financial and Administrative Framework Agreement
- GEI: Growth and Employment Initiative
- GM: Geometric Mean
- LGF: Loan Guarantee Facility
- MAP: Multi-Annual Programme
- OECD: Organisation for Economic Cooperation and Development
- OLS: Ordinary Least Squares
- PBT: Profit (or loss) Before Taxes
- PS: Propensity Score
- PSM: Propensity Score Matching
- RCM: Rubin Causal Model
- ROA: Return-on-Assets
- SME: Small and Medium-sized Enterprise
- SMEG: Small and Medium-sized Enterprises credit Guarantee

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