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The impact of business-support services on firm performance: a meta-analysis

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Abstract Interventions designed to support small and medium enterprises (SMEs) are popular among policy makers, given the role SMEs play in job creation around the world. Significant resources from governments and international organizations are directed to business-support interventions in low and middle-income countries (LMICs) based on the assumption that market failures and institutional constraints impede SME growth. SME business-support interventions in LMICs most often relate to formalization, business environment, exports, clusters, training, technical assistance, access to credit, and innovation. This paper reviews and summarizes 40 rigorous evaluations of SME-support services in LMICs and presents evidence to inform policy debates pertaining to SMEs and business-support services. We present evidence that business-support interventions improve firm performance and create jobs. However, little is known about which interventions work best for SMEs and why. More rigorous impact evaluations are needed to fill the knowledge gap in the field.

Keywords SMEs · Impact evaluation · Private sector development · Firm performance

JEL classification J21 · J48 · O10 · L26

1 Introduction

Small and medium enterprises (SMEs) are responsible for most employment generation in developed and developing countries (Ayyagari et al. 2011, 2007). Consequently, they play a central role in socio-economic policies. In developing countries, business-support interventions are often based on the assumption that institutional constraints (or failures) impede SMEs from reaching their full potential to generate jobs, profits, and economic growth. Thus, the considerable financial resources that governments and development organizations allocate to the development of the SME sector is intended to address institutional constraints and allow SMEs to operate more efficiently, leading to productivity growth (Beck et al. 2005).

Development agencies provide considerable targeted assistance to SMEs in low and middle-income country (LMIC) economies. For instance, the World Bank devoted $9.8 billion to SME projects between 2006 and 2012 (IEG 2013). For the same period, the International Finance Corporation (IFC) of the World Bank Group directed $25 billion to

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SMEs. However, there is limited evidence on the impact of SME support in the literature. This is due either to an insufficient number of studies employing convincing identification strategies to isolate the causal impact of the intervention under consideration or to limited information regarding the mechanism underlying such interventions.

There is a need to systematically review and synthesize the evidence to provide an account of the impact of different business-support programs on SMEs. This systematic review contributes to the public debate by providing an account of the effect of different types of direct support on firm performances. The evidence gathered and summarized is expected to provide policy makers with a comprehensive overview of the literature and a list of SME interventions that have been most effective. The review outlines channels through which a particular intervention can affect firm-level outcomes and synthesizes evidence of existing interventions most frequently found in the literature: (i) matching grants, (ii) export promotion, (iii) innovation, (iv) training (technical assistance), (iv) cluster-based development, and (v) tax simplification policies. We synthesize evidence of the impact of various interventions on different firm outcomes, such as employment creation, exports, innovation, investment, labor productivity, and firm performance indicators such as revenues and profits.

This work builds on previous related literature and systematic reviews that focused on specific sets of policies and included interventions that support micro-enterprise. For instance, McKenzie and Woodruff (2014) analyze business training interventions that include microenterprises and potential entrepreneurs. Similarly, Cho and Honorati (2014) focus on interventions promoting entrepreneurship among potential or current entrepreneurs. Finally, Grimm and Paffhausen (2015) provide a review similar to this work by analyzing the impact of various types of SME support, but their work focuses only on employment outcomes and includes interventions with micro-entrepreneurs (for example, microfinance) and, in a few cases, potential entrepreneurs.

Our research differs from previous reviews in many ways. First, all evidence coming from studies with microenterprises and self-employed are not covered in this review due to their different nature compared to SMEs.[1] We make the distinction because considering interventions with different nature together can impact the results and our ability to learn about the impact of SME policies.[2] Second, our review provides a thorough analysis of the impact of different types of SME support on various firm outcomes (not only on employment outcomes) and presents meta-analysis and meta-regression results disaggregated by type of intervention. Third, our meta-regression results shed light on the impact of singled interventions. In the case of matching grants programs, for instance, the results suggest a positive impact of such interventions on firm performance (0.15 SD or 7.6% over the control mean) and employment creation (0.14 SD or 7.5% over the control mean). Having separate evidence for matching grants is relevant from a public policy perspective as it is used by public entities worldwide and is one of the most popular interventions used by multilateral organizations such as the World Bank (Campos et al. 2014).

The findings suggest that overall SME business support has a positive impact on firm performance, employment creation, and labor productivity. When we look at interventions separately, matching grants stand out as effective in creating jobs and improving firm performance indicators. As discussed below, the high variability in terms of number of studies per intervention and the quality of the evidence prevent us from pointing out which SME policies are most effective and likely to work in different settings. The rest of the paper is organized as follows: Sect. 2 presents the logical framework associated with the interventions considered in this review. Section 3 describes inclusion criteria and search methods. Section 4 presents the search results and included studies. Section 5 presents the meta-regression methodology. Section 6 shows the results, followed by the conclusion.

[1] The most common criteria used to classify SMEs are based on an employment threshold. For instance, the European Union, the World Bank (see, for example, the Enterprise Survey website www.enterprisesurveys.org), Beck et al. (2005), and many papers included in this review adopt 250 employees as a cut-off to classify SMEs. However, there is no common definition, and countries also adopt other employment thresholds, revenue, or capital stock to define SMEs. This paper considers cut-offs used by the SME support service programs evaluated by papers included in the review.

[2] Bauchet and Morduch (2013) argue that there are significant differences between SMEs and microenterprises. For instance, they state that unlike microcredit, which can be used to finance consumption needs, SME finance is targeted to entrepreneurs with skills and management capacity and to support investments. SME borrowers need capital in larger amounts than is typical of microcredit.

2 Logical framework

Various approaches are used to provide support services to SMEs. We identified the main among these approaches as relating to the following: formalization and reforms aimed at enhancing the business environment,[3] export promotion, clusters (local productive systems), training and technical assistance, SME financing, and innovation policies.

The literature on SME support can be divided into two distinct strands. The first considers indirect interventions that address constraints SMEs may face such as red tape, while the second addresses the impact of direct business support on SMEs such as training and matching grant programs.[4] In the first strand, many studies look at the impact of indirect types of public support for SMEs, such as tax simplification and lower registration costs, which are intended to provide incentives for the entry of new firms, the formalization of informal SMEs, and the growth of small firms. The underlying assumption is that formal firms are less credit-constrained than their informal counterparts, and therefore formalization would be a necessary condition for better firm outcomes (see e.g., McKenzie and Woodruff 2008). Indeed, La Porta and Shleifer (2008) show that informal firms are smaller in scale and less productive than formal firms. Thus, if informal firms are prevented from growing due to credit constraints, then reducing the cost of formalization should, in theory, indirectly give informal firms an opportunity to escape the informality-low productivity trap and affect firm outcomes.[5] Such interventions are an indirect form of public support, as they target all firms with annual revenues below a certain threshold. Moreover, all informal firms are incentivized to formalize through tax simplification. Those that formalize do not directly receive other forms of public support.[6]

The second group of studies addresses the impact of direct business support on SMEs. The interventions assessed by these studies focus on supply-side constraints, i.e., constraints that are to some extent under firms' control (Syverson 2011). Lopez-Acevedo and Tan (2010) argue that supply-side constraints, such as access to finance, weak managerial and workforce skills, inability to exploit economies of scale, and imperfect information about market opportunities, new technologies and methods of work organization, affects mainly SMEs. They argue that in response to these constraints, developing countries have designed SME public interventions to improve dimensions of SME performance.[7] These studies addressing direct business-support estimate the impact of a program on SMEs within a specific sector in a given country, with the intervention based on the assumption that SMEs face specific constraints. In this view, SMEs need external (usually public) support to overcome specific constraints and improve their prospects for investment and productivity. A successful intervention may even generate spillover effects on firms that do not belong to the program's target group. This kind of support comes, for instance, in the form of training programs and value chain and association strategies (for example, clusters), which are intended to improve business productivity via better inputs and address coordination failures respectively. Note that unlike indirect public support programs, the unit of intervention is the firm itself. A related policy objective that might be pursued by governments is increasing firm survival rates. Governments justify these programs to compensate for market failures and keep more firms in the market to increase competitiveness and sustain employment.[8] On the other hand, critics argue that keeping inefficient firms alive distorts the

[3] Bruhn and McKenzie (2013) review several experimental and quasi-experimental evaluations to investigate the impact of regulatory changes aimed at reducing bureaucratic barriers to SME formalization and growth.

[4] Such indirect interventions are similar to what Syverson (2011) calls "external drivers" or "environmental factors" underlying a firm's productivity. Syverson (2011) argues that governments can influence elements of the market environment and induce business to take actions to raise their productivity.

[5] Although La Porta and Shleifer (2014) argue that by far the greatest perceived obstacle by informal firms is lack of access to finance, the link between access to finance and registration may not be causal as banks may evaluate other aspects such as organized accounting and formal human capital of entrepreneurs before granting credit.

[6] In fact, there are interventions that are targeted at formal enterprises only, such as subsidized credit lines. Thus, it is possible that after formalizing, some firms may end up being served by different interventions.

[7] Most studies included in the meta-analysis presented in this paper are evaluations of public interventions.

[8] Heim et al. (2016) provide evidence of the impact of European Commission aid on firm survival rates. The results indicate that restructuring aid decisions of the European Commission between 2003 and 2012 increased survival rate and improve the financial viability of firms. The European Commission considers rescue and restructuring (R&R) aid as key policy tool to support firms in difficulty, aiming at avoiding their dissolution.

market. However, our review did not find studies for LMICs where firm survival rate associated with SME support services was evaluated.

As this review investigates the impact of a diverse array of interventions, we provide a logical framework for the two types of interventions and hypothesize a potential path from activities to intermediary and then final outcomes for each case.

Support to SMEs is generally related to the dual goals of productivity growth and employment generation. A general framework motivating SME support services is thus linked to the improvement or creation of institutions that allow SMEs to reach their full potential in productivity growth and employment. Figure 1 provides a general illustration of the simplified logical framework related to each type of intervention considered in this review. The description of the hypothesis in each intervention model surveyed in this review is provided below.

1. *Matching Grants/Credit*. Matching grants/credit is one of the most widespread types of SME intervention in LMIC countries. These programs consist of a government (conditional) subsidy, but the subsidy is attached to a specific purpose. For instance, the government can subsidize a consulting service (Bruhn et al. 2012), a technology upgrade, or acquisition of a certificate required to allow firms to export. Matching grants/credit are justified on the grounds that these investments have positive externalities and that, on their own, firms are likely to invest less than the optimal level (Campos et al. 2014). Subsidized credit lines through SME financing programs are popular and are intended to tackle adverse selection in credit markets—a problem that results in financial constraints and limits to SME activities (Stiglitz and Weiss 1981; Aghion and Morduch 2005).[9] The availability of subsidized credit/loans is thought to allow firms to invest, hire new employees, and acquire productive assets. These investments are likely to lead to productivity growth.
2. *Training and management programs* are based on the idea that market failures that limit firm growth are related to the lack of skills in the workforce. Skills acquired in specific training programs should contribute to worker employability, wages, and firm productivity (for example, through the adoption of more efficient management practices), but firms may not have incentives to invest the optimal amount in training because they are unable to fully internalize the benefits of this investment in case employees move somewhere else (Acemoglu and Pischke 1998). For instance, Syverson (2011) discusses the role of intangible capital in productivity and indicates that managerial practices are likely to have causal impacts on productivity. In the same line, Bloom and Van Reenen (2010) discuss the link between firm performance and productivity. They find that developing countries like Brazil, China, and India have significantly worse managerial practices measured by their management scores compared to the USA, Japan, and Western Europe.
3. Interventions that support *local production systems* (LPS) are based on the idea that individual firms benefit from agglomeration externalities and coordination (for example, Schmitzh 1995). Similarly, Maffioli et al. (2016) argue that cluster-based public intervention is needed to solve coordination failures that prevent positive externalities. These interventions create formal and informal institutional frameworks to facilitate collaboration and strengthen local business environment that help mitigate coordination failures. Economic theory suggests that formal firms might act together to capture collective externalities, experience mutual growth, and impact local economic performance. A successful project that allows firms to benefit from positive externalities generated by collective actions would affect outcomes such as employment and regional growth through the establishment of collective agreements and specific outputs from collective action. Collective actions are expected to generate intermediate outputs that allow firms to achieve higher levels of productivity and employment and, in turn, positively impact regional economic performance.[10]

[9] It is argued that some firms consider interest rates available at commercial banks as too high. This would affect the pool of bank's clients, as most borrowers would be risk prone. One way of dealing with the adverse selection problem would be to lower the interest rates. The reluctance of banks to do so themselves opens space to government intervention.

[10] Like the papers included in this review, we do not try to provide a specific and precise definition of local agglomeration. For more detail discussion on this see Altenburg and Meyer-Stamer (1999) and Martin and Sunley (2003).

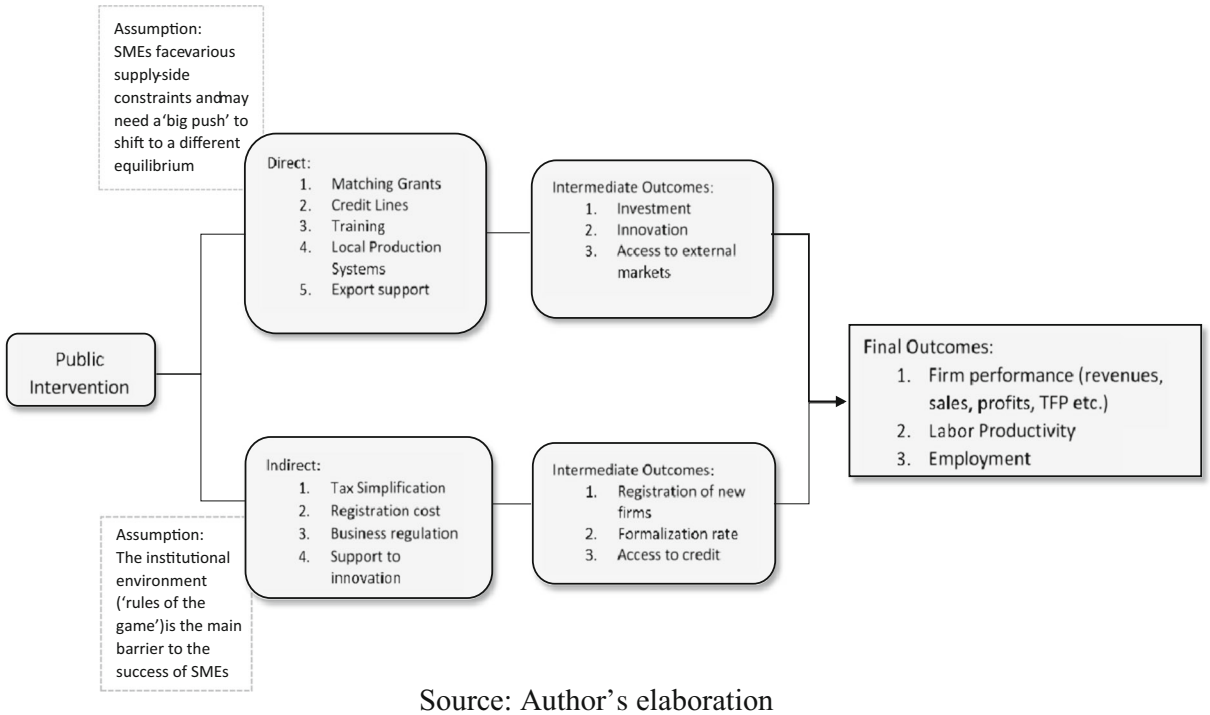


Fig. 1 Logical framework

4. Support for *innovation policies*. Support for innovation policies is based on the idea that social returns to innovation exceed private returns as summarized by Lundvall and Borras (2005) and Cirera and Maloney (2017). Acs and Audretsch (1988) is one of the first studies discussing the differences in innovation in small and large firms and provide evidence that the innovation activity of small firms responds to considerably different technological and economic environments. Innovation support to SMEs involves funding to improve processes, and it is intended to capture externalities stemming from innovations, as indicated in Lagacé and Bourgault (2003). Innovation programs aimed at SMEs might support innovation transfer, R&D programs, and certifications related to innovations (for example, process innovation and/or product differentiation). The rationale is that innovation will impact the productivity and growth of SMEs, which contributes positively to regional and national growth.
5. Public intervention supporting *access to external markets*. Such interventions seek to tackle information asymmetries that prevent firms from accessing external markets and involve the provision of training and counseling. The identification and adaptation to external markets generates exports that may lead to increased production, which, in turn, are thought to impact firm profits and employment creation. These interventions find justification in the literature as in the model by Rauch and Casella (2003), where the lack of information makes it difficult for firms to find a suitable trading partner and to create matching frictions. Inadequate information about international trading opportunities may hinder exports. Ties through international information-sharing network relationships and certification, for instance, help producers to solve their matching problems and find suitable trading partners in other countries.
6. *Tax simplification and business registration*. These initiatives are a form of indirect business support to SMEs and are aimed at improving firm performance through formalization. Economic theory suggests that formal firms grow by accessing credit markets and by taking advantage of economies of scale. A tax simplification program could affect outcomes such as employment and profits through two intermediate outcomes: (1) formalization rates and (2) access to credit. The causal chain could be simplified as follows: the necessary conditions for a tax

simplification program shifts informal entrepreneurs from an equilibrium characterized by low productivity and profits to another where they face fewer growth constraints (as a result of formalization). Plenty of studies concentrate only on final outcomes but do not shed light on the mechanisms associated with tax simplification/formalization (and consequently offering little policy guidance). Indirect support to SMEs may include policies regarding business registration, property registration, and regulatory frameworks (Fajnzylber et al. 2011; Monteiro and Assunção 2012; McKenzie 2011; Piza 2016).

The various result chains shown in Fig. 1 are thus useful in providing the rationale for the types of interventions considered in this review.[11]

3 Inclusion criteria and search methods

This review focuses on studies that evaluate policies aimed at supporting SMEs in LMICs (as defined by the World Bank). The focus on LMICs is justified, firstly, because private firms in these countries tend to be more labor intensive and less innovative and, consequently, are the main employers of a large proportion of the labor force (for example, Acs and Amorós 2008; Cravo et al. 2012). Secondly, restricting the scope to LMICs helps identify the binding constraints that SMEs might face in similar institutional contexts.

A common definition of SMEs does not exist. The papers included in this review mainly use criteria based on employment to classify SMEs. For instance, a common cut-off used to define SMEs is 250 employees, as discussed in Beck et al. (2005), Ayyagari et al. (2007), Cravo et al. (2012, 2015), Kushnir et al. (2010), Bruhn et al. (2012), Tan (2010), Lopez-Acevedo and Tinajero (2010), and Cassano et al. (2013). Other employment cut-offs are used by SME support service programs evaluated by papers included in the review.[12] The review also includes studies where the criteria to qualify for SME support services is based on other variables such as annual revenue, capital stock, or sales (based on national classifications) instead of employment to classify SMEs. SME classification usually defines the upper cut-off based on employment, annual revenue, capital stock, or sales and includes all firms below the threshold.

To examine evidence of the effect of SME support services on firms, this review focuses on quantitative analyses and includes only studies using experimental (randomized controlled trials, or RCTs) and quasi-experimental methods—such as regression discontinuity design (RDD), instrumental variables (IV), difference-in-differences (DID), matching on covariates, and propensity-score matching (PSM), and any other studies that purported to control for selection bias (for example, Heckman two-step estimator). Experimental and quasi-experimental methods are regarded as good tools when the main objective is to estimate the causal impact of an intervention or policy (for example, see Duflo et al. 2008; Angrist and Pischke 2015). When an intervention is carefully designed or the identification strategy of an observational study is convincing enough, the findings on the impact of the program or intervention are said to have internal validity. That is, one can claim that the intervention caused the difference in the outcomes between treatment and control groups. This review only considers those studies that assess the impact of an intervention comparing the treatment (or eligible) and the control (or comparison) groups.

Importantly, as described previously, this review includes studies that consider the impact of six different types of business-support services based on firm performance. Our study has the advantage that it examines more firm-level outcomes and does not restrict the analysis to employment outcomes, as in Grimm and Paffhausen (2015).[13] Our review covers studies that looked at both intermediate (or secondary) outcomes (such as access to credit, training, formalization, and access to external markets) and final (or primary) outcomes (such as profits, employment generation, and productivity). To be included in the review, the study had to report

[11] The task of providing a detailed account about economic theory and small business is beyond the scope of this paper. You (1995) provides a lengthy discussion about small business in economic theory that can guide further discussions on SME support and economic theory.

[12] Further, the European Union and the World Bank (see, for instance, the Enterprise Survey website www.enterprisesurveys.org) adopt 250 employees as a cut-off to classify SMEs.

[13] Though the literature recommends that synthesis is informed by the theory of change embedded in the design of an intervention (see Hombrados and Waddington 2012), our focus extends beyond the outcomes directly anticipated by an intervention to also include unanticipated outcomes.

estimates to at least one final outcome. Studies that only reported estimates for intermediary outcomes were excluded. We look for context-specific variables that can help explain the failure or success of an intervention to understand the causal chain of each intervention.[14]

3.1 Search methods

Following the inclusion criteria set up, different search strategies were devised to identify studies to include in the review. The generalized search strategy covered a comprehensive set of published and unpublished sources. We prioritize electronic searches regarding interventions of interest; it was most likely that sources available electronically were reported in formal literature on SMEs or in the "gray literature" from national and international organizations. The review covers studies published in English, Spanish, and Portuguese.[15]

The first stage of the review involved a search for all published and unpublished studies likely to be relevant to our objectives. To be included, the studies had to (i) report on SME support interventions of the kind detailed in the section on interventions; (ii) focus on LMICs, as defined by the World Bank; and (iii) have occurred between 2000 and 2014, since the review would cover studies that used impact evaluation techniques that have evolved since that year.

Given the variety of interventions covered, reference "snowballing" was an effective strategy to complement our search and consists of using existing reviews, papers, and reports to identify the set of studies to be reviewed (Hammerstrøm et al. 2010; cited in Waddington et al. 2012). Our search strategy, therefore, also drew on a first set of important studies identified in an initial screening. We then conducted the electronic search that is described in detail in the online Appendix A and Piza et al. 2016.

[14] Unfortunately, we were not able to find detailed documentation for each study included in the review. The lack of this documentation limits our knowledge and understanding of the interventions tested.

[15] The search strategy did not involve specific search of papers published in French (e.g., snowballing and internet searches). Nevertheless, papers in French identified through the search of electronic databases were screened.

4 Search results and included studies

4.1 Search results

The initial electronic search returned 9475 studies, which was reduced to 5785 after dropping duplicates. The final list of studies was examined using the filters outlined above in the search methods and described in more detail in the online Appendix A, which assessed the impact of an SME intervention using rigorous evaluation methods. With that in mind, abstracts of all 5785 studies were read. It was noted that the great majority neither used quantitative methods to assess the impact of an intervention, nor a rigorous method to address selection problems, nor looked at interventions targeting micro-entrepreneurs.

Three researchers, working independently, were involved in applying the selection criteria. They read the abstracts and drew up a list of 63 papers that passed all filters. The list dropped to 42 after excluding 21 studies that only covered microenterprises. The papers were then classified according to the methods used: quasi-experimental and experimental methods respectively.

The 42 studies where thoroughly examined to decide whether they should be included in the review. We excluded six studies that looked exclusively at intermediate outcomes—such as formalization rates and numbers of new firms—and different versions of the same study. We also excluded 13 studies that did not use rigorous evaluation methods to address causality. The snowballing strategy added 17 studies and generated a final list of 40 studies (23 from the search of online platforms and 17 from snowballing). A further four studies were dropped from the empirical analyses, because we were unable to compute a standardized effect size and/or their standard errors. To compare effect sizes across studies, we used two standardized measures reported in Sect. 5.1 and described in detail in the online Appendix B.

The empirical analysis, therefore, included 36 studies and 72 effect size (ES) per intervention-outcome study. The large number of ES is because a few studies tested the impact of several interventions together and then separately on the same outcomes, and some randomized controlled trials tested the effect of more than one treatment arm.

4.2 Studies included

Figure 2 shows the cumulative number of studies produced between 2003 and 2014. Between 2003 and 2010, only 16 studies used experimental or quasi-experimental techniques to assess the impact of different business-support services on SMEs. Between 2011 and 2014, that number more than doubled. The rapid growth in the number of studies in the 2000s is related to the increase of the literature on impact evaluation and more specifically on the impact evaluation of SME support programs. In the process of identifying the main approaches to SME and designing the review, no rigorous impact evaluation was found prior to 2000.[16]

Figure 3 shows evidence from 18 countries, most of which are in the Latin American region. As noted in Grimm and Paffhausen (2015), this could be because countries in this region have many experiences with active labor market policies over the past two decades.

The assessment of the papers included in this review allows us to analyze the effect of the interventions on a comprehensive list of outcomes. The final outcomes extracted from the papers reviewed are (i) employment creation, (ii) labor productivity, and (iii) firm performance. The following measures were extracted from the papers reviewed for intermediary outcomes: (i) access to credit, (ii) exports, (iii) formalization rates, (iv) innovation, (v) investment, and (vi) survival rates.

For firm performance, we group various outcomes such as profits, revenues, sales, added value, stock of assets, return on assets, gross production, and firm productivity (measured as total factor productivity). For employment, we group paid workers, new workers, workers recruited, and employment rates. Innovation encompasses all types of investments in research and development (R&D), new products, and patents. Our measure of labor productivity groups studies that report sales per worker, profit per worker, revenue per worker, and R&D per worker. Figure 4 reports the percentage distribution of reported outcomes (72 in total). Five outcomes stand out: firm performance (27.8%), employment (20.1%), exports (15.3%), labor productivity (11.1%), and investment (8.3%), and innovation (8.3%).

It is important to mention the heterogeneity in the quality of the evidence available in the studies included in this review. We used a tool named "risk of bias" to classify the quality of evidence by classifying each paper according to how well they handled all potential sources of bias (confounding factors). For instance, in the case of studies using propensity-score matching only, it is impossible to control for unobserved characteristics. A study using PSM would likely be classified as having moderate or high risk of bias. Section E in the online appendix provides a full description of the tool and explains how each study included in the review was classified. We grouped studies with either moderate or high risk of bias in one category and used a binary variable to identify studies with "high" risk of bias in the meta-regression exercise.

5 Meta-analysis

This review investigates the impact of a diverse array of SME supports. The types of support include matching grants/subsidized credit, innovation support, export promotion, and regulatory reforms aimed to reduce red tape costs, training/technical assistance, and local productive arrangements (cluster). The impact of these interventions is analyzed in a series of outcomes such as employment creation, exports, innovation, investment, labor productivity, and firm performance. This section presents the results from the data extracted from the papers included in the review. Table A.1 in the appendix provides the list of studies included in the review (details on each study are provided in Table C.1 in the online appendix).

An initial forest plot analysis provides a summary of the effect size of the interventions and outcomes considered in this review. The figures illustrate the effect size of interventions on different outcomes and the heterogeneity of the results. The overall effect is computed assuming a random effects (RE) model. An RE model assumes there might be different ES underlying different studies and interventions, and that the total variance for these should account for between-studies variance (see Borenstein et al. 2009). We also report the confidence intervals for each overall estimate and their p values to assess statistical significance. To provide a

[16] For instance, a paper by Grimm and Paffhausen 2015) study a similar issue but focus only on employment outcome. Their search was conducted after 1990, and only one paper from prior to the year 2000 (Fretwell et al. 1999) was found. This paper would not qualify for this review, as it is designed to assess active labor policy in general (not SMEs specifically) and also includes assessment of self-employment, which is not covered by this review. This is an indication that going back in time would generate an enormous number of abstracts to be reviewed and would likely return few, if any, SME impact evaluations.

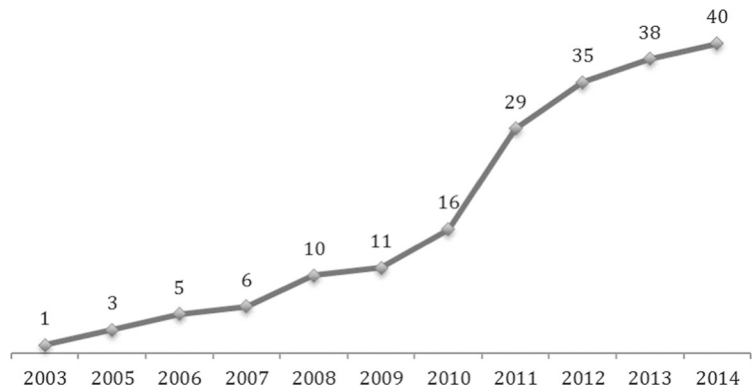


Fig. 2 Cumulative number of studies per year

Source: Author's elaboration

more robust set of results, meta-regressions are used to analyze the impact of SME support programs on firm outcomes, controlling for moderator factors.

5.1 Computing effect sizes

Most studies included in this paper use quasi-experimental methods to estimate the causal effect of a program. The majority of papers estimate the average treatment effect on the treated (ATT), but few estimate the local average treatment effect (LATE) instead.

For our meta-analyses, the unit of analysis was the study.[17] Nonetheless, several studies performed more than one estimate for the same outcomes. For example, in some cases, studies report on different interventions, and in others, different specifications are tested for the same intervention. In any case, there is a need to synthesize several estimates for the same intervention (for example, matching grants) and outcomes (for example, employment). When a study covers more than one treatment (for example, matching grants and technical assistance) and provides estimates for each treatment separately and for "whatever" treatment without distinguishing between the two treatments, we opted to use only the latter estimate to compute overall effect size when all interventions were pooled.[18] In this case, the treatment dummy is defined as one if a firm is supported by "any program" (in the example, either matching grants or technical assistance) and zero if not (as in Tan 2010; Lopez-Acevedo and Tinajero 2010).

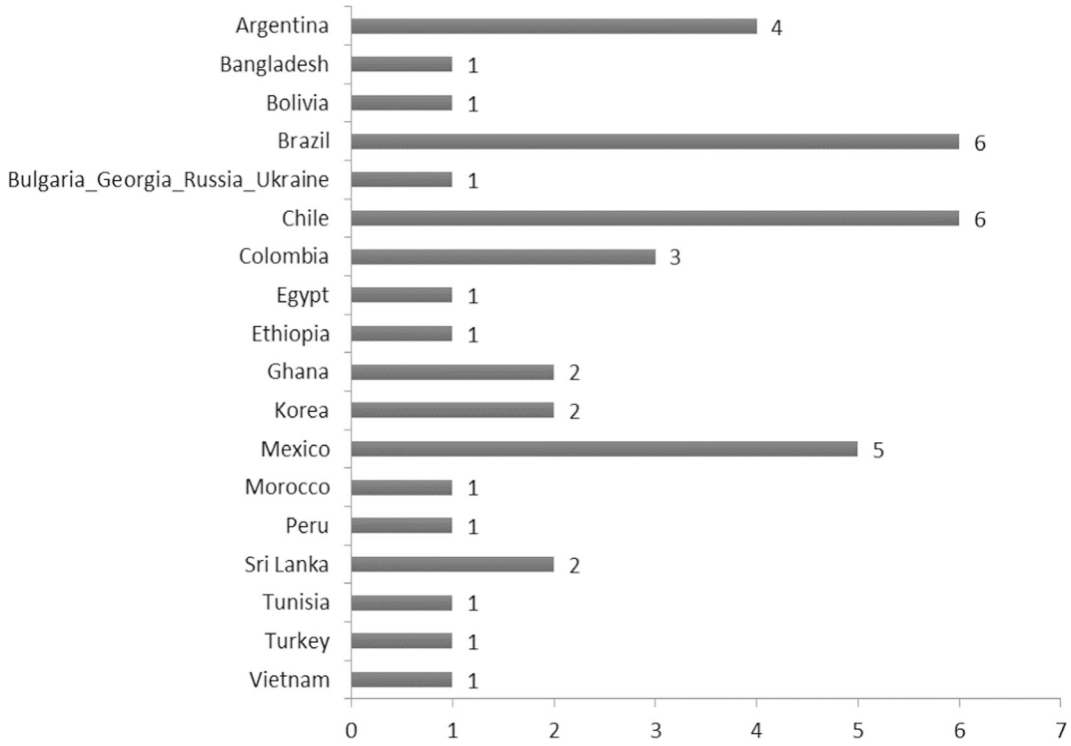
When such a "synthetic effect" is not provided, we determine it by taking a simple average of the ES across different interventions per outcome per study (Lipsey and Wilson 2001). In such cases, the variance of effect sizes was computed assuming zero covariance, because in most cases, overlap was limited. That is, firms either participated in one program or another.[19] It was necessary to averaging out across standardized ES provided in the same study to generate overall ES per outcome per study so we could carry out meta-analysis, pooling together different business-support programs.

We also performed subgroup analyses looking at some interventions separately. Our review reports on a relatively high number of studies looking at the effect of matching grants on firm outcomes. In cases where the same study tested the impact of more than one intervention (for example, matching grants and technical assistance), we first averaged the ES for matching grants and technical assistance separately and then took a simple average to obtain an overall ES per outcome per study. As before, this was to estimate an overall standardized ES across different interventions. Again, we computed

[17] As discussed in Duvendack et al. (2012), there is no consensus on whether meta-analysis should be performed for quasi-experimental studies. In this review, we use meta-analysis to provide the "big picture" of the impact of interventions aimed at SMEs. However, given the challenges in practice and decisions made, we argue that these results should be treated with care.

[18] Alternatively, we could have computed a weighted average of two separate coefficients.

[19] Variance of (a + b) = var.(a) + var.(b) − 2 Cov(a,b), assuming Cov(a,b) = 0 is a conservative assumption, as it implies lower precision of overall effects unless the covariance is negative. On average, we expect the covariance across studies to be close to zero. We also believe this is a reasonable assumption, because according to these studies, the number of firms taking up different treatments is not high. Given the restricted overlap between different treatments, we do not believe there is reason to worry about high correlation between firms participating in different interventions. It is important to clarify that by doing this, we are not averaging across outcomes, but instead, across different ES for a given outcome.



Source: Author's elaboration

Fig. 3 Number of studies per country

the variance assuming covariance between effect sizes as zero.[20]

When sample sizes and treatment effects for subgroups were available, we computed summary effects as a weighted average of the effects' sizes. As before, we also computed the variance by assuming covariance between the ES equals zero, because this seems to be a plausible assumption for cases where overlap between subgroups is non-existent or small, that is, where the ES are plausibly independent.

In sum, we provide synthesized ES for three primary outcomes: firm performance, employment, and labor productivity. For four secondary outcomes—exports, investment, innovation, and formalization rates—we show the forest plots with individual estimates in the online appendix since we did not systematically review studies looking specifically at those outcomes.

6 Results

This section provides an overview of the overall average effect of business-support programs to SMEs. We start by aggregating all interventions and providing evidence for single interventions when sample size (number of studies) allows. We use forest plots and random effect estimates to compute the average standardized effect size and use I-squared and tau-squared statistics to compute variability of our main findings.[21] The results are summarized for the final (or primary) outcomes of employment, productivity, and firm performance.

[20] In other words, we did not combine estimates obtained for firms only receiving matching grants with estimates for firms receiving a package of interventions (for example, matching grants and technical assistance).

[21] We report forest plot and heterogeneity measures, such as the chi-squared test for heterogeneity (which captures within-study variance), the I-squared statistic, which we interpret as the proportion of total variance across the observed effects explained by between-study variance, and τ^2 (tau-squared), an estimate for the variance of the "true effect size" (see Borenstein et al. 2009). Borenstein et al. (2009, p.118) argue that "I-squared is a descriptive statistic and not an estimate for any underlying quantity."

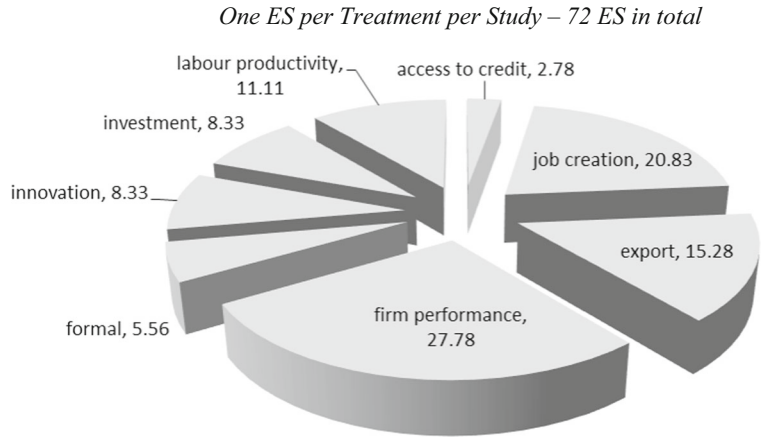


Fig. 4 Percentage of outcomes analyzed

Source: Own elaboration

6.1 Forest plot analysis

Our review found 18 ES related to firm performance across different interventions as illustrated by forest plots in the online Appendix D.[22] Figure D.1 reports the standardized ES (SMD) of each study and the overall average across interventions. The interventions included in this figure consider different groups of firms (for example, sectors) and tackle different market failures. Nevertheless, providing an overall picture of the interventions covered in the review remains relevant for policy making.[23]

On average, interventions aimed at improving firm performance had a positive and statistically significant effect of 0.13 standard deviation (SD) or 22% over the control mean. Interestingly, the heterogeneity between studies is relatively small. The tau-squared is very low (0.0196). As indicated by the statistic I-squared (92.1%), there is an indication of high heterogeneity across studies. This measure captures the degree of inconsistency in the studies' results (Higgins et al. 2003).

Since our review included seven ES for studies that examined the impact of matching grants programs, our data allows us to look at the effect of these two interventions on firm performance in isolation. Figure D.2 shows that the effect of MG on firm performance equals 0.15 SD (or 7.6% over the control mean) and is similar to that obtained with all interventions pooled together. The effect is very precisely estimated.

The number of ES for employment outcome is 13 (Figure D.3). Although most evidence comes from Latin America, the figure suggests that different types of business support for SMEs help create jobs in almost all the countries considered. On average, programs targeted at SMEs help with employment creation. The overall effect is equal to 0.15 SD (or 9% over the control mean) and is statistically significant. Despite the smaller number of cases, the tau-squared statistic points to a between-study variance of 0.081; that is, the between-study variance accounts for more than 50% of the pooled effect size (0.08/0.15). However, the high value of the I-squared statistic (99.2%) indicates high true between-study variability. This result is consistent with the view that SMEs are an important source of job creation. When we look at the effect of matching grants on employment (Figure D.4), the results are similar with a positive effect size of 0.14 SD (or 7.5% over the control mean) and is statistically significant at 5%. Nevertheless, the reduction in the number of studies leads to higher variability between the point estimates as captured by the tau-squared (0.133) and I-squared statistics (99.4%).

The number of ES results for labor productivity is seven. The evidence comes almost exclusively from countries in Latin America (Figure D.5). The overall effect size is 0.11 SD, indicating that SME support might affect productivity. The overall variance is relatively low, as the I-squared statistic indicates that 88.7%

[22] Figure D.1 in the online appendix reports forest plots dropping studies with ES that are outliers. The results with the full set of observations are similar (see Piza et al. 2016).

[23] The decision to report overall effect for different interventions was also made in a systematic review that covered the impact of interventions aimed at improving children's enrollment in primary and secondary schools. See Petrosino et al. 2012.

of the total variance is explained by between-study variability, and the tau-squared is low (0.0117). When we look at the effect of matching grants in isolation (Figure D.6), we find a small effect that is not statistically different from zero (0.05 SD with a 95 CI of (− 0.05, 0.15)).

The initial indication of a positive impact of SME support on firm performance is interesting and can have at least two interpretations. First, it can be argued that business support of any sort works as subsidies ("free money") that end up favoring firms that would actually be able to carry on without any injection of public resources, that is, a *picking the winners* argument. On the other hand, one could take this result as an indication that SME interventions of any sort make a difference to SMEs. In the meta-regression analysis, we approached this issue indirectly by looking at whether firm size is associated with the final outcomes.

6.1.1 Meta-regression

The forest plots presented above provide a useful preliminary overview of the overall ES of SME-support programs. However, forest plots are unable to control for moderator factors (for example, firm size, regional characteristics, and studies' risk of bias). Meta-regressions are estimated to provide a better account of effect size related to SME-support programs.

The meta-regression analysis is performed for the pooled sample of interventions and for matching grants separately. The overall effect is estimated using a random effects (RE) model. We also report the confidence interval for each overall estimate and its p value to assess statistical significance. The baseline framework is as follows:

$$y_i = \beta X_i + \varepsilon_i$$

where y_i is the outcome, X_i includes the type of intervention, and ε_i is the error term. Extensions of the baseline model include four additional moderator factors: Latin America, Africa, firm size, and a risk of bias indicator (see online Appendix E). The meta-regressions are estimated for final and intermediary outcomes.

6.1.2 Primary outcomes

Table 1 shows the coefficients for the meta-regression. The first row shows the random effects estimates without controlling for any moderator factors. The coefficients are identical to those reported in the forest plot once outliers are excluded. These estimates correspond to the overall mean effect as shown in the forest plots.

Table 1 Meta-regression for primary outcomes (excluding outliers)

	Firm performance	Employment creation	Labor productivity
RE estimate—no controls	0.13***	0.15***	0.11***
p value	0.000	0.001	0.001
N	19	13	
Moderator variables (control variables)			
Constant	0.10**	0.19***	0.14**
p value	0.036	0.01	0.014
LAC fixed effect (1 if LAC; 0 otherwise)	0.057	− 0.06	− 0.03
p value	0.35	0.43	0.48
N	18	13	7
Constant	0.15***	0.15***	Na
p value	0.000	0.002	
Africa fixed effect (1 if Africa; 0 otherwise)	− 0.10	− 0.03	Na
p value	0.18	0.82	
N	18	13	
Constant	0.16***	0.21***	0.13
p value	0.000	0.004	0.11
Firm size (continuous variable)	− 0.001*	− 0.001*	− 0.0003
p value	0.06	0.15	0.70
N	18	13	7
Constant	0.09**	0.074	0.11**
p value	0.047	0.21	0.027
Risk of bias (1 for moderate or high RoB; 0 for low RoB)	0.08	0.11	0.00
p value	0.17	0.12	0.99
N	18	13	7
Constant	0.14***	0.16***	Na
p value	0.000	0.002	
Method (1 if RCTs; 0 if QE)	− 0.07	− 0.08	Na
p value	0.42	0.42	
N	18	13	

***Statistically significant at 1%; **Statistically significant at 5%; *Statistically significant at 10%

We then estimate the meta-regression controlling for each moderator factor in separate regressions, if the samples allows. We report the coefficient for the constant (RE when the dummy variable takes the value of zero) and the coefficient of the moderator variable in all cases.

Given the small sample of studies, these estimates are underpowered. The lack of statistical significance should not mean that these moderator factors are unimportant. The magnitude of the effect size and its sign can be informative but should be interpreted with caution in such a context.

First, the coefficient of the dummy variable for LAC is positive but statistically insignificant. The estimate indicates that business-support services implemented in LAC is associated, on average, with greater effects on firm performance. However, we observe the opposite for the other two outcomes: business-support services implemented in LAC are associated, on average, with lesser effects on employment creation and labor productivity by 0.06 of an SD and 0.03 of an SD respectively. As before, the estimates are not significant in statistical terms. We have insufficient data to explore this issue further, but it could be that business support to SMEs in LAC lead to more capital-intensive technology and therefore are less likely to create jobs.

The estimate for the "Africa" dummy indicates that SME-support programs in Africa are associated with a lesser pooled effect on firm performance but is only marginally associated with a lesser effect on employment creation, though both coefficients are statistically insignificant. The size of firms may play a role in the main findings. As can be seen in the table, the random effects estimate increases in all three cases once we control for firm size, suggesting that larger firms are associated with greater impacts. The relationship might not be linear.[24] Figure F.1 in the online appendix shows the histogram for this variable. The figure highlights that most of the firms assessed in the studies covered in this review have fewer than 100 employees. A high percentage (25%) has no more than 10 employees (first bar). For studies covering African countries, the median size of firms is 93 and the mean is 83. This indicates that there is a greater proportion of small firms studied in Africa, given the left-skewed distribution. Another possible explanation for this pattern could be related to program's implementation. If quality of programs' implementation was worse in African countries, this would reduce the level of the pooled effect. Finally, the pattern is also consistent with the findings of experiments carried out with micro and small firms in LMICs. McKenzie (2017) overview of effectiveness of active labor market policies indicates that interventions similar to the ones covered in this review tend to impact more performance outcomes than employment. If the same applies to our sample of studies, it could be argued that the interventions tested are more likely to affect firms' efficiency than firms' employment growth. That said, it is important to emphasize that this is only suggestive evidence that should be interpreted with care given the small sample of studies and the level of heterogeneity among them.

Once risk of bias is controlled for there are significant reductions in the magnitude of the effects, which indicate that high-risk studies tend to have more positive results for firm performance than studies with low or moderate levels of bias. One could interpret these results as a signal that the most rigorous studies have not found effects of business interventions on firms' performance and employment creation. With few rigorous studies available, any conclusion regarding the effects of such interventions should be interpreted with caution.

Finally, the coefficient of the dummy variable that informs the method used suggests that the RCTs included in this review are less likely to find positive effects on firm performance and employment creation. This might be in part due to the scales of the programs evaluated. Studies using quasi-experimental methods usually rely on administrative datasets with thousands of observations whereas RCTs might test programs in their pilot stages.

Table 2 replicates Table 1 for MG interventions alone. The results for firm performance are qualitatively similar to those presented in Table 1, but present few differences. For instance, the coefficient of the dummy Africa is large and negative in the first column, suggesting that MG programs in Africa are associated with worse firm performance.

MG programs showed positive effects on firm performance and employment creation, but no effect on labor productivity. We interpret these results as an indication that firms targeted by MG interventions were likely facing some constraint to increase output beyond

[24] We tested a quadratic specification for the variable size. The coefficients for the quadratic term are very often negative, suggesting a concave relationship between firm size and firm performance. Because the number of studies is relatively small, the estimates are imprecisely estimated and are available upon request.

Table 2 Meta-regression for primary outcomes. Matching grants (exclude outliers)

	Firm performance	Employment creation	Labor productivity
RE Estimate—no controls	0.15**	0.13*	0.052
p value	0.012	0.083	0.33
N	7	7	5
Moderator variables (control variables)			
Constant	0.11*	0.13	0.14
p value	0.095	0.305	0.244
LAC fixed effect (1 if LAC; 0 otherwise)	0.10	0.005	− 0.11
p value	0.40	0.98	0.38
N	7	7	5
Constant	0.17***	0.17**	Na
p value	0.000	0.029	Na
Africa fixed effect (1 if Africa; 0 otherwise)	− 0.27**	− 0.35	Na
p value	0.03	0.12	Na
N	7	7	Na
Constant	0.17*	0.26*	0.24
p value	0.084	0.082	0.11
Firm size (continuous variable)	− 0.001	− 0.002	−0.004
p value	0.37	0.15	0.11
N	7	7	5
Constant	0.15	0.06	0.068
p value	0.131	0.58	0.501
Risk of bias (1 for moderate and high risk of bias; 0 for low)	− 0.01	0.16	− 0.03
p value	0.94	0.60	0.82
N	7	6	5
Constant	0.16***	0.20**	Na
p value	0.002	0.018	Na
Method (1 if RCTs; 0 if QE)	− 0.23	− 0.29	Na
p value	0.27	0.17	Na
N	7	7	Na

Statistically significant at 1%; **Statistically significant at 5%; *Statistically significant at 10%

the variable costs associated with extra hired labor, but the finding would also be consistent with these firms having a labor-intensive technology.

6.1.3 Study limitations

Most of the studies covered in this review employ quasi-experimental designs that rely on assumptions that may fail at controlling for all sources of confounders. The process of elaboration of this review confirms a point made by Baird et al. (2013) that very few economic papers report the exact information necessary to perform ES calculations. As such, we had to make assumptions. In addition, to synthesize the ES across different studies, we made a considerable simplification in averaging SMD obtained through estimation of different parameters, such as intention to treat (ITT) often reported in RCTs, average treatment on the treated (ATT) reported in DID and PSM, and the local average treatment effect (LATE) reported in RDD and IV. Our review also gathered evidence from 18 countries, four regions—Asia, Africa, Latin America, and Eastern Europe—various contexts, and with differences in program scale, intensity, and period, which considerably complicated study comparability and the drawing of general conclusions.[25]

We tried to account for heterogeneity within and between studies by estimating random effects models and using moderator variables in the meta-regressions. However, the I-squared and tau-squared statistics showed a high degree of variability in the main findings.

Additional limitations of this review are worth noting. We searched for and included evidence published or made available after 2000. However, judging by other systematic reviews conducted in this field and by the publication dates of included studies, it is unlikely that more studies would be included in the review had searches been defined with an earlier starting date.[26] The review covers studies published in English, Spanish, and Portuguese, and while we did not conduct a specific search in French, we searched several databases that include studies written in other languages, and we screened French language studies for inclusion in the review. We did not conduct specific searches in the RePec database; nevertheless, it is worth mentioning that

[25] Studies were conducted in different countries, years, and scales, as some used administrative data and other small-scale RCTs.

[26] See footnote 16.

we did conduct electronic searches in the Econlit database that encompasses all RePec working papers. We only conduct moderator analysis for those regions where we had sufficient observations to undertake appropriate analysis—in other words, Latin America (since the majority of the evaluated interventions were implemented in Latin America) and Africa.

Finally, we used Egger's tests to assess whether the results discussed above reveal indications of publication bias.[27] Table 3 shows the results for the three primary outcomes.

The coefficient of the variable *bias* is positive but only statistically significant at 11% (p value = 0.104) for firm performance indicators. This result indicates weak evidence of publication bias towards studies showing positive effects of business support on SME performance indicators. The evidence of publication bias is stronger for employment creation, as can be seen in the second column of Table 3. The coefficient of the variable bias is positive (7.14) and statistically significant at 9% (p value = 0.084). We found no evidence of publication bias for labor productivity.

Table 3 Egger's test for publication bias

	Firm performance	Employment creation	Labor productivity
Slope	0.055	− 0.20**	0.20**
(s.e.)	(0.03)	(0.08)	(0.07)
p value	*0.109*	*0.028*	*0.027*
Bias	1.82	7.14*	− 3.24
(s.e.)	(1.07)	(3.82)	(1.96)
p value	*0.104*	*0.084*	*0.148*

Standard errors (s.e.) in parenthesis

**Statistically significant at 5%; * Statistically significant at 10%

7 Concluding remarks

This systematic review summarizes the evidence of the impact of SME-support programs that used rigorous evaluation techniques to identify the causal effect of an intervention on SME outcomes.

The meta-analysis found that interventions aimed at spurring SME performance had positive impacts on firm performance indicators as well as employment generation, labor productivity, exports, and investment. The sample size allowed us to look at the effect of matching grants through forest plots and meta-regression. Overall, the evidence shows encouraging results regarding the impact of business support on primary outcomes such as SME performance, employment creation, and labor productivity as well as on secondary outcomes such as exports, innovation, and investment. Particularly, the evidence for matching grants suggests that interventions that remove supply-side constraints have a positive impact on firms' outcomes.

Nevertheless, the analysis shows that region (LAC and Africa), firm size, and quality of studies (risk of bias) play an important role in the overall average effects. Importantly, despite the reasonable number of studies, few papers were classified as having a low risk of bias. Consequently, the results stemming from a large number of studies with high risk of bias should be read carefully.

This review significantly contributes to improving our understanding of the effect of SME-support interventions on different outcomes while clearly setting apart SME interventions from micro-enterprise interventions, which are different in nature. Nevertheless, more work should be done to better understand what type of support works best for SMEs. It is not only the type of SME support that matters, and future evaluations should also address the volume of resources and intensity of each SME support as this is important to improving understandings of the effectiveness of such interventions.

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[27] We used the *metabias* command in Stata.

Appendix 1

Table 4 – Included Studies

Authors	Type of Intervention	Country
Bruhn et al. (2012)	Matching grant	Mexico
Weiss et al. (2011)	Export promotion	Chile
De Giorgi and Rahman (2013)	Tax simplification	Bangladesh
Aivazian and Santor (2008)	Access to credit	Sri Lanka
Arraiz et al. (2013)	Local productive systems	Chile
Lee and Cin (2010)	Innovation	Korea
Mano et al. (2012)	Training	Ghana
Atkin et al. (2014)	Export	Egypt
Rijkers et al. (2010)	Matching grant	Ethiopia
Rand and Torm (2012)	Tax simplification	Vietnam
Fajnzylber et al. (2011)	Tax simplification	Brazil
Lopez-Acevedo and Tan (2005)	Training	Mexico
Duque and Munoz (2010)	Innovation, export, training and LPS (clusters).	Colombia
Tan (2010)	Innovation, LPS (cluster), matching grants	Chile
Jaramillo and Diaz (2011)	Innovation and training	Peru
Lopez-Acevedo and Tinajero (2010)	Matching grants, export, innovation, local productive system, and training.	Mexico
Castillo et al. (2010)	Export	Argentina
McKenzie and Sakho (2007)	Tax simplification	Bolivia
De Negri et al. (2006)	Innovation (R&D)	Brazil
Oh et al. (2009)	Credit	Korea
Sanguinetti (2005)	Innovation (R&D)	Argentina
Cassano et al. (2013)	Access to credit	Bulgaria, Georgia, Russia, and Ukraine
Benavente and Crespi (2003)	Local productive system	Chile
Benavente et al. (2007)	Innovation (matching grant)	Chile
Chudnovsky et al. (2006)	Innovation (matching grant)	Argentina
Bruhn (2011)	Formalization	Mexico
Corseuil and de Moura (2011)	Tax simplification	Brazil
Özçelik and Taymaz (2008)	Innovation (R&D)	Turkey
Karlan et al. (2014)	Matching grant and training	Ghana
Kalume et al. (2013)	Tax simplification	Brazil
Sekkat (2011)	Training	Morocco
Machado et al. (2011)	Access to credit	Brazil
Crespi et al. (2011)	Innovation (matching grants and contingent loans for R&D)	Colombia
Kaplan et al. (2011)	Formalization	Mexico
de Mel et al. (2012)	Formalization	Sri Lanka
Martincus et al. (2012)	Export promotion	Argentina
Martincus and Carballo (2008)	Export promotion	Peru
Martincus and Carballo (2010)	Export promotion	Colombia
Martincus and Carballo (2010)	Export promotion	Chile
Gourdon et al. (2011)	Export promotion (matching grant)	Tunisia

Note: A detailed version of this table is provided in the online appendix that accompanies the paper

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