

Bertoni, Fabio; Colombo, Massimo G.; Quas, Anita

**Working Paper**

## The effects of EU-funded guarantee instruments of the performance of small and medium enterprises: Evidence from France

EIF Working Paper, No. 2018/52

**Provided in Cooperation with:**

European Investment Fund (EIF), Luxembourg

*Suggested Citation:* Bertoni, Fabio; Colombo, Massimo G.; Quas, Anita (2018) : The effects of EU-funded guarantee instruments of the performance of small and medium enterprises: Evidence from France, EIF Working Paper, No. 2018/52, European Investment Fund (EIF), Luxembourg, [http://www.eif.org/news\\_centre/publications/EIF\\_Working\\_Paper\\_2018\\_52.htm](http://www.eif.org/news_centre/publications/EIF_Working_Paper_2018_52.htm)

This Version is available at:

<https://hdl.handle.net/10419/190505>

**Standard-Nutzungsbedingungen:**

Die Dokumente auf EconStor dürfen zu eigenen wissenschaftlichen Zwecken und zum Privatgebrauch gespeichert und kopiert werden.

Sie dürfen die Dokumente nicht für öffentliche oder kommerzielle Zwecke vervielfältigen, öffentlich ausstellen, öffentlich zugänglich machen, vertreiben oder anderweitig nutzen.

Sofern die Verfasser die Dokumente unter Open-Content-Lizenzen (insbesondere CC-Lizenzen) zur Verfügung gestellt haben sollten, gelten abweichend von diesen Nutzungsbedingungen die in der dort genannten Lizenz gewährten Nutzungsrechte.

**Terms of use:**

*Documents in EconStor may be saved and copied for your personal and scholarly purposes.*

*You are not to copy documents for public or commercial purposes, to exhibit the documents publicly, to make them publicly available on the internet, or to distribute or otherwise use the documents in public.*

*If the documents have been made available under an Open Content Licence (especially Creative Commons Licences), you may exercise further usage rights as specified in the indicated licence.*

# The effects of EU-funded guarantee instruments on the performance of Small and Medium Enterprises:

Evidence from France

Fabio Bertoni ■

Massimo G. Colombo ■

Anita Quas ■



*Fabio Bertoni* is a Professor of Finance and Associate Dean for Research at emlyon business school.

Contact: [bertoni@em-lyon.com](mailto:bertoni@em-lyon.com)



*Massimo G. Colombo* is a Full Professor of Entrepreneurship, Entrepreneurial Finance and Innovation Economics, and Associate Dean for Research and Rankings at Politecnico di Milano, School of Management.

Contact: [massimo.colombo@polimi.it](mailto:massimo.colombo@polimi.it)



*Anita Quas* is an Associate Professor of Corporate Finance at emlyon business school

Contact: [quas@em-lyon.com](mailto:quas@em-lyon.com)

**Editor:**

Helmut Kraemer-Eis,  
Head of EIF's Research & Market Analysis, Chief Economist

**Contact:**

European Investment Fund  
37B, avenue J.F. Kennedy, L-2968 Luxembourg  
Tel.: +352 248581 394  
[http://www.eif.org/news\\_centre/research/index.htm](http://www.eif.org/news_centre/research/index.htm)

Luxembourg, November 2018



Scan above to  
obtain a PDF  
version of this  
working paper

**Disclaimer:**

This Working Paper should not be referred to as representing the views of the European Investment Fund (EIF) or of the European Investment Bank Group (EIB Group). Any views expressed herein, including interpretation(s) of regulations, reflect the current views of the author(s), which do not necessarily correspond to the views of the EIF or of the EIB Group. Views expressed herein may differ from views set out in other documents, including similar research papers, published by the EIF or by the EIB Group. Contents of this Working Paper, including views expressed, are current at the date of publication set out above, and may change without notice. No representation or warranty, express or implied, is or will be made and no liability or responsibility is or will be accepted by the EIF or by the EIB Group in respect of the accuracy or completeness of the information contained herein and any such liability is expressly disclaimed. Nothing in this Working Paper constitutes investment, legal, or tax advice, nor shall be relied upon as such advice. Specific professional advice should always be sought separately before taking any action based on this Working Paper. Reproduction, publication and reprint are subject to prior written authorisation.

*This page intentionally left blank*

## Abstract<sup>1</sup>

This paper provides a policy-oriented summary of the econometric study commissioned by the European Court of Auditors, in the context of its audit of EU-funded loan guarantee instruments.<sup>2</sup> The study assesses the real performance effects of EU-guaranteed loans to SMEs disbursed in France during the years 2002 to 2016. The study estimates the average treatment effect of guaranteed loans over a 10-year period around disbursement, using a combination of difference-in-difference estimation, coarsened exact matching and propensity score analysis. On average, French SMEs benefitting from EU-guaranteed loans experienced additional 9% asset growth, 7% sales growth, and 8% employment growth compared to the control group. The economic significance of the effect is typically stronger for smaller and younger firms. Beneficiary SMEs also experienced 5% lower default rates. The study also estimates the effects of guaranteed loans on SME productivity. Consistent with earlier works, the analysis finds a short-run dip in productivity, accompanied by a medium-run recovery and a long-run positive effect, signalling the presence of adjustment costs in the production function following loan-induced investments. The study concludes by discussing potential implications for policy makers and further research.

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

**JEL codes:** G2, H25, O16

---

<sup>1</sup> This research benefited from the European Court of Auditors (ECA) under the negotiated procedure PN553.

<sup>2</sup> European Court of Auditors (2017). EU-funded loan guarantee instruments: positive results but better targeting of beneficiaries and coordination with national schemes needed. Special report No 20/2017.

*This page intentionally left blank*

## Preface

Small and Medium-sized Enterprises (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. 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. As a result, many SMEs with economically viable projects cannot obtain the necessary financing from the regular system of financial intermediation.<sup>3</sup>

Credit Guarantee Schemes (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. 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 (Kraemer-Eis et al., 2018).

The number of Credit guarantee schemes in support of European SMEs has increased in the past decades. At the EU28 level, several schemes were implemented over the last 20 years:

- In 1998, the European Commission (EC) established the first SME Guarantee facility (“SMEG 1998”) under the “Growth and Employment Initiative, 1998-2000” programme.
- This first facility was followed by the “SMEG 2001”, implemented under the 2001-2006 Multi-Annual Programme for enterprises and entrepreneurship for SMEs (MAP).
- In turn, this programme was followed by the “CIP SMEG” facility implemented under the Competitiveness and Innovation Framework Programme 2007-2013.
- The COSME Loan Guarantee Facility (LGF) in 2014 is the successor of these predecessor facilities. The facility is currently in its implementation period, which will last until 2020.

To implement and manage such facilities, the European Commission entrusted the European Investment Fund (EIF). Thanks to the latest programme – the COSME LGF – over 350,000 SMEs have already benefitted from close to EUR 30bn in financing made available (as of June 2018).

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

---

<sup>3</sup> For information on SME financing market failures and policy responses see Kraemer-Eis et al. (2018).



(EaSI) programme, and the EU SME Initiative.<sup>4</sup> EU programmes co-exist with and complement a wide range of *national guarantee schemes*, diverse in scope and instruments (Chatzouz, 2017).

The widespread use of CGSs across Europe has driven a greater demand for the measurement of the economic effects for such policy tool. “An impact evaluation should be a fundamental component of any public credit guarantee scheme” (World Bank, 2017). Despite the clear consensus, we still know relatively little about the real effects of CGSs. Against this background, retrospective impact assessments based on quantitative micro-data are an essential tool to analyse the medium- to long-run impact of CGSs. If implemented correctly, they can assess whether a change in a SME-related outcome (e.g. sales) can be directly attributable to the CGSs.

The undertaking of such assessments poses several challenges, both of theoretical and technical nature. To assess causality, impact studies 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 treatment* – can be used to address the missing data issue.

Against this backdrop, several well-established methodologies have been set forth in the economic literature to identify counterfactual groups. Fully experimental approaches (e.g. randomised control trials) are theoretically superior to other methods, yet seldom feasible and/or desirable for policy makers. It is also not possible to implement these retrospectively without introducing estimation bias. For this reason, researchers often revert to quasi-experimental methods. No single quasi-experimental method can be considered *universally* superior to others, but the specific features of the policy under scrutiny must feed into the selection of the optimal approach.<sup>5</sup>

Another important challenge is the collection and/or access to the necessary micro-data, which can be costly. In this respect, European-based CGSs can benefit from the recently improved availability and harmonisation of financial account data for SMEs.<sup>6</sup> Further challenges, such as the difficulty to disentangle the CGS-specific impact from other SME-related policies,<sup>7</sup> as well as to measure its indirect effects to SMEs and the broader economy, all contribute to the high level of expertise necessary to carry out such type of assessments.

The EIF lies at the forefront of this research strand, for a number of reasons. As a European institution, the EIF pursues the objectives of the European Union and impact studies allow to show and justify its *raison d’être*. In addition, impact studies are rigorous tools the EIF uses to learn from its past, feeding such know-how into the development of new mandates and products.

In the recent past, the EIF achieved a recognised reputation in the field through its impact assessments of programmes fostering SME financing (e.g. guarantee, equity). Notwithstanding its recent efforts, much work still lies ahead and the EIF is constantly striving to identify innovative

---

<sup>4</sup> See [http://www.eif.org/what\\_we\\_do/guarantees/index.htm](http://www.eif.org/what_we_do/guarantees/index.htm) for additional information.

<sup>5</sup> For instance: in a relatively rich data setting, difference-in-differences and matching methods may be superior to regression discontinuity designs in terms of external validity and identification strategy (since the SME threshold is typically linked to a larger set of public policies).

<sup>6</sup> Collected, for instance, from official business registers, national banks and annual reports. It should be noted, however, that mixing different data sources can be “leaky”, hampering the external validity of the outcome of the analysis.

<sup>7</sup> For example, national/regional CGSs, grant schemes and other application-based or SME status-based subsidies.

solutions to improve its approach toward impact assessment. Studies are based on a variety of state-of-the-art econometric methodologies and benefit from the support of prominent academics for data generation and result analysis, conferring an additional layer of validation and certification.

In this context, Asdrubali and Signore (2015), jointly published by the EIF and the European Commission, is one of the first impact assessments carried by the EIF. The study focused on SMEs located in Central, Eastern and South-Eastern Europe (CESEE). A total of 16,051 guaranteed loans to 14,400 SMEs in 12 countries and related data were sourced from EIF internal records. The cross-sectional, administrative data was further complemented by time series on SME financial accounts from Bureau Van Dijk's Orbis database. The empirical approach relied on a mix of techniques, notably propensity score-based matching and difference-in-differences. Such combined estimator showed theoretically superior features than each of the parts (Blundell and Costa Dias, 2000).

Asdrubali and Signore (2015) concluded that SMEs receiving an EIF/EC-guaranteed loan faced a 15-20% increase in sales and employment compared to a control group formed of similar companies. The benefits were significantly higher for micro and small companies, as well as young firms. No significant positive effect could be observed for SME profits. A significant and negative effect on total factor productivity was measured in the short-term, but with a medium-run catch-up.

Following the publication of the report of Asdrubali and Signore (2015), the European Court of Auditors (ECA) commissioned a comparable study on MAP and CIP-guaranteed loans. The follow-up study was carried in the context of a performance audit on EU-funded loan guarantee instruments.<sup>8</sup> The study focused on SMEs located in France. Notably, ECA requested that a methodology consistent with Asdrubali and Signore (2015) be employed in this new study. The final report was authored by academics Bertoni, Colombo and Quas. The results of this follow-up study, whose main findings are described in this paper, prove to be in line with the initial findings of Asdrubali and Signore (2015). The full study can be found in Bertoni *et al.* (forthcoming).

Similar studies are currently being carried out, focusing on different countries, with the goal of providing for the first time a consistent, pan-European impact assessment of EU-funded loan guarantee instruments. Notably, a follow-up study looking at the impact of CGSs in Benelux, Italy, and the Nordic countries is currently in the making, with expected finalisation by end of 2018.

Looking forward, the Research & Market Analysis (RMA) division at EIF has set forth an ambitious roadmap for impact assessments, with a long-run goal to assess the entirety of EIF policy instruments. All related studies are (or will be) published here: [http://www.eif.org/news\\_centre/research/index.htm](http://www.eif.org/news_centre/research/index.htm).

**Helmut Kraemer-Eis**  
*Head of RMA, Chief Economist*

**Simone Signore**  
*Research Officer*

**Julien Brault**  
*Research Officer*

---

<sup>8</sup> See footnote 2.

## Table of Contents



Abstract .....	V
Preface .....	VII
Table of Contents .....	X
List of Figures .....	XI
1 Introduction .....	1
2 Sample and methodology of the study .....	1
3 Empirical results .....	5
3.1. The effect of loan guarantee schemes on the performance of SMEs.....	5
3.2. The role of moderating factors.....	6
3.3. The effect of guaranteed loans on firm survival .....	7
3.4. The effect of guaranteed loans on access to credit .....	7
3.5. The effect of loan sizes.....	8
4 Robustness tests and additional evidence .....	8
4.1. Disentangling the effects of guaranteed loans on organic and external growth .....	8
4.2. Controlling for sample selection due to data availability .....	8
4.3. Controlling for non-parallel growth .....	9
5 Conclusions.....	9
References .....	10
Appendix I: List of Acronyms.....	11
About .....	12
... the European Investment Fund .....	12
... EIF's Research & Market Analysis.....	12
... this Working Paper series .....	12
EIF Working Papers.....	13

## List of Figures

Figure 1: MAP and CIP loans to French SMEs.....	2
Figure 2: Cohort sequential design for the estimation of treatment effects .....	4
Figure 3: The performance effects of guaranteed loans: Conditional average treatment effect for the treated (CATT) by performance indicator and years after loan granting.....	5

## 1 Introduction

Loan guarantee schemes – which provide financial institutions with a partial guarantee on the loans granted to firms – are an important policy mechanism to alleviate the financial constraints of small and medium-sized enterprises (SMEs). These schemes play a fundamental role in the policies designed by the European Commission (EC) to support European SMEs since the early 2000s.

Existing studies provide mixed evidence about the effectiveness of these schemes, and more evidence is needed about the magnitude of their effect, how it unfolds over time, and which type of companies benefit the most from loan guarantees.

A study by Bertoni, Colombo and Quas (2018) makes a substantial step toward answering these important questions. The authors consider the population of French SMEs that, between 2002 and 2016, received a guaranteed loan under the Multi-Annual Programme (MAP) and Competitiveness and Innovation Framework Programme (CIP). The European Investment Fund (EIF) implemented these programmes on behalf of the European Commission. The aim of the study is to assess the short and long-term effects of guaranteed loans on the economic performance of beneficiary firms.

Recipient firms are matched with “twin” firms that did not benefit from this policy scheme (such “twin” firms represent a counterfactual group). The econometric estimates show that, on average, French SMEs benefitting from guaranteed loans created more jobs and grew more in terms of assets and sales compared to their “twins”. Most of this additional growth is organic (i.e., does not come from an increased M&A activity). After a short-term decline, the productivity level of beneficiaries outpaces that of non-beneficiaries in the long run. Beneficiaries are also more likely to survive than “twin” firms. The magnitude of the positive effect of guaranteed loans increases roughly linearly with the loan amount. Several additional checks confirm the robustness of these results.

The analysis highlights that the magnitude of the effects illustrated above varies across beneficiary firms. The effects are larger for smaller and younger firms, and when the loan guarantee is more valuable (i.e., riskier loans and larger caps on the guaranteed amount). In general, the effects are proportional to the difficulty faced by the beneficiary firms in having access to the debt market.

This evidence clearly shows that for French SMEs, the loan guarantee schemes provided by the EIF have played a fundamental role in fostering their ability to compete successfully in the market. In the following, we describe in detail the sample, methodology and results of the study.

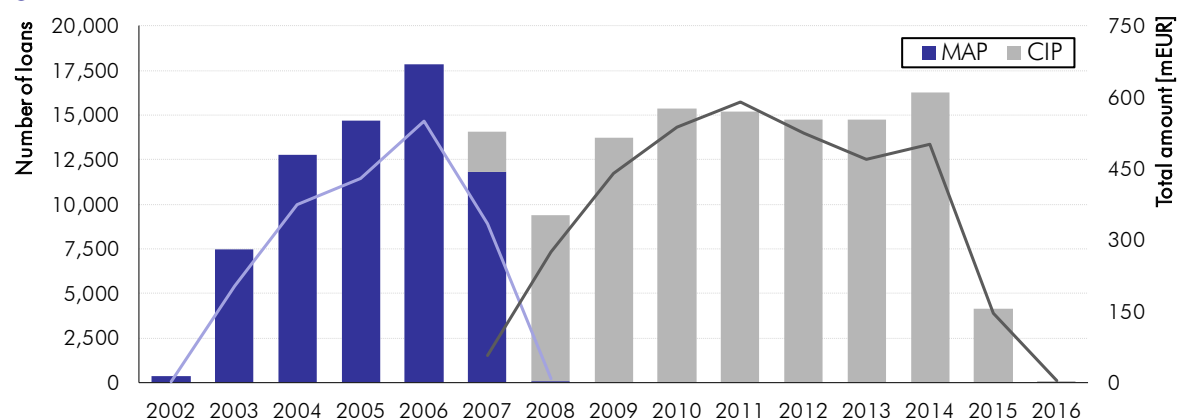
## 2 Sample and methodology of the study

The initial population for the study consists of the 170,825 loans granted in France between 2002 and 2016 to 123,132 business entities as part of the MAP (65,042 loans between 2002 and 2008) and CIP (105,783 loans between 2007 and 2016) guaranteed loan scheme programmes.

The average amount was EUR 31,915 (median EUR 16,500), with MAP loans being slightly larger than CIP loans (EUR 33,548 and EUR 29,259 on average, respectively). Figure 1 shows the number and total (nominal) amount of these loans aggregated by year.

The MAP loans peaked in both number and total amount in 2006, while CIP loans were deployed quite constantly over the period 2009 to 2014.

**Figure 1: MAP and CIP loans to French SMEs**



Source: authors, based on EIF data. Bar charts show number of loans by signature year (left scale); lines show aggregate loan amounts in mEUR (right scale).

As shown in Table 1, on average beneficiaries are nine years old and have close to three employees. MAP loans were granted to slightly younger, smaller companies. For each granted loan, companies on average invested EUR 36,310, 13.2% of which for intangible assets.

**Table 1: Characteristics of beneficiaries at the time of the loan**

Programme	CIP		MAP		CIP+MAP	
	mean	std. dev.	mean	std. dev.	mean	std. dev.
Age (years)	9.39	10.11	8.30	48.37	8.98	30.73
Number of employees	2.81	5.34	2.70	5.37	2.77	5.35
Investment (kEUR)	42.18	214.68	24.46	55.14	36.31	178.62
Intangibles (%)	14.05	32.91	11.54	30.92	13.23	32.29

Source: authors, based on EIF data.

A total of 21,960 loans were granted to entities that either did not have a valid fiscal identification code (e.g., private individuals or companies that do not need to register under French law) or could not be identified from Bureau van Dijk Orbis/Diane databases.<sup>9</sup> This leaves with a dataset of 148,855 loans (referred to as the *usable population*). Out of these, the study considers the 85,589 loans that were granted to 57,208 firms for which it was possible to retrieve accounting data.

Table 2 shows the distribution of the final sample of loans with respect to the usable population according to characteristics of the loan (the programme, the signature year and the amount granted), and the beneficiaries (age, industry, region, and size). Distribution tests based on the chi-square statistic ( $\chi^2$ ) show that the distribution of the final sample significantly differs from the usable population. Nonetheless, addressing the sample selection only reinforces the results of the study.

<sup>9</sup> <https://orbis.bvdinfo.com> and <https://diane.bvdinfo.com> [Last accessed: February 2017].

Table 2: Distribution differences between the final sample and the initial loan population

	Final sample		
	N	%	% of the usable population
<b>Panel A: loans' characteristics</b>			
<i>Distribution by programme:</i>			
CIP	62,208	72.68	59.35
MAP	23,381	27.32	53.08
Total	85,589	100.00	57.50
<i>Distribution by signature year:</i>			
2002-2004	5,837	6.82	49.43
2005-2006	13,079	15.28	54.14
2007-2008	10,773	12.59	55.98
2009-2010	16,448	19.22	57.08
2011-2012	18,507	21.62	62.23
2013-2014	18,628	21.76	60.21
2015-2016	2,317	2.71	55.75
<i>Distribution by loan amount:</i>			
Less than EUR 5,000	2,852	3.33	45.02
EUR 5,000-10,000	12,020	14.04	52.03
EUR 10,000-20,000	28,569	33.38	57.13
EUR 20,000-50,000	27,233	31.82	61.62
More than EUR 50,000	14,915	17.43	59.16
<b>Panel B: Beneficiaries' characteristics</b>			
<i>Distribution by age classes:</i>			
Less than 1 year old	12,043	14.15	52.71
1-5 years old	28,234	33.18	61.51
6-25 years old	39,284	46.16	58.87
More than 25 years old	5,538	6.51	44.05
<i>Distribution by industry (NACE codes):</i>			
Construction (F)	24,866	29.06	60.20
Manufacturing (C)	12,025	14.05	60.81
Services (G-O)	40,185	46.97	58.31
Other	8,483	9.91	45.15
<i>Distribution by region:</i>			
FR1 (Île de France)	15,139	17.69	59.41
FR2 (Bassin Parisien)	10,758	12.57	50.07
FR3 (Nord - Pas-de-Calais)	2,296	2.68	58.86
FR4 and FR5 (Est et Ouest)	21,128	24.69	59.35
FR6 (Sud-Ouest)	13,091	15.30	58.58
FR7 (Centre-Est)	14,416	16.84	61.61

(Table 2 continued)

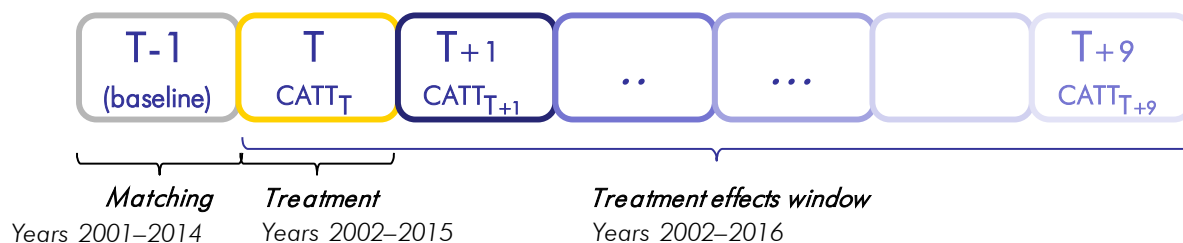
	N	Final sample	
		%	% of the usable population
FR8 (Méditerranée, including Corse)	8,015	9.36	57.65
FR9 (Départements d'outre-mer)	744	0.87	27.21
Other	2	0.00	66.67
<b>Distribution by size classes:</b>			
1 employee	49,002	57.25	48.42
2-9 employees	29,380	34.33	73.91
10-49 employees	7,004	8.18	91.07
50-249 employees	203	0.24	96.21

Source: authors, based on EIF data.

The study also considers a sample of 526,315 non-treated companies (i.e., companies that were not granted any guaranteed loan under the MAP and CIP programmes). These companies were selected with a random sampling from the Diane and/or Orbis databases, stratified by foundation year. For each foundation year, 10 non-treated companies were randomly selected for each treated company. The final database has 6,092,831 firm-year observations.

The study estimates the *conditional average treatment effect for the treated* (CATT) of guaranteed loans on beneficiary SMEs over a 10-year period around loan receipt. Firms were classified into 15 cohorts, according to the year they were granted the guaranteed loan. For a given beneficiary firm, T indicates the year the loan was granted. Figure 2 illustrates the research design of this study.

Figure 2: Cohort sequential design for the estimation of treatment effects



For a given performance measure (e.g., sales growth), the CATT measures the difference in the growth, over a given time horizon, between a beneficiary SME and a hypothetical scenario in which the beneficiary SME would not receive the EIF/EC-guaranteed loan.<sup>10</sup> To measure this hypothetical, *unobservable* scenario we consider the value taken by the performance measure for “twin” matched companies. In order to estimate the CATT, the study relies on difference-in-differences techniques and matching techniques that combine coarsened exact matching (Iacus et al., 2008) and propensity score matching (Rosenbaum and Rubin, 1983), with the aim of assuring comparability, model parsimony, and balancing between treated and “twin” non-treated firms.

<sup>10</sup> The data only allows differentiating between EIF/EC-guaranteed loans and non-EIF/EC-guaranteed loans. This implies that in the hypothetical counterfactual scenario, the beneficiary SMEs could a) receive a guaranteed loan from a different CGS (e.g. national, regional), b) receive a (non-guaranteed) loan, c) any of the above but with different terms and conditions than the EIF/EC guarantee, and d) receive no loan at all.

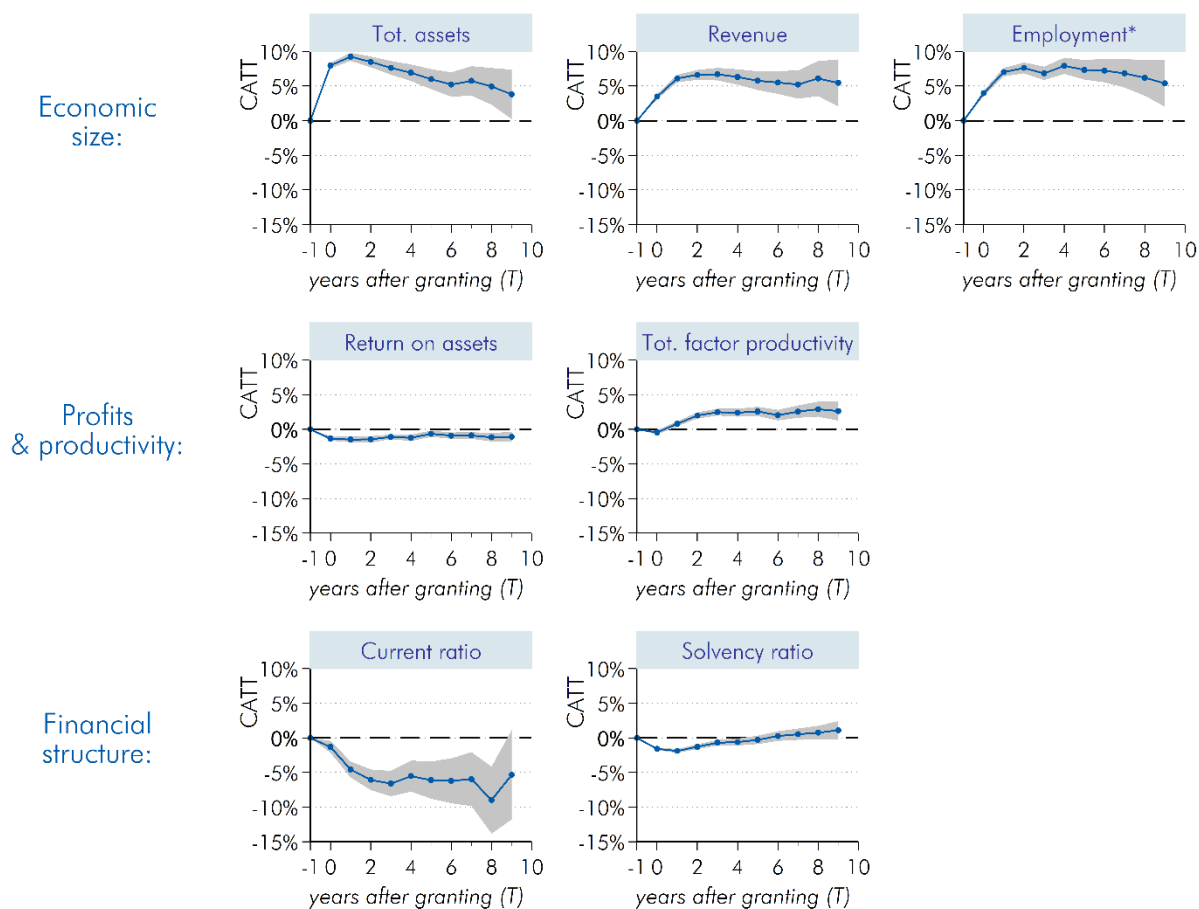


### 3 Empirical results

#### 3.1. The effect of loan guarantee schemes on the performance of SMEs

Figure 3 illustrates and summarizes the main results of the study. We discuss here only those concerning the following performance measures: sales, employment, assets and total factor productivity (TFP).<sup>11</sup> On average, SMEs that receive a guaranteed loan grew more than “twin” matched companies in terms of sales, employees and total assets. The effect reaches a peak at T+1 for assets (+9.2%), T+3 for sales (+6.7%) and T+4 for employment (+7.9%).

**Figure 3: The performance effects of guaranteed loans: Conditional average treatment effect for the treated (CATT) by performance indicator and years after loan granting**



Note: estimated CATT coefficient plotted in blue. The shaded area around the blue line represents the 99% confidence interval for the estimate. \*Measured via cost of employment (incl. pension costs). Source: authors, based on EIF data and Bureau Van Dijk's Orbis/Diane.

These findings suggest that the loan boosts immediate assets growth,<sup>12</sup> which requires 2-3 additional years to express its full effect on sales and employment growth. The effect is still significant at time T+9, its long-term magnitude is between 4% and 5%.

<sup>11</sup> TFP measures the efficiency of a firm in using its inputs (capital and labor) in producing output. In this study we measure TFP using the procedure by Levinsohn and Petrin (2003).

<sup>12</sup> Note that immediate asset growth is at least in part explained by the additional availability of resources due to the loan.

Total factor productivity (TFP) decreases in the short term and increases in the longer term. The decrease in TFP is consistent with the presence of adjustment costs in the production function (i.e., with the fact that investments above the natural replacement rate are not immediately productive). The positive effect on TFP is still significant at time T+9 and the magnitude of the long-term increase in TFP is quite large (between 2.5% and 3.0%).

## 3.2. The role of moderating factors

### Firm characteristics

Results show that SMEs that tend to suffer more from financial constraints are those that obtain the largest positive effect from this policy scheme. Indeed, guaranteed loans have a much larger effect on smaller and younger companies, which according to the academic literature are the companies more subject to financial constraints.

The treatment effect is larger on smaller companies – defined as companies with sales below the median value for treated companies at the time of the treatment, i.e. EUR 367,500 – in terms of sales growth (+2.7 percentage points, p-value<0.1%), employment growth (+4.4 percentage points, p-value<0.1%) and assets growth (+5.6 percentage points, p-value<0.1%).

The treatment effect is also larger in younger companies – defined as companies with age below the median value for treated companies at the time of the treatment, i.e. 7 years. This only applies to employment growth (+2.3 percentage point, p-value<0.1%), not to sales and assets growth.

### Loan specific characteristics

The study calculates the implicit subsidy inherent in the loan.<sup>13</sup> Firms that receive a larger implicit subsidy should experience a relatively larger effect, on the assumption that they would face greater challenges in accessing alternative credit finance. In line with this reasoning, when the implicit subsidy increases by 1%, the 3-year treatment effect of the guaranteed loan increases by 2.7 percentage points (p-value<1%) for sales growth, 3.9 percentage points (p-value<1%) for employment growth, and 4.6 percentage points (p-value<1%) for assets growth.

### Macroeconomic conditions

Interestingly, 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.

### Regional differences

After controlling for credit and/or VC activity volumes in regions where treated firms are located, the study finds no compelling evidence that the local availability of credit and/or venture capital (VC) influences the performance effects of guaranteed loans.

---

<sup>13</sup> The implicit subsidy is the expected value of the public guarantee on the loan, calculated as the expected loss of the loan times the percentage of total public guarantee on that loss.

### Industry differences

The effects of guaranteed loans on firm performance are similar across industries, with a few exceptions. The most interesting exception is advanced knowledge industries, where the CATT is smaller than in personal goods and services for sales growth (+2.8% versus +6.9%) and assets growth (+4.4% versus +8.8%). This evidence supports the view that, unless tailored specifically for innovative companies, traditional loan guarantee schemes prove a less effective policy tool to finance knowledge-intensive SMEs, which generally favor non-debt forms of financing (e.g., Carpenter and Petersen, 2002).

### 3.3. The effect of guaranteed loans on firm survival

The study also analyses whether companies that received guaranteed loans are more or less likely to face a dissolution, due to bankruptcy or acquisition by another company. The methodological approach to measure the effects on survival is similar to that of the main analysis on firm performance. However, this time the analysis is performed in a cross-section setting using Orbis data to fit a probit model on firms' dissolution status as at end 2016. For reasons of data availability, the analysis is limited to companies that first received a guaranteed loan after 2006.

The econometric results show that, on average, beneficiary SMEs are 5.7% less likely to face dissolution compared to control group companies, during the observed period.

Calculating differences in survival is also useful to determine how survivorship could bias CATT estimates on growth. In general, dissolution is more likely in firms that grow at a slower pace. However, because of dissolution, these slow-growth firms are not observable, and this generates a survivorship bias. This bias affects the estimated CATT when survivorship is different between treated and control companies, making CATT upward biased if treated companies have higher probability of dissolution than "twin" non-treated companies and downward biased if the opposite occurs. Intuitively, if more treated companies are dissolved than control group companies, more slow-growing companies will disappear in the treated sample than from the control sample, giving the false impression of a faster average growth among treated than control companies.

In our case, because treated companies are more likely to survive than non-treated companies, the results of the study illustrated earlier are not upward biased, and they can safely be considered as an estimate of the lower bound of the CATT of guaranteed loans.

### 3.4. The effect of guaranteed loans on access to credit

The study explores the access to credit by treated firms using the concept of credit event. A credit event occurs in a year in which liabilities increase by 5% or more of average total assets. In the overall sample, credit events represent about 37% of firm-year observations.

The probability of a credit event is not different between a treated and a "twin" non-treated company in the year before the treatment. The probability of a credit event increases substantially (13.9 percentage points) in the year of the treatment, consistently with the fact that the treatment itself is a credit event for many of the treated firms. In the first year after the treatment, a treated firm has a

slightly higher probability (3.2 percentage points) of a credit event than a non-treated firm. The probability is however slightly lower two (-2.0 percentage points), three (-2.6 percentage points) and four (-1.5 percentage points) years after the treatment, and not significantly different after that.

These results show that overall the effect of the treatment on the probability of a credit event is not larger in years other than the treatment year. Therefore, the differences in growth and productivity highlighted earlier are unlikely to be related to other credit events.

### **3.5. The effect of loan sizes**

The study also assesses whether the performance effects of guaranteed loans depend on the loan size. For this purpose, the authors resort to a dose-response function analysis (Hirano and Imbens, 2004). Expectedly, results show that larger loan amounts correspond to larger treatment effects.

In the first three years after granting of the loan, a fourfold increase of the dose of the treatment (from EUR 10,000 to EUR 40,000) leads to: a 10 percentage points increase of assets; a 6 percent increase of sales growth; a 6 percent increase of employment growth. Regarding TFP, larger loan amounts correspond to lower levels of TFP increase in T+3. This result is probably due to adjustment costs after the investment, which are proportional to the size of the investment (and hence of the loan). In line with this view, the negative association between the amount of the loan and TFP growth vanishes at T+9.

## **4 Robustness tests and additional evidence**

### **4.1. Disentangling the effects of guaranteed loans on organic and external growth**

It is important to determine whether the positive effects of guaranteed loans on firms' growth that are detected by the study are due to "genuine" organic growth, or to growth through acquisitions. To this end, the authors estimate two 3-year growth models on the total sample, with and without the number of acquisitions carried out by sample firms in the corresponding period. As expected, firms that perform acquisitions grow substantially more than firms that do not. However, even controlling for acquisitions, the CATT estimates are essentially unaffected. Therefore, while external growth is an effective strategy to accelerate growth for firms in the sample, most of the observed effects are due to organic growth.

### **4.2. Controlling for sample selection due to data availability**

Most of the analyses in the study were performed on a sample with sufficiently available data, drawn from the population of EIF/EC-guaranteed loans received by French SMEs. As discussed in section 2, the sample is not random and the results may be affected by a sample selection bias. In order to control for this bias, the authors estimate a Heckman-style model for growth of employment, sales and assets, controlling for endogenous selection (i.e., the fact that observations included in the analysis can be different from those excluded from the analysis due to observable and unobservable characteristics). For two of the three growth equations (i.e. sales and employment), the econometric

estimates indicate that sample selection likely leads to a downward bias in the estimates of the treatment effect. However, the magnitude of this bias is negligible.

### 4.3. Controlling for non-parallel growth

A potential explanation of the results illustrated above is that the faster growth of treated companies could be due to firms already growing faster than their “twins” before the treatment takes place, thus simply continuing their faster growth path (non-parallel path). The authors thus repeat all the growth estimates adding a control for the growth rate before the event (i.e., the growth rate between T-2 and T-1). The results illustrated earlier are confirmed both in terms of magnitude and in terms of statistical significance, ruling out this alternative explanation.

## 5 Conclusions

The study described in this work assesses the effect of EIF’s MAP and CIP guaranteed loans on the “real” performance of French SMEs, measured by the creation of new jobs, increase of sales, assets and total factor productivity.

The results of the study document a statistically and economically significant positive effect of the EIF/EC guarantee scheme on French beneficiary SMEs, which persists up to 10 years after receipt of the loan. The magnitude of the effect is larger for smaller and/or younger SMEs, consistently with a broad literature that links these attributes to increased challenges in access to finance.

These results prove that this policy instrument has been highly beneficial to French recipient firms, confirming the findings in Asdrubali and Signore (2015) for Central, Eastern and South-Eastern European countries.

The authors are currently undertaking similar analyses, focusing on different countries, with the goal of exploring how cross-country differences affect the effectiveness of guaranteed loans. Notably, a follow-up study looking at the impact of CGSs in Benelux, Italy, and the Nordic countries is currently in the making, with expected finalisation by end of 2018.

## References

- Asdrubali, P. and Signore, S. (2015). The economic impact of EU guarantees on credit to SMEs: Evidence from CESEE countries. *European Commission's European Economy Discussion Paper 002 and EIF Working Paper 2015/29*.
- Bertoni, F., Colombo, M.G., and Quas, A. (2016). Long-term effects of loan portfolios guarantees on SME's performance. *Draft report for negotiated procedure with the European Court of Auditors*.
- Bertoni, F., Colombo, M.G., Quas, A. (2018). The real performance effects of guaranteed loans: evidence from French SMEs. *Working paper*, Politecnico di Milano.
- Blundell, R. and Costa Dias, M. (2000). Evaluation Methods for Non-Experimental Data. *Fiscal Studies*, 21: 427-468.
- Carpenter, R. E. and Petersen, B. C. (2002). Capital market imperfections, high-tech investment, and new equity financing. *The Economic Journal*, 112: F54-F72.
- Chatzouz, M., Gereben, A., Lang, F., and Torfs, W. (2017). Credit Guarantee Schemes for SME Lending in Western Europe. *EIF Working Paper 2017/42*.
- Gebauer, S., Setzer, R., and Westphal, A. (2017). Corporate Debt and Investment: a Firm-Level Analysis for Stressed Euro Area Countries. *ECB Working Paper Series*.
- Hirano, K. and Imbens, G. W. (2004). The propensity score with continuous treatments. In Gelman, A. and Meng, X.-L. Wiley (eds.) *Applied Bayesian Modeling and Causal Inference from Incomplete-Data Perspectives*. Wiley.
- Iacus, S.M., King, G. and Porro, G. (2008). Matching for causal inference without balance checking. *SSRN working paper number 1152391*.
- Kraemer-Eis, H., Botsari, A., Gvetadze, S., Lang, F., and Torfs, W. (2018). European Small Business Finance Outlook, June 2018. *EIF Working Paper 2018/50*.
- Lazzarini, S., Musacchio, A., Bandeira de Mello, R., and Marcon, R. (2015). What Do Development Banks Do? Evidence from BNDES, 2002-2009. *Technical report*.
- Levinsohn, J. and Petrin, A. (2003). Estimating production functions using inputs to control for unobservables. *Review of Economic Studies*, 70(2), 243: 317-342.
- OECD (2013). SME and entrepreneurship financing: The role of Credit Guarantee Schemes and Mutual Guarantee Societies in supporting finance for small and medium-sized enterprises. *Final report*.
- OECD (2015). New approaches to SME and entrepreneurship financing: Broadening the range of instruments. *Technical report*.
- Rosenbaum, R. and Rubin, D. (1983). The central role of the propensity score in observational studies for causal effects. *Biometrika* 70, 41-55.
- Rubin, D. B. (1974). Estimating causal effects of treatments in randomized and nonrandomized studies. *Journal of Educational Psychology*, 66(5), 688-701.
- World Bank and FIRST, "Task Force for the Development of a Toolkit for Impact Evaluation of Public Credit Guarantee Schemes for SMEs", 2017
- World Bank, *Global Financial Development Report*, Washington, 2014

## Appendix I: List of Acronyms

- CATT: Conditional average treatment effect on the treated
- CGS: Credit Guarantee Scheme
- CIP: Competitiveness and Innovation Framework Programme
- DID: Difference-in-Differences
- EC: European Commission
- ECA: European Court of Auditors
- EIF: European Investment Fund
- EU: European Union
- MAP: Multi-Annual Programme
- M&A: Mergers and acquisitions
- OLS: Ordinary Least Squares
- PBT: Profit and Loss Before Taxes
- PCGS: Public Credit Guarantee Scheme
- PS: Propensity Score
- PSM: Propensity Score Matching
- ROA: Return-on-Assets
- SME: Small and Medium-sized Enterprise
- SMEGF: SME Guarantee Facility
- TFP: Total Factor Productivity

## About ...

### ... the European Investment Fund

The European Investment Fund (EIF) is Europe's leading risk finance provider for small and medium-sized enterprises (SMEs) and mid-caps, with a central mission to facilitate their access to finance. As part of the European Investment Bank (EIB) Group, the EIF designs, promotes and implements equity and debt financial instruments which specifically target the needs of these market segments.

In this role, the EIF fosters EU objectives in support of innovation, research and development, entrepreneurship, growth, and employment. The EIF manages resources on behalf of the EIB, the European Commission, national and regional authorities and other third parties. EIF support to enterprises is provided through a wide range of selected financial intermediaries across Europe. The EIF is a public-private partnership whose tripartite shareholding structure includes the EIB, the European Union represented by the European Commission and various public and private financial institutions from European Union Member States and Turkey. For further information, please visit [www.eif.org](http://www.eif.org).

### ... EIF's Research & Market Analysis

Research & Market Analysis (RMA) supports EIF's strategic decision-making, product development and mandate management processes through applied research and market analyses. RMA works as internal advisor, participates in international fora and maintains liaison with many organisations and institutions.

### ... this Working Paper series

The EIF Working Papers are designed to make available to a wider readership selected topics and studies in relation to EIF's business. The Working Papers are edited by EIF's Research & Market Analysis and are typically authored or co-authored by EIF staff. The Working Papers are usually available only in English and distributed only in electronic form (pdf).



## EIF Working Papers

- 2009/001 *Microfinance in Europe – A market overview.*  
November 2009.
- 2009/002 *Financing Technology Transfer.*  
December 2009.
- 2010/003 *Private Equity Market in Europe – Rise of a new cycle or tail of the recession?*  
February 2010.
- 2010/004 *Private Equity and Venture Capital Indicators – A research of EU27 Private Equity and Venture Capital Markets.* April 2010.
- 2010/005 *Private Equity Market Outlook.*  
May 2010.
- 2010/006 *Drivers of Private Equity Investment activity. Are Buyout and Venture investors really so different?* August 2010.
- 2010/007 *SME Loan Securitisation – an important tool to support European SME lending.* October 2010.
- 2010/008 *Impact of Legislation on Credit Risk – How different are the U.K. and Germany?*  
November 2010.
- 2011/009 *The performance and prospects of European Venture Capital.*  
May 2011.
- 2011/010 *European Small Business Finance Outlook 1/2011.*  
June 2011.
- 2011/011 *Business Angels in Germany. EIF's initiative to support the non-institutional financing market.* November 2011.
- 2011/012 *European Small Business Finance Outlook 2/2011.*  
December 2011.
- 2012/013 *Progress for microfinance in Europe.*  
January 2012.
- 2012/014 *European Small Business Finance Outlook.*  
May 2012.
- 2012/015 *The importance of leasing for SME finance.*  
August 2012.
- 2012/016 *European Small Business Finance Outlook.*  
December 2012.
- 2013/017 *Forecasting distress in European SME portfolios.*  
May 2013.
- 2013/018 *European Small Business Finance Outlook.*  
June 2012.
- 2013/019 *SME loan securitisation 2.0 – Market assessment and policy options.*

- October 2013.
- 2013/020 *European Small Business Finance Outlook.*  
December 2013.
- 2014/021 *Financing the mobility of students in European higher education.*  
January 2014.
- 2014/022 *Guidelines for SME Access to Finance Market Assessments.*  
April 2014.
- 2014/023 *Pricing Default Risk: the Good, the Bad, and the Anomaly.*  
June 2014.
- 2014/024 *European Small Business Finance Outlook.*  
June 2014.
- 2014/025 *Institutional non-bank lending and the role of debt funds.*  
October 2014.
- 2014/026 *European Small Business Finance Outlook.*  
December 2014.
- 2015/027 *Bridging the university funding gap: determinants and consequences of university seed funds and proof-of-concept Programs in Europe.* May 2015.
- 2015/028 *European Small Business Finance Outlook.*  
June 2015.
- 2015/029 *The economic impact of EU guarantees on credit to SMEs. Evidence from CESEE countries.* July 2015.
- 2015/030 *Financing patterns of European SMEs: An Empirical Taxonomy.*  
November 2015
- 2015/031 *SME Securitisation – at a crossroads?*  
December 2015.
- 2015/032 *European Small Business Finance Outlook.*  
December 2015.
- 2016/033 *Evaluating the impact of European microfinance. The foundations.*  
January 2016
- 2016/034 *The European Venture Capital Landscape: an EIF perspective. Volume I: the impact of EIF on the VC ecosystem.* June 2016.
- 2016/035 *European Small Business Finance Outlook.*  
June 2016.
- 2016/036 *The role of cooperative banks and smaller institutions for the financing of SMEs and small midcaps in Europe.* July 2016.
- 2016/037 *European Small Business Finance Outlook.*  
December 2016.
- 2016/038 *The European Venture Capital Landscape: an EIF perspective. Volume II: Growth patterns of EIF-backed startups.* December 2016.

- 2017/039 *Guaranteeing Social Enterprises – The EaSI way.*  
February 2017.
- 2017/040 *Financing Patterns of European SMEs Revisited: An Updated Empirical Taxonomy and Determinants of SME Financing Clusters.* March 2017.
- 2017/041 *The European Venture Capital landscape: an EIF perspective. Volume III: Liquidity events and returns of EIF-backed VC investments.* April 2017.
- 2017/042 *Credit Guarantee Schemes for SME lending in Western Europe.*  
June 2017.
- 2017/043 *European Small Business Finance Outlook.*  
June 2017.
- 2017/044 *Financing Micro Firms in Europe: An Empirical Analysis.*  
September 2017
- 2017/045 *The European venture capital landscape: an EIF perspective.*  
Volume IV: The value of innovation for EIF-backed startups. December 2017.
- 2017/046 *European Small Business Finance Outlook.*  
December 2017.
- 2018/047 *EIF SME Access to Finance Index.*  
January 2018.
- 2018/048 *EIF VC Survey 2018:*  
Fund managers' market sentiment and views on public intervention. May 2018.
- 2018/049 *EIF SME Access to Finance Index – June 2018 update.*  
June 2018.
- 2018/050 *European Small Business Finance Outlook.*  
June 2018.
- 2018/051 *EIF VC Survey 2018: Fund managers' perception of EIF's value added.*  
September 2018.
- 2018/052 *The effects of EU-funded guarantee instruments on the performance of Small and Medium Enterprises: Evidence from France.* November 2018.

*This page intentionally left blank*

