Public SME grants and firm performance in European Union: A systematic review of empirical evidence

Ondřej Dvouletý · Stjepan Srhoj · Smaranda Pantea

Abstract Governments allocate financial resources to support small- and medium-sized enterprises (SMEs) through public subsidies and grants. However, do these public investments help supported firms to increase their performance and growth? We answer this question by conducting a systematic review of evidence in the European Union. We review studies investigating the effects of public grants on firm performance in the European Union's 28 member countries that were published from 2000 on. We provide a structured overview of 30 studies covering 13 countries. Our review offers information on the methodological approaches, variables and findings of the previous studies. The summarized findings show mostly the positive outcomes of the grants on firm-survival, employment, tangible/fixed assets, sales/turnover, with mixed findings for labour productivity and total factor productivity (TFP). However, we point out that there are significant differences concerning the time period of analysis (investigating short-term vs long-term outcomes), and importantly, the heterogeneity of effects concerning firm size and age, region, industry and intensity of support. Our study offers a series of recommendations for policymakers and researchers.

Keywords Entrepreneurship and SME policy · Business support · Public grants · Policy evaluation · A systematic review · European Union

JEL Classifications D04 · L26 · L53

1 Introduction

Policies aiming to support entrepreneurship with an outlook to increase competitiveness and wealth of our economies have become part of our everyday lives. Entrepreneurship and small and medium-sized (SME) policies represent a piece of the puzzle in a complex net of actors and institutions, interacting with entrepreneurs and small business owners within the regional entrepreneurial ecosystem and providing them support in their endeavour (Stam 2015; McCann and Ortega-Argilés 2016; O'Connor et al. 2018; Acs et al. 2018; Gimenez-Nadal et al. 2019).

There have been many attempts to specifically define entrepreneurship and SME policies (or their separate parts), to summarize range of activities included and to discuss their primary purpose in the past years (e. g. Holtz-Eakin and Rosen 2004; Lundström and Stevenson 2005; Audretsch and Beckmann 2007; Karlsson and Andersson 2009; Arshed et al. 2014; Smallbone 2016).

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One of the most known definitions was provided by Stevenson and Lundström ([2001](#), p. 23) who define them as "*policy measures taken to stimulate entrepreneurship that are aimed at the prestart, the start-up and post-start-up phases of the entrepreneurial process.*"

Under the umbrella of entrepreneurship and SME policies, we may find various activities, including trainings and education, advisory services and counselling or direct financial support distributed through financial instruments (soft loans and credit guarantees) and capital grants/subsidies (Lundström and Stevenson [2005](#); Pergelova and Angulo-Ruiz [2014](#); Dvouletý and Lukeš [2016](#); Cowling et al. [2018](#)).

The traditional economic reasons and therefore intentions behind public policies promoting entrepreneurship include mainly addressing market failures (i.e. uncertainty, asymmetric information, indivisibilities, high transaction costs and achieving positive externalities), and they were documented by the scholars extensively (e.g. Auerswald [2007](#); Karlsson and Andersson [2009](#); Parker [2018](#)). However, the empirical research on the structure of entrepreneurial activity and its development show that only a few entrepreneurs create jobs for others and contribute thus to the overall increase of employment (Burke et al. [2000](#); Cowling et al. [2004](#); Millán et al. [2015](#); Dvouletý [2018](#)). For example, Dvouletý ([2018](#), p. 411) counts that the entrepreneurial activity in Europe represents 17% of the economically active population (15–64 years), consisting of 12% solo entrepreneurs and only 5% of job creators.[1] Based on these empirical observations, some scholars and academic researchers (Nightingale and Coad [2013](#); Terjesen et al. [2016](#); Audretsch and Link [2019](#); Coad and Srhoj [2019](#)) opened an ongoing discussion on whether it is not better to support only a specific group of entrepreneurs with a high-growth potential by allocating public resources to elite programmes promoting only high-growth entrepreneurship instead of having broad range of policies supporting all kinds of entrepreneurs, including solo self-employed individuals. This discussion escalated in general criticism of policies promoting entrepreneurship in articles by Shane ([2009](#)) and later by Edoho ([2016](#)). Besides the scientifically driven debate (we may also refer here to the evidence-informed approach towards policymaking, see e. g. Parkhurst [2017](#)), it is important to explain that the formation of public policies and mix of

the tools is significantly influenced also by other reasons, especially by the stage of the political cycle, institutional environment and politicians' goals (Arshed et al. [2014](#); Debus et al. [2017](#)). Specifically, if we take the optics of evolutionary economics (Nelson, [2009](#)), we may learn that formation of public policy nowadays reflects rather an accomplishment of pragmatically settled political and strategic goals, such as increasing national competitiveness, innovativeness and exports with an end goal of increasing national welfare and the standards of living (Peneder [2016](#); Wishlade et al. [2016](#)). Leaving aside the discussion on the original intentions behind the formation of a specific public policy, it is essential to acknowledge that at the end, it depends only on a particular policy and its design (selection criteria, targeting, intensity of support), whether it was successful in achieving its goal, or not (Preuss [2011](#); Fotopoulos and Storey [2019](#)).

This study is also motivated by the revival of interest in the industrial and business support policies in the EU that are being part of entrepreneurship and SME policies. Specifically, industrial/business support policies aim to enable firms to expand or modernize existing production capacity, which firms are unable to undertake due to financial constraints (Rodrik [2008](#); Aghion et al. [2011](#); McGillivray [2018](#)). Within the EU, SMEs are an important focus of business support policies. De Man et al. ([2016](#)) and later Dvouletý and Lukeš ([2017](#)) have chronologically described the historical development of the framework for entrepreneurship and SME policies in the EU. The most important milestones included the proclamation of entrepreneurial, innovative and open Europe in Lisbon Agenda in 2000 (Grimm [2011](#)); the European Commission's ([2003a](#), [b](#)) Green Paper on Entrepreneurship and the release of a definition of SMEs in 2003; implementation of the Small Business Act (SBA) and principle "think small first". SBA was then revised in 2011 as a response to the political request to mitigate the consequences of the 2008–2010 economic crisis.[2] Finally, in 2012, the European Commission announced the Entrepreneurship 2020 Action Plan, which is a part of the European 2020 Strategy aiming to achieve smart, sustainable and inclusive growth (De Man et al. [2016](#); McCann and Ortega-Argilés ([2016](#)); Dvouletý and Lukeš [2017](#); European Commission [2008](#), [2011](#), [2013](#), [2014](#)).

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[1] Based on the three waves (2005, 2010 and 2015) of the European Survey on Working Conditions (EWCS).

[2] General Block Exemption Regulation 651/2014 declared certain categories of aid compatible with the internal market. Regional aid and aid for SMEs were the first two categories mentioned (European Commission [2014](#)).

The EU common strategic documents, legislative frameworks and specific rules develop over time; however, they still provide the individual member states with a relatively large degree of freedom in settings of the national programmes, their financial distribution, thematic focus and forms of public support used (e.g. financial instruments vs direct subsidies).[3] It is thus important to acknowledge that the formation of specific programmes largely depends on the negotiations between the EU member states and the European Commission. The common characteristics of the programmes, funded jointly from both national and EU funds, include preventing distortions on the EU internal market and supporting mainly SMEs by smaller financial allocations under the principle "de minimis"[4] (European Commission 2006, 2014; Wishlade et al. 2016).

This paper contributes to the debate in the EU on the effectiveness of these policies by providing a comprehensive review of counterfactual evaluations of business support for SMEs, from national and EU funds, in the EU. We are asking in our article the following research question—do public grants positively influence firm-level performance? What kind of findings report previously published studies?

To the best of our knowledge, this is the first review of the literature with this specific focus. The focus on the EU ensures that all policies studied comply with the EU rules on state aid, and in other domains, and, thus, their results are relevant for the design of business support policies in the EU but also elsewhere, for instance in the EU candidate countries (e.g. in the Western Balkan countries). Additionally, there is a higher similarity between EU member states compared to those outside the EU. While there is evidence on business support policies outside the EU (Kersten et al. 2017), it is difficult to generalize these results outside the highly specific institutional and economic context of the developing countries studied and policies studied may not be transferrable to the EU, due to existing regulations. We also reflect on the recent work of Wishlade et al. (2016) who attempted to summarize the outcomes of the entrepreneurship support allocated through the financial instruments in the EU,

and who concluded that there are not many rigorous and methodologically correct evaluation studies at the national level. The motivation for SME focus is then twofold. First, business support policies are more likely to be relevant for firms that experience more severe financial constraints, such as small firms. Secondly, as discussed above, SMEs benefit from significant business support from both EU and national governments, and it is necessary to examine its effectiveness.

This study relates to several existing reviews of literature that were published in the past. Caliendo (2016), Dvouletý and Lukeš (2016) and Zoellner et al. (2018) reviewed studies on start-up support for unemployed individuals. Dimos and Pugh (2016), Zúñiga-Vicente et al. (2014) and Testa et al. (2019) recently reviewed support for research and development (R&D). Policies facilitating soft business support have been reviewed by Hogendoorn et al. (2019). Grimm and Paffhausen (2015), Piza et al. (2016) and Kersten et al. (2017) have focused on in their studies on low- and middle-income countries. While Kersten et al. (2017) include in their study all kinds of entrepreneurship and SME initiatives, Piza et al. (2016) focus in their review only on the effects of business support services and Grimm and Paffhausen (2015) primarily on the impact of financial instruments. Grimm and Paffhausen (2015) conclude while summarizing the empirical evidence that the overall effect of policies on employment has been so far very modest and somewhat negative. Kersten et al. (2017) conclude in their review that SME support has positive effects on firm performance, capital investment and employment, while insignificant effects on profitability and wages. Piza et al. (2016) conclude that the effects on the firm's performance, employment and labour productivity are positive.

Other closely related studies were written by the Organization for Economic Co-operation and Development—OECD (2008) and Storey (2017), but their primary focus is on the review of various methodological designs and evaluation frameworks. Both above-mentioned initiatives provide a very nice overview of evaluation methods and examples of previous evaluations.

Our review focuses on grants, which are discretionary instruments based on firm and project characteristics, with limited general equilibrium effects. Compared to tax-based incentives, they are more homogenous,[5]

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[3] However, it is worth noting that there are also large common EU entrepreneurship support programmes such as Competitiveness and Innovation Framework Programme (2007–2013) and COSME Programme (2014–2020), for details we refer to European Commission website (2019).

[4] Most of the state aid for SMEs is 'minimis' aid, defined as small amounts of state aid to firms about which the EU countries do not have to notify the European Commission (European Commission 2006).

[5] In contrast, Spengel et al. (2015) show that tax incentives to support SMEs in the EU cover a large variety of instruments, which makes the results difficult to compare.

which increases the comparability of the results. However, grants are less cost-efficient, when compared to financial instruments. Finally, to improve the comparability of the results and to focus on most credible evidence, the review covers only rigorous, firm-level evaluations that address the endogeneity of firm support in a convincing way and provide, plausibly, causal effects (Criscuolo et al. 2019).

The main contribution of this empirically oriented review is that it provides structured information on the previously published studies in terms of the followed methodological approaches, used variables and obtained findings. The rest of the article is organized as follows. In the following Section 2, we describe our methodological approach and selection of studies. Section 3 provides a review of research designs, methods and variables (Section 3.1), and a summary of the main findings of the previously published studies (Section 3.2). Section 4 provides implications for policymakers and researchers, and the final section concludes the article.

2 Methodology and selection of articles

Systematic reviews help the research community understand better what has been empirically studied so far and what are the challenges for future research, based on the examined volume of previously published literature (Ginsberg and Venkatraman 1985). Literature reviews have a rooted tradition in entrepreneurship research (Gorman et al. 1997; Ucbasaran et al. 2001; Dvouletý and Lukeš 2016; Block et al. 2017; Kersten et al. 2017; Dabić et al. 2019) and the scholars also acknowledge their importance.

We respect the tradition of doing systematic reviews in entrepreneurship research, and we base our own review of literature on the methodological approaches applied in the previously published reviews. We describe our approach in the following two subsections, providing readers with information on the initial screening, searching for academic articles (Section 2.1) and their selection (Section 2.2).

2.1 Methodology and code

The main aim of our review is to provide a systematic overview of empirical evidence on the microeconomic effects of entrepreneurship and SME public grants in Europe (specifically on EU 28 countries). We believe that this empirically oriented review might be interesting for the community as it provides systematic information on the methodological approaches, variables and findings of scholars.

We focus in our review only on European Union 28 member countries (EU 28) and support of small and medium-sized enterprises (SMEs), given the promotion activities allocated within the EU cohesion policies. Further, for the sake of clarity, we focus only on competitiveness/entrepreneurship and SME promoting grants, so we exclude grants promoting R&D activities, self-employment out of unemployment support or initiatives providing non-grant forms of support (e.g. financial instruments, training, etc.). We restrict our review on robust evaluation methods (primarily counterfactual evaluations) only, and we analyse studies published from the year 2000 and onwards.

To systematically search in the databases of academic articles, we had to develop a code reflecting the objective of our research. We based our initial code on Kersten et al. (2017, p. 348) as it was the closest published systematic review recently on a similar topic, although having different aims and scope. The original code contained four parts reflecting the focus of the review on EU 28 countries, support for SMEs, outcome variables reflecting the financial the firm performance and rigorous evaluation methods. Then, we have sent this code to five influential scholars experienced in the topic of entrepreneurship and SME policies (namely Norin Arshed, Daniele Bondonio, Marc Cowling, David McKenzie, and David Storey) with a kind request to provide a feedback on the code and our approach and we have received many valuable comments during late November 2018. We have used the received comments to adjust our code and searching strategy, and we provide the final version of the code in Appendix.

In the next stage, we applied the developed code in the two most well-known academic databases within Social Sciences, i.e. Web of Science (Clarivate Analytics 2019) and Scopus (Elsevier 2019), to search for relevant academic articles. We have used the code (see Appendix) in both databases and downloaded the list of academic articles meeting the code during January 1–11, 2019.

It is not surprising that overlapping articles were appearing both in Scopus and Web of Science, and therefore, we had to merge both lists and to remove duplicities. The final list included 318 articles meeting the code which we used as a primary database for our further work.

From the bibliometric point of view, it might be interesting to see in which journals the articles appeared most frequently. The following Fig. 1 shows the list of journals having at least three papers appearing on our list. The highest number of papers appeared in the journal *Environment and Planning C: Government and Policy*, which is nowadays named *Environment and Planning C: Politics and Space*. The list then continues by *Journal of Small Business and Enterprise Development*, *Entrepreneurship and Regional Development*, *Small Business Economics*, and other leading entrepreneurship journals.

2.2 Selection of articles

Then, we have downloaded abstracts for these 318 papers, which were subject to a review. Three of us have independently assigned values from 1 (least relevant) to 5 (most relevant) according to the relevance of the article for the review of the literature based on the four selection criteria. After that, we have calculated mean and standard deviation from the three individual scores, and we have checked the average scores. We have further excluded all papers that had on average scored below half (2.3), and we have ended up by having 59 potentially relevant papers for the structured table, aiming to summarize the key variables (country of analysis, programme, period and sample, policy target, outcome variables, empirical approach and findings).

We have obtained full texts for these 59 studies, and we have carefully assessed their relevance for the review. In addition to that, we have thoroughly inspected all references included in these papers to capture also documents that could not have occurred in the initial search in databases. From this perspective, we have also included published working papers and articles in the press. At this stage, we also went again through the content of the top eight journals displayed in Fig. 1 to make sure that we do not miss any important study.

Then, we selected the most relevant papers for our review. The studies were excluded mostly from the initial pool of papers, because (i) they have not been focused on EU 28 countries, (ii) the support has not included direct grants, (iii) were focused on R&D grants, (iv) when the methodology was not sufficiently robust (we have excluded mostly studies based on simple Ordinary Least Squares—OLS regressions). The final list of 30 studies can be found in Table 1.

3 Review of empirical studies

Based on a careful selection of methodologically sound and policy-oriented evaluation studies, we provide a review of 30 empirical studies in Table 1. The included studies cover a range of countries, showing that the richest empirical evidence obtained in the last two decades comes from Italy ($N = 8$). However, Table 1 includes also studies from the UK ($N = 4$), Croatia ($N = 3$), Czech Republic ($N = 3$), Ireland ($N = 3$) and Germany ($N = 2$) and one study from Belgium, Estonia, Finland, Hungary, Latvia, Spain, and Sweden.

The key variables included in Table 1 cover country of analysis, programme, period and sample, policy target, outcome variables, empirical approach and findings. We start by reviewing research designs, methods and variables in Section 3.1, and in Section 3.2, we summarize the main findings of the previously published studies.

3.1 Review of research designs, methods and variables

All presented studies are based on the longitudinal firm-level datasets, allowing the estimation of the effects of public grants after the end of the intervention.

The framework of the reported empirical studies is driven often by the range of the programme, but also by the author's and policymaker's preferences in choosing smaller parts of larger schemes to be evaluated. Some studies assess the effects of the programme in a particular *region* (e.g. Capelleras et al. 2011; Bia and Mattei 2012); other scholars assess the impact of the intervention only in a selected *industry* (e.g. Dvouletý and Blažková 2019a, b). There are also emerging studies considering the *intensity of public support* (e.g. Bia and Mattei 2012; Srhoj et al. 2019c). We may also observe studies focusing on selected *firm size* (e.g. Srhoj et al. 2019a), those focusing on *new firms* only (e.g. Söderblom et al. 2015) or complex studies evaluating the effects in all sectors and regions of the country (e.g. Banai et al. 2017; Beņkovskis et al. 2018).

Having looked at the applied methodology, most of the studies ($N = 15$) are methodologically based on the combination of the matching techniques and difference in differences approach (i.e. quasi-experimental design) which is still considered to be the rigorous standard in evaluation literature (Khandker et al. 2010; Storey 2017). The authors use most often different algorithms of the propensity score matching; however, some

Number of Articles

Fig. 1 List of journals with at least three papers appearing after the initial search in Web of Science and Scopus databases

studies also apply coarsened exact matching (e.g. Cerqua and Pellegrini 2017) or Mahalanobis distance (e.g. Srhoj et al. 2019c). Relatively often, the authors also follow the regression discontinuity design ($N = 4$) or implement the two-stage Heckman selection model ($N = 3$). It is beyond the ambition of this paper to discuss the advantages and disadvantages of each method; however, we recommend very practical handbooks of quantitative evaluation methods that have been written for example by Khandker et al. (2010) and Gertler et al. (2016) or a methodological review "Six steps to heaven" that was written by Storey (2017). Nevertheless, we would like to highlight in this review the importance of counterfactual impact evaluation as a method of providing reliable information about the outcomes of public intervention in case we do not face a natural/randomized experiment.

It is also essential to describe the cleaning procedure in order to avoid sample selection bias that might occur due to reasons such as availability of firm-level data in the undertaken analysis, compared to the number of firms supported within the programme, as recently highlighted by Dvouletý and Blažková (2019a).

Most of the included studies assessed the short-term effects that are usually captured 2 years after the end of the intervention. However, there are also emerging examples of studies where the authors have been able to assess also *mid-term* and *long-run effects* (e.g. Koski and Pajarinen 2013; Pellegrini and Muccigrosso 2017).

Another methodological challenge for empirical scholars is to decide whether to restrict *control/comparison group* only on rejected applicants from the programme (e.g. Bronzini and de Blasio 2006; Decramer and Vanormelingen 2016) or whether to work also with a random sample (or even population) of firms that are eligible for the programme (even if they have not expressed their willingness to apply for the public support). The latter approach is prevailing in the empirical studies, which is probably driven by the unavailability of the lists of rejected applicants to the researchers and could be prone to issues with unobservable variables. However, in case of having the list of rejected applicants, we would like to encourage scholars to expand their studies to include both control groups and to compare the obtained findings across control groups.

Once we have a look at the variables used by the authors, still most of the authors study the effects of

Table 1 Review of empirical studies

Authors	Country of analysis, programme	Period, sample	Policy target	Outcome variables	Empirical approach	Findings
Decramer and Vanormelin-gen (2016)	Belgium, Investment subsidy program for SMEs in Flanders	2004–2009, 932 supported firms and 4463 not supported firms (rejected applicants)	SMEs in all sectors in Flanders	Fixed assets, employment, sales, value-added, labour productivity and TFP growth	RDD	The authors find positive effects on fixed assets, employment, sales, value-added, labour productivity and TFP growth for very small firms, and they do not find any effects for larger firms.
Srhoj et al. (2019a)	Croatia, Grants for young micro and small firms	2008–2016, 222 supported firms and 32,100 not supported firms	Support of micro and small firms	Survival, sales, employment, bank loans	PSM + DID	The authors find positive effects on acquiring bank loans and on firm survival while no effects for employment and sales growth. The authors find heterogeneous effects concerning firm age.
Srhoj et al. (2019b)	Croatia, Grants for women entrepreneurs	2008–2012, 534 supported firms and 17,787 not supported firms	Development of firms owned by women	Survival, sales, value-added, capital, bank loans, employment, average wage, intermediate inputs, TFP, labour productivity	PSM + DID, Causal mediation analysis	The authors find positive effects on sales, value-added, capital, bank loans, employees and intermediate inputs. The authors find mediation effects of grants on capital increase via bank loans. Heterogeneous effects concerning women's age are documented. The cost-benefit analysis points to benefits outweighing scheme costs.
Srhoj et al. (2019c)	Croatia, Strengthening the business competitiveness of the small economy	2008–2012, 610 supported firms and 77,377 not supported firms	Acquisition of machinery, tools and inventories, marketing activities, business plan development	Sales, value-added, capital, bank loans, employment, average wage, intermediate inputs, inventories, TFP, labour productivity	PSM + DID, FE	The authors find positive effects on the small firm's value-added, sales, capital, bank loans, employment, average wage and intermediate inputs, but no effects on larger firms. To achieve positive effects in the small firms' sample, grants have to be designed, so that the grant amount in firms' profits is not too small. The cost-benefit analysis points to benefits outweighing scheme costs.
Dvouletý and Blažková (2019a)	The Czech Republic, Operational Programme Enterprise and Innovation (OPEI)	2007–2015, 143 treated and 604 control firms	Firms in the Food industry	Price-cost margin, return on assets, assets turnover, value-added per labour costs, long-run risk, growth of tangible assets, growth of	PSM + DID	The authors find positive effects on price-cost margin, value-added per labour cost, the growth of sales and growth of tangible assets.

Table 1 (continued)

Authors	Country of analysis, programme	Period, sample	Policy target	Outcome variables	Empirical approach	Findings
Dvouletý and Blažková (2019b)	The Czech Republic, Operational Programme Enterprise and Innovation (OPEI)	2007–2015, 157 treated and 1224 not supported firms	Firms in the Food industry	Production efficiency, labour productivity and TFP	PSM + DID	Two years after the end of the intervention, the authors find a positive impact of subsidies on labour productivity of supported firms. However, the effects on TFP were negative. The impact on production efficiency indicator was proven to be inconclusive. The authors conclude there was no significant technological change in firm-level productivity.
Špička (2018)	The Czech Republic, Rural Development Programme and the Operational Programme Enterprise and Innovation (OPEI)	2007–2015, 550 supported firms and 550 not supported firms.	Firms in the Food and Beverage Industry	Fixed assets, credit-to-debt ratio, fixed assets to turnover ratio, labour productivity growth	PSM + DID	The author finds significant positive effects on fixed assets and credit-to-debt growth, but insignificant effects on fixed assets to turnover ratio growth. Also, there were mixed effects on labour productivity growth. It was insignificant in the short term but positive in the long term.
Hartšenko and Sauga (2013)	Estonia, Enterprise Estonia programs	2004–2010, 508 supported, and 3921 not supported firms	SMEs in all sectors	Sales, labour productivity	FE, RE	The authors find positive effects on sales and labour productivity
Koski and Pajarinen (2013)	Finland, Business subsidies promoting employment	2003–2008, 30,000 supported firms 373,058 not supported firms	Business subsidies boosting employment	Employment	DID, IV	The authors find positive short-term effects on employment. However, the authors report different effects across start-ups and incumbent firms, especially when it comes to long-term effects.
Brachert et al. (2018)	Germany, Improving Regional Economic Structures Program (GRW)	2007–2014, 254 supported and 19,821 not supported firms	Firms in East Germany	Employment, turnover, gross fixed capital, labour productivity	CEM + DID, FE + DID	The authors find positive effects on employment and gross fixed capital (but only the initial effect); however, for the remaining variables, the authors find mixed or non-significant results.
Kölling (2015)	Germany, various grants and subsidies	1996–2009, 4621 supported and 24,946 not supported firms (t-1)	Firms in all sectors	Employment, monthly wages, investment, value-added, productivity (sales in constant prices)	PSM + DID	The author finds positive effects on value-added, productivity, employment and wages.

Table 1 (continued)

Authors	Country of analysis, programme	Period, sample	Policy target	Outcome variables	Empirical approach	Findings
Banai et al. (2017)	Hungary, EU Economic Development Operational Programme and Regional Development Operational Programmes	2003–2015, 9636 supported, and 192,570 not supported firms	SMEs in all sectors	Employment, value-added, sales, profit, tangible assets, labour productivity	PSM + DID, FE	The authors find positive effects on employment, value-added, sales, profit, tangible assets, but insignificant effects on labour productivity.
Girma et al. (2007)	Ireland, Grants distributed by Industrial Development Authority	1992–1998, 1087 firms in the sample, N for treated and not supported firms is not specified	Firms in the manufacturing industry with at least 20 employees	TFP	GMM	The authors study the effects of different kinds of grants, and they find that only grants that support productivity-enhancing activities increase total factor productivity.
Girma et al. (2008)	Ireland, grants from Industrial Development Agency	1983–1998, 1464 supported firms and 646 not supported firms	Manufacturing firms.	Employment growth	GMM	The authors find positive effects on employment. Based on the results, domestic firms create more additional jobs per euro of grant payment than foreign ones.
Bondonio and Greenbaum (2014)	Italy (Piemonte), 25 European, national and regional programs.	2000–2003, firms in Piemonte: 42,310 non-assisted firms and 5284 assisted firms.	SMEs, focus on Manufacturing industry (but no specific restrictions)	Employment growth	GMM	The authors find positive effects on employment and employment growth. The effects were increasing with the intensity of public support.
Bernini and Pellegrini (2011)	Italy, Italian Law 488/92 (Regional policy)	1996–2004, 574 treated and 848 not supported firms.	Firms in lagging regions and the manufacturing sector	Sales, value-added, employment, fixed assets, TFP, labour productivity growth.	PSM + DID	The authors find positive effects on sales growth, value-added, employment and fixed assets, but negative effects on TFP and labour productivity growth.
Bronzini and de Blasio (2006)	Italy, Italian Law 488/92 (Regional policy)	1993–2001, 1008 supported firms for 2nd auction and 1329 supported firms for 3rd auction. Control group: rejected applicants (N not specified).	Firms in lagging regions and manufacturing sector	Investments expressed as a percentage of sales, as a percentage of assets and as a percentage of capital.	DID	The authors find positive effects on investments. The authors find some support that subsidized firms may have taken some of the investment opportunities that unsubsidized firms would have exploited in the absence of incentives.
Cerqua and Pellegrini (2014)	Italy, Italian Law 488/92 (Regional policy)	1994–2004, 428 treated and 531 not supported firms	Firms in lagging regions and the manufacturing sector	Tangible assets, turnover, employment, labour productivity	RDD	The authors find positive effects on tangible assets, turnover and employment, but insignificant negative effects on labour productivity.
	Italy, Italian Law 488/92 (Regional policy)	1995–2001, 213 treated firms, 693 affected	SMEs in less developed regions focus on		CEM + DID	The authors find positive effects on the growth of tangible capital,

Table 1 (continued)

Authors	Country of analysis, programme	Period, sample	Policy target	Outcome variables	Empirical approach	Findings
Cerqua and Pellegrini (2017)		untreated firms and 1352 not-affected untreated firms.	Manufacturing industry (but no specific restrictions)	Tangible capital, turnover, employment and TFP growth		The authors find positive effects on turnover and employment and negative effects on TFP. For firms located less than 1 mile from the treated firms, there were insignificant spillovers on turnover and TFP, but negative spillovers on employment.
Bernini et al. (2017)	Italy, Italian Law 488/92 (regional policy).	1995–2003, 377 supported and 697 not supported firms localized in the South and 264 supported and 536 not supported firms localized in the Center-North	Firms in lagging regions	TFP growth	Multiple RDD	The authors find initial negative effects on TFP growth and signals of positive effects on TFP growth after 3–4 years.
Pellegrini and Muccigrosso (2017)	Italy, Italian Law 488/92 (regional policy).	1996–2009, 1910 supported, and 2435 not supported firms.	Firms in lagging regions and manufacturing sector	Firm survival	RDD, survival analysis	The authors find positive effects on the survival of start-ups at all ages of the firms in the long term.
Bia and Mattei (2012)	Italy, Support to Piedmont firms	2001–2003, 4802 supported firms and not specified control group (if any)	Firms in the Piedmont region	Employment	PSM + DID, Dose-response functions	The authors find positive effects on employment. They also found that the effects were increasing with the amount of financial aid for both small-sized and medium- or large-sized firms.
Bepkovskis et al. (2018)	Latvia, Programmes funded from the European Fund for Regional Development (ERDF)	2007–2013, 390 and 360 not supported firms	Firms in all sectors	TFP, labour productivity, average wage, capital-labour ratio, employment, turnover, exports-to-turnover ratio	PSM + DID	The authors find initial positive effects on capital-labour ratio, employment, average wage and turnover. Productivity gains are observed 2 years after the end of the intervention.
Roper and Hewitt-Dundas (2001)	Northern Ireland (Local Enterprise development unit) and Republic of Ireland (Small Business Programme)	1991–1994, Northern Ireland: 135 supported and 199 not supported, Republic of Ireland: 85 supported and 204 not supported	Small firms in the Manufacturing sector (10–100 employees) active for at least four years and with a high growth potential	Turnover growth, employment, ROA	Two-stage Heckman selection model	The authors find, in both cases a positive effect on employment, but no effect on turnover growth or profitability.
Capelleras et al. (2011)	Spain, Navarra region, Financial support for businesses	2000–2005, 78 supported (41% of the sample) and 114 not supported	New businesses in the Navarra region	Employment growth	Two-stage Heckman selection model	The authors find no positive effects on employment growth.
Söderblom et al. (2015)	Sweden, VINN NU Program		New firms that are in the process of developing a	Employment, equity, sales	PSM + DID	The authors find positive effects on employment, equity and sales.

Table 1 (continued)

Authors	Country of analysis, programme	Period, sample	Policy target	Outcome variables	Empirical approach	Findings
		2002–2008, 130 supported and 154 not supported firms	unique and innovative product or service			
Harris and Trainor (2005)	The United Kingdom (Northern Ireland), Selective Financial Assistance (SFA).	1983–1998, 436 supported firms, a control group of eligible but not supported firms (N not specified).	Manufacturing firms in lagging regions.	TFP	GMM	The authors find positive effects on TFP.
Mole et al. (2009)	The United Kingdom, Business Link programme	2003–2005,1130 intensively supported firms, 1166 assisted firms and 1152 not supported firms	Support of small firms and firms located in disadvantaged communities	Employment, sales	Two-stage Heckman selection model	The authors find positive effects on employment, but no significant effects on sales.
Criscuolo et al. (2019)	The United Kingdom, Regional Selective Assistance (RSA)	1997–2004, 4550 supported, and 39,308 not supported firms.	Manufacturing firms in lagging regions.	Investment, employment, TFP	IV	The authors find positive effects on employment and investment, but no effects on TFP.
Harris and Robinson (2004)	The United Kingdom, RSA (Regional Selective Assistance) and SMART/SPUR (Small Firm Merit Awards for Research andTechnology/Support forProducts Under Research)	1990–1998, 1778 supported plants, two control groups (all areas: 30,504 not supported plants, in assisted areas: 12,146 non-supported plants).	RSA: investment in manufacturing plants in lagging regions, which commit to expanding/safeguard employment. SMART: innovation in SMEs.	TFP growth	GMM	Compared to the control group, RSA had positive effects on TFP. Compared to other firms in the assisted areas, RSA and SMART had insignificant effects on TFP growth. When allowing the effect to vary by region and sector, most effects were insignificant, but there were positive effects on TFP growth in Scotland.

TFP total factor productivity, *ROA* return on assets, *GMM* generalized method of moments, *FE* fixed-effects regressions, *RE* random-effects regressions, *IV* instrumental variables approach, *2SLS* two-staged least squares, *RDD* regression discontinuity design, *PSM+ DID* propensity score matching with difference in differences approach, *PSM + GMM* estimation of GMM based on matched sample, *PSM + RE* random-effects regressions on matched sample, *CEM + DID* coarsened exact matching with difference in differences approach

schemes on *employment* (*N* = 20) as an indicator of job creation, followed by indicators related to the overall firm financial performance. These include indicators reflecting the *growth of the firm, activity and productivity, profitability and rentability*. The overall *growth of the firm* is usually measured by tangible/fixed assets or total assets and their growth. *Activity and productivity* authors usually operationalize by the indicators of assets turnover, labour productivity (value-added per labour cost) and total factor productivity (TFP). *Profitability and rentability* are usually measured by the indicators of sales (or turnover), value-added or profit. For the calculation of financial indicators, we refer to a useful handbook of corporate finance written by Brealey et al. (2017) and authors seeking to estimate TFP may get inspired by a practical review written by Van Beveren (2012). The important lesson which we may take from the previous studies is that the trend is now shifting towards using multiple indicators (e.g. Decramer and Vanormelingen 2016; Beňkovskis et al. 2018; Srhoj et al. 2019c), instead of using one or two measures, providing a structured overview on the overall effects of the grants on firm financial performance and productivity.

3.2 Review of results

First of all, we need to acknowledge that it is challenging to draw clear conclusions based on the obtained results as they differ across indicators, so we summarize findings from the studies concerning the indicators that were most frequently used. We begin by the least ambitious indicators measuring firm performance (survival) and end up with the most challenging once (productivity).

First, we explore studies considering *firm-survival* as the outcome variable. All three included studies (Pellegrini and Muccigrosso 2017; Srhoj et al. 2019a, b) report higher survival rates of subsidized enterprises in comparison with the control group.

Previous 18 studies aiming to investigate the effects of subsidies on *employment* report positive results (Roper and Hewitt-Dundas 2001; Girma et al. 2008; Mole et al. 2009; Bernini and Pellegrini 2011; Koski and Pajarinen 2013; Bia and Mattei 2012; Bondonio and Greenbaum 2014; Söderblom et al. 2015; Kölling 2015; Decramer and Vanormelingen 2016; Banai et al. 2017; Cerqua and Pellegrini 2014, 2017; Beňkovskis et al. 2018; Brachert et al. 2018; Criscuolo et al. 2019; Srhoj et al. 2019b, c) and only two studies do not find

positive effects (Capelleras et al. 2011; Srhoj et al. 2019a).

When it comes to the variables reflecting firm-growth, we summarize studies concerning the growth of the *tangible/fixed assets* as they mostly reflect the purchase of new equipment, which is the most common usage of public grant schemes. Nine studies report positive effects on tangible or fixed assets (Bernini and Pellegrini 2011; Cerqua and Pellegrini 2014, 2017; Brachert et al. 2018; Decramer and Vanormelingen 2016; Banai et al. 2017; Dvouletý and Blažková 2019a; Srhoj et al. 2019b, c), and only Špička (2018) finds no effects on fixed assets.

Once we explore the effects of grants on the financial performance of the firm, operationalized by *sales or turnover*, the results become more heterogeneous, but still, they are positive. The positive effects are reported by ten studies (Bernini and Pellegrini 2011; Hartšenko and Sauga 2013; Cerqua and Pellegrini 2014, 2017; Söderblom et al. 2015; Decramer and Vanormelingen 2016; Banai et al. 2017; Srhoj et al. 2019b, c; Dvouletý and Blažková 2019a), while four studies report negative or non-significant effects (Roper and Hewitt-Dundas 2001; Mole et al. 2009; Brachert et al. 2018; Srhoj et al. 2019a).

Getting to the most challenging variables reflecting firm productivity, i.e. firm's capability to use inputs and resources efficiently, there are most often used two variables—*labour productivity* and *total factor productivity*. *Labour productivity* is more commonly used because it can be easily calculated from the firm's financial records. Six studies (Hartšenko and Sauga 2013; Decramer and Vanormelingen 2016; Beňkovskis et al. 2018; Srhoj et al. 2019c; Dvouletý and Blažková 2019a, b) report positive effects on labour productivity, and seven studies report negative or non-significant effects (Bernini and Pellegrini 2011; Cerqua and Pellegrini 2014; Banai et al. 2017; Špička 2018; Brachert et al. 2018; Srhoj et al. 2019a, b). Results concerning total factor productivity are even less in favour of productivity gains. Five studies (Harris and Robinson 2004; Harris and Trainor 2005; Girma et al. 2007; Decramer and Vanormelingen 2016; Beňkovskis et al. 2018) report positive effects, and seven studies (Bernini and Pellegrini 2011; Cerqua and Pellegrini 2017; Bernini et al. 2017; Criscuolo et al. 2019; Dvouletý and Blažková 2019b; Srhoj et al. 2019b, c) report negative or non-significant effects.

To summarize the previously published results, most studies report positive effects of the programmes on

firm-survival, employment, tangible or fixed assets, sales or turnover, while effects for labour productivity and total factor productivity are somewhat mixed. Although we need to point out that the number of studies observing positive effects on the first four indicators is quite convincing, the results concerning firm-productivity are not that clear. For example, the same authors who find positive effects on employment, tangible or fixed assets, sales or turnover report negative (Bernini and Pellegrini 2011; Cerqua and Pellegrini 2014, 2017; Dvouletý and Blažková 2019a, b) or insignificant (Srhoj et al. 2019a, b) effects on productivity. Most grants come with a clear objective of increasing capital or fixed assets and employment, and the results confirm a positive impact on those two indicators. However, the end goal of these grants is to increase firm competitiveness (i.e. reaching a technological change improving firm-efficiency or reallocation of existing resources into more efficient usage), and therefore, policymakers might expect a positive effect on firm productivity. Our results show this is more often not achieved. Total factor productivity is also described as a measure of ignorance (Van Beveren 2012), that is, the part of production functions' output that cannot be explained by the production functions' inputs. A potential reason for positive effects on production function inputs and outputs but no effects on productivity might be due to the firms' cost curves, namely, the firms might be in the constant returns-to-scale region of their cost curves (although the technological change is expected to reach increasing returns-to-scale). If this is so, the inputs would increase, the outputs would increase, but at the same pace as before the grant, so productivity remains constant. We encourage researchers to delve deeper into the impact of grants on firm-level productivity (and its decomposition across production factors), particularly with detailed product-level data containing product costs and quantities sold which would increase the precision of the productivity estimates (Prescott 1998; Kim and Han 2001; Van Beveren 2012).

Moreover, we need to highlight that complex evaluation studies often cannot adequately take into account heterogeneity discussed in Section 3.1, concerning region, industry, firm size, firm age and the intensity of public support. Understanding the heterogeneity connects to Rodrik (2008) who says it is not the question of whether the industrial policy should be conducted, but instead how it should be done. Reported heterogeneous effects can further help and guide policymakers in

understanding how and when public grants can be more effective. When summarizing the previously published results concerning the variables mentioned above, the obtained evidence is relatively scarce, so these conclusions should be interpreted with caution, but the readers might benefit from reading the previously published results which are highlighted in Table 1.

In total 14 studies (Banai et al. 2017; Beņkovskis et al. 2018; Brachert et al. 2018; Bronzini and de Blasio 2006; Bernini and Pellegrini 2011; Bondonio and Greenbaum 2014; Cerqua and Pellegrini 2014, 2017; Bernini et al. 2017; Pellegrini and Muccigrosso 2017; Harris and Trainor 2005; Mole et al. 2009; Criscuolo et al. 2019; Harris and Robinson 2004) find that grants provided in less-developed regions have positive effects on firm performance, while there were no studies comparing the difference in effects of the same instrument between more and less-developed regions.

Most studies cover firms in manufacturing sectors or explicitly state that the majority of firms are in manufacturing sectors (Bernini and Pellegrini 2011; Bondonio and Greenbaum 2014; Cerqua and Pellegrini 2014, 2017; Criscuolo et al. 2019; Girma et al. 2007, 2008; Harris and Robinson 2004; Harris and Trainor 2005; Hartšenko and Sauga 2013). Only one study (Banai et al. 2017) provides separate estimates for service sectors and finds positive effects on firm performance in service sectors, but lower than in manufacturing sectors studied and construction. Finally, some studies (Koski and Pajarinen 2013; Decramer and Vanormelingen 2016; Beņkovskis et al. 2018) estimate results for all sectors, without providing results specific for manufacturing or service sectors, making it difficult to draw conclusions about specific sectors. Three studies focus on a particular sector of manufacturing (Dvouletý and Blažková 2019a, b; Špička 2018). As the vast majority of studies are focused on manufacturing sectors and the results elaborated at the beginning of this section should be regarded as more generalizable to the manufacturing sector.

Five studies (Bia and Mattei 2012; Cerqua and Pellegrini 2014; Decramer and Vanormelingen 2016; Srhoj et al. 2019c; Criscuolo et al. 2019) compare effects for smaller and larger firms, and they report unanimous evidence for positive effects towards smaller firms and suggest substitution of private for public funds when large firms are beneficiaries. In addition, three studies (Srhoj et al. 2019a, b; Mole et al. 2009) have an explicit focus on grants for small firms and results are

somewhat positive, with some evidence suggesting the entrepreneur gender and firm age as potential options for better targeting within small firms. Indeed, some scholars (e.g. Bloom, Van Reenen, & Wililams, 2019) suggest it is not the firm smallness but firm age that matters for positive effects of grants due to higher financial constraints stemming from the higher informational asymmetry. The current evidence in this regard is scarce, with two studies (Koski and Pajarinen 2013; Srhoj et al. 2019a) providing some evidence showing more favourable effects of grants on the performance of very young firms.

Finally, only two studies (Bia and Mattei 2012; Srhoj et al. 2019c) investigate the intensity of public support; in both cases, researchers suggest too small grants should be avoided, with few differences. The two studies evaluate different policies. On the one hand, Bia and Mattei (2012) in Italy investigate policy with an average grant amount of €200,000, while Srhoj et al. (2019c) in Croatia investigate policy with an average grant amount of €10,000. For smaller firms, Bia and Mattei (2012) find increasing positive effects up to the amount of €150,000, and for larger firms, they find increasing positive results up to €300,000. The authors indicate an inverted U-shaped pattern with the grant size. On the other hand, Srhoj et al. (2019c) focus on small firms and define grant amount in relative terms, as a share of the grant amount in firm profits, making a proxy of firms' financial constraints. The authors find evidence for a positive effect of grants on firm performance when the grant amount is more than 10% of the firms' last year profits, on the other hand. However, they find no effects when grant amount is below 10% of firms' profits, suggesting the substitution of private for public money. The authors elaborate on the substitution of public for private funds by arguing the firm should be financially constraint if grants are to achieve additionality.[6] However, if there are no financial constraints as is the case when profits are quite larger than the grant amount, the firm would in a neoclassical framework undertake the planned investments anyways (Srhoj et al. 2019c). Nevertheless, still more research is needed on the topic of optimal grant size.

The reported effects obtained with counterfactual methods can be used to estimate the cost-benefit analysis or costs per job created; however, only two studies report cost-benefit analysis (Srhoj et al. 2019b, c) and five studies report costs per job created (e.g. Decramer and Vanormelingen 2016; Cerqua and Pellegrini 2014; Srhoj et al. 2019b, c; Criscuolo et al. 2019). Two studies report higher benefits than costs of grant schemes, with benefits being 115% of the costs for SME policy and 270% of the costs for grant scheme targeting small firms owned by women. These benefits reported are lower than the benefits of export promotion services, where Munch and Schaur (2018) find that benefits to outweigh the costs by as much as three times. On the other hand, considerable heterogeneity is found with regard to public cost per job created, with costs of €189,000, €62,000, €26,000, €14,700 and €6000 per job.

Spillovers and Stable Unit Treatment Value Assumption (SUTVA), as the main assumption behind counterfactual impact evaluations, are to this day rarely questioned, which should change if we are to understand the true effect of grant allocations to firms, industries and regions. Only one study (Cerqua and Pellegrini 2017) questions the SUTVA assumption underlying all the counterfactual studies reviewed in this manuscript. Criscuolo et al. (2019) consider business development grants not to have considerable effects on general equilibrium in comparison to large R&D grants. But how realistic is the assumption of no spillovers? In a Marshallian or Walrasian equilibrium, the firm performance ultimately makes changes that affect other firms in the same industry and in the related industries. Cerqua and Pellegrini (2017) directly test this question and find adverse effects on employment within neighbouring firms, which possibly affects negatively their capabilities and neighbouring firms' success.

Finally, we also need to acknowledge the cross-country heterogeneity of the programmes that significantly influence the success of programmes as highlighted in previous reviews of empirical evidence (Kersten et al. 2017; Piza et al. 2016; Grimm and Paffhausen 2015). However, it is notable that studies from all regions of the EU (eastern, continental, southern and northern) tend to find positive effects, at least on some firm performance measures. No evidence on investigating the political economy of grant allocation or connection between institutional quality and estimated impacts was found.

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[6] The concept of behavioural/output additionality has been described, for example, in works of Söderblom et al. (2015); McKenzie et al. (2017) or Čadil (2019).

4 Implications for policymakers and researchers

The presented review of empirical studies provides policymakers with positive impacts of public grants on *firm-survival*, *employment*, *tangible (or fixed assets)*, *sales (or turnover)*, and mixed findings for *labour productivity* and *total factor productivity*. Nevertheless, once we dive more into the presented empirical evidence, many challenges should be according to our opinion further discussed and addressed by the stakeholders.

First of all, we need to ask openly. To what extent the presented empirical studies are facing sample selection issues? This might be a serious issue that might influence the presented findings, as already pointed out by several scholars (e.g. Kersten et al. 2017; Storey 2017; Dvouletý and Blažková 2019a). Scholars, researchers and evaluators need to report the cleaning procedures conducted to obtain presented empirical results. How many firms were supported by the programme and how many of those are represented in the empirical analysis? Moreover, it is also very worth mentioning how many recipients of public support are no longer active in the business. Policymakers might then consider scholar's advice (e.g. McKenzie 2011; Dvouletý et al. 2019) to impose reporting duty on all firms obtaining public support that would measure the key policy-related indicators and financial records (i.e. profit and loss statements and balance sheets) during and after the end of programme. Having data available for all supported firms (both from reporting or from other existing governmental databases) would provide a more complete view on the real outcomes of public interventions. Also, a standard approach to impact evaluations should be to register a pre-analysis plan on dedicated web platforms.

Policymakers and research community should cooperate closely on implementing this recommendation into practice. They should also cooperate together with the evaluation activities of the public programmes. Such cooperation might increase robustness of conducted empirical studies, by incorporating into matching techniques also firm-related characteristics that could not have been addressed in the previous studies, such as education and experience of managers/owners, and their psychological traits including risk averseness and entrepreneurial self-efficacy (also stressed by Kersten et al. 2017).

Also, we need to dive further into the actual heterogeneity of effects concerning the observable characteristics we already have available in our datasets, such as firm size and age, region, industry and intensity of public support. By reflecting this firm-heterogeneity in evaluation studies, we may then become more successful in better targeting public aid on firms that have a higher likelihood to utilize the public resources more efficiently.

We propose the following research questions/criteria to be addressed in future studies more deeply:

- Do micro and small firms report better financial results compared to medium-sized and large firms?
- What types of behavioural additionality occur when entrepreneurs interact with public SME grants?
- Do we find support for the territorial effects of public grants? Do firms supported in more prosperous regions perform better compared to firms subsidized in lagging regions?
- Are the effects of public grants heterogeneous across industries? In which industries firms react better and in which worse? What characteristics of the industries are driving the effects?
- Do firms obtaining more intense support report better results compared to firms receiving less intense support? What is the optimal size of public grants, and what is the optimal subsidy rate?

We also encourage scholars to carefully explore the whole set of financial indicators presented in this review to better understand what kind of changes happened in the supported firms after the implementation of public policy.

The future studies also need better to address the differences between short-term and long-term effects of public grants as most of the previously published studies focus on rather short-term effects. Making this clear distinction (2-year effects vs 3 to 5-year effects vs longer-term effects) could better address the identified ambiguity between the positive impacts on employment, tangible (or fixed assets), sales (or turnover), but mixed effects on labour productivity and total factor productivity. This might be justifiable in the short term as it might take time for firms to work-in the new machines and to utilize their working capacity fully. Nevertheless, if we are not able to see long-term productivity gains, which would mean improvement in efficiency through better internal use of resources, then,

it is questionable if the policy can be considered successful. The grants mainly aim to encourage firms to implement a technological change and to become more efficient than before and if they are unable to do so, then they do not meet the policy target.

Finally, we believe there is considerable room for improvement in understanding the spillover effects of public grants, at least at the industry level. How did the policy change the structure of the industry? Has the overall rate of bankruptcy increased, i.e. implying that the supported firms expelled the non-supported firms because they obtained competitive advantage through a policy action? How did the market shares of supported companies change and re-shape the structure of the industry?

5 Conclusion

There has been a long-term tradition in allocating public grants as a direct form of support to firms and entrepreneurs to increase their growth and improve their financial performance and efficiency. Once we have a look at the literature, studying the effects of public entrepreneurship and SME grants, we may find many individual studies published in the past years. Nevertheless, there are not many initiatives to summarize the previously published studies in the form of a structured overview, and the previous efforts have focused mainly on low- and middle-income countries.

In this article, we contribute to the field from the perspective of developed countries, and we provide a systematic review of empirical evidence in Europe. We explicitly focus on the European Union's (EU) 28 membership countries, as there have been significant financial streams allocated to foster entrepreneurship recently. We systematically search for literature published from 2000 on, and we provide a review of 30 methodologically rigorous studies from Italy, UK, Croatia, Czech Republic, Ireland, Germany, Belgium, Estonia, Finland, Hungary, Latvia, Spain and Sweden. We summarize systematic information on the methodological approaches, variables and findings of scholars.

When summarizing the previously published results concerning the firms' financial performance, we conclude that the previous studies report mostly positive effects of the programmes on firm-survival, employment, tangible (or fixed assets), sales (or turnover) and mixed findings for labour productivity and total factor productivity (TFP). Nevertheless, we need to stress that the overall representation of variables differs across studies, and there have been some ambiguous results, especially concerning the firm-productivity. Our article provides a series of implications for both policymakers and the research community. Out of these, we would like to highlight the need to address the heterogeneity of effects concerning the firm size, firm age, region, industry, and intensity of public support. We call for more studies that would address the long-term effects of public grants that may reveal the real effects on the efficiency of resources in subsidized firms. Future studies should include a range of variables assessing overall performance and productivity. We would also suggest more studies on the behavioural change as well as estimations of spillover effects of public grant schemes in partial and general equilibrium framework.

Finally, we need to acknowledge that although we did our best to include most of the previously published studies based on a rigorous methodology, there might also be studies that we could not find or those that have not been published in English. The absence of these studies in our review limits the provided findings.

Compliance with ethical standards

Competing interests The authors declare that they have no competing interests.

Consent for publication All the authors read the manuscript and agree to publication.

Ethics approval and consent to participate The authors hereby declare that this manuscript is not published or considered for publication elsewhere.

Appendix: Search code.

(anywhere)

TS = (SME grant OR small firm* grant OR BUSINESS grant OR FIRM grant OR ENTERPRISE grant OR SME subsid OR small firm* subsid OR BUSINESS subsid OR FIRM subsid OR ENTERPRISE subsid OR SME support OR small firm* support OR BUSINESS support OR FIRM support OR ENTERPRISE support OR supported SME OR supported small firm* OR supported BUSINESS OR supported FIRM OR industrial policy OR state aid OR EU subsid OR EU programme OR policy instrument OR business start-up support OR Voucher)

AND

CU = (Austria* OR Italy* OR Belgium* OR Latvia* OR Bulgaria* OR Lithuania* OR Croatia* OR Luxembourg* OR Cyprus* OR Malta* OR Czechia* OR Czech Republic* OR Netherlands* OR Holand* OR Denmark* OR Poland* OR Estonia* OR Portugal* OR Finland* OR Romania* OR France* OR Slovakia* OR Germany* OR Slovenia* OR Greece* OR Spain* OR Hungary* OR Sweden* OR Ireland* OR United Kingdom* OR European Union OR EU)

AND

TS = (micro firm OR micro business OR micro enterprise OR micro compan OR small firm OR small business OR small enterprise OR small firm OR small compan OR SME OR Small and medium-sized enterprise OR Medium-sized business OR Medium-sized firm OR Medium-sized enterprise OR Medium-sized firm OR Medium-sized compan)

AND

TS = (firm performance OR productivity OR profit* OR employment OR revenue* OR turnover OR sales OR value added OR return* to capital OR investment OR assets OR production capacity OR firm size)

AND

TS = (experiment OR field experiment OR randomized evaluation OR random* OR impact evaluation OR impact assessment OR counterfactual evaluation OR propensity score OR regression discontinuity OR diff-in-diff OR difference-in-differences OR difference in differences OR instrumental variable* OR identification strategy OR impact on OR impact of OR causal effect OR evidence OR value for money evaluation OR VFM evaluation OR Cost Benefit Analysis OR CBA Analysis OR matching OR synthetic control methods).

Source: Own work initially inspired by Kersten et al. (2017, p. 348).

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