WORKING PAPER

Export boosting policies and firm behaviour:

Review of empirical evidence around the world

by

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Abstract

How effective are direct government policies for boosting exports? We answer this question with a structured overview of 34 studies covering 26 countries around the world, and in doing so, we provide nine findings. We show export boosting policies are heterogenenous by design and include export promotion policies, public grants for exporters, public export guarantee schemes, subsidised export loans, and randomised foreign market access programmes. Our review provides insights into policy effectiveness with respect to extensive and intensive export margins as well as firms' production function inputs and its outputs. Heterogeneity of effects across firm characteristics is emphasised and the discussion is enriched with new evidence on spillover effects from export boosting policies. Finally, we provide *back-of-the-envelope* calculations of aggregate macroeconomic effects and give recommendations for policymakers. Our findings show export boosting policies are relevant and *proven-to-be-effective* policy instruments.

Keywords:

export promotion policies; guarantees; grants; loans; impact evaluation; review

JEL classification: F13 F14 L15 L25 010 024

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1. Introduction

Countries with a larger manufacturing sector and high-tech manufacturing capabilities are found to be associated with a higher long-term innovation potential (Coad & Vezzani, 2019). For small open economies it is crucial that a large number of firms discover a path to the export market (Broocks & Van Biesebroeck, 2017). With the emergence of international trade laws, regional regulations, and multilateral trade agreements, most governments have shifted from traditional macroeconomic policy interventions to other forms of export assistance (Aalto & Gustafsson, 2020). As with theoretical arguments in international economics and trade, the policy focus has shifted to micro-level too. In particular, the focus of trade policy has moved towards trade facilitation and export promotion (Cadot, Fernandes, Gourdon & Mattoo, 2015). Supporting firms' attempts to internationalise has the potential to strengthen firm competitiveness, make them start exporting and thus lead towards empirically proven exporters' characteristics: being larger firms, more productive, and paying higher wages (Wagner, 2007; Costa, Pappalardo, & Vicarelli, 2017). If exports do lead to an increase in firm performance, what remained unclear for a long period is whether the increase in performance happens through *learning-by-exporting* and consequently an outer change in the production possibility frontier (PPF) takes place or there is just a fluctuation along the PPF. Recent study (Atkin, Khandelwal, & Osman, 2017) shows robust evidence in favour of *learning-by-exporting* and thus an outer change in the PPF. Such a path makes promotion of export a tempting objective for policymakers striving for higher macroeconomic growth (Wagner, 2007; Cruz, Lederman, & Zoratto, 2018).

Consequently, the number of national export promotion agencies (EPAs) and their export promotion programmes (EPPs) have significantly increased over the last 20 years (Cruz et al., 2018; Lederman, Olarreaga, & Payton, 2010). During the 1990s about 65 % of existing EPAs in developing countries were created with the goal of supporting the shift from heavily relying on imports towards exporting (Cruz et al., 2018). Regardless of whether in developing or developed countries, many EPAs are public entities which receive a substantial amount of resources from the goverment, i.e. taxpayers (Van Biesebroeck, Yu, & Chen, 2015), despite existing private firms providing similar substitute services (Cruz et al., 2018). It seems that public funds are necessary for existing EPAs and EPPs to function, so it comes as no surprise that some researchers criticised the efficiency of agencies in developing countries (i.e. Lederman, Olarreaga, & Payton 2010). The efficiency of public money spent on EPP could be of a particular concern when public budgets are tight, and policymakers look to prioritise the most efficient measures.

EPAs assist firms in overcoming circumstantial difficulties and becoming successful exporters (Munch & Schaur, 2018). If there are private providers of the export promotion service, and public entites support exporters, the question is why do governments intervene in the market with EPAs and

which market failure are they trying to solve? Major economic rationales for government support are fostering information spillovers and obviating the barriers to trade such as asymmetries of information (Aalto & Gustafsson, 2020; Copeland, 2008).

Information asymmetry between potential exporter and foreign customers and firms as well as a lack of trust between stakeholders in international business can be solved if the potential exporter undertakes the sunk cost to acquire information needed. If not, a lack of information can lead to underinvestment, which is why EPAs aim to share the risk with potential exporters and decrease the asymmetry of information. In regard to information spillovers, successful exporting of products can lead to information sharing with other exporting and non-exporting firms on the demand condition for different types of products on a foreign market. Copeland (2008) concludes that information spillovers provide theoretical backbone of government export promotion support, but the empirical evidence of spillover effects call for further research. Cadot, Iacovone, Pierola, & Rauch (2013) provide examples of positive spillovers from exporters to neighbouring firms producing similar products. However, if there are no information spillovers, Copeland (2008) questions the need for providing an export promotion scheme

EPPs can be directed towards diverse promotion activities, such as country image building through promotion and advocacy or various bundles of support services (Laderman et al., 2010, p. 257). Export supporting services can include training, technical regulations, quality standards, capacity building, logistics, customs packaging, pricing, as well as marketing services such as advertising, fairs, exhibitions, missions, and follow-up services offered by representatives abroad. (Laderman et al., 2010; Munch & Schaur, 2018; Volpe Martincus & Carballo, 2010a). The variety of supporting services is broad and encompasses partner search and matchmaking (meetings, recruitment, contact databases, and other forms of market entry assistance) (Munch & Schaur, 2018) as well as market research and publications (datasets and information, surveys, publications) (Laderman et al., 2010). Moreover, services can include the analysis of political and economic conditions, international law, and business plans (Munch & Schaur, 2018; Volpe Martincus & Carballo, 2010a). It should be highlighted that while an EPP is the most commonly used policy, it is not the only policy for supporting exports. Some authors (e.g. Broocks & Van Biesebroeck, 2017) include financial subsidies under the umbrella of EPPs, but there are also other policies like subsidised export loans (i.e. export discount credit programme) and public export credit guarantees which we define jointly with EPPs as export boosting policies.

Several aggregate level studies evaluate the effects of EPAs and direct subsidies on exporters. Bernard and Jensen (2004) investigate factors that increase the probability of entry into exporting with a panel of U.S. manufacturing firms. Previous authors found volatile entry and exit rates of manufacturing firms in the export market, with past exporters have higher probability to re-enter exporting, while

current exporters have higher probability of remaining exporters in the following years. Since entry costs are substantial, and spillovers from the export activity of other firms negligible, Bernard and Jensen (2004) conclude that export promotion costs have no significant effect on exporting prospects. Using the bilateral gravity model of trade Rose (2007) positively answers the question "*is the presence of foreign missions systematically linked to a country's exports?*". Namely, with other factors constant, exports increase between six and ten percent for each extra consulate. Furthermore, based on survey data covering 103 developing and developed countries, Lederman et al. (2010) find a statistically significant effect of EPAs and their strategies on exports.

Using a two-country model of trade with heterogeneous firms, Defever and Riaño (2017) provide a quantitative assessment of the effect that subsidies with an export share requirement have on exports, concluding that this kind of subsidy increases exports more than an equivalent unconditional subsidy accessible to each exporter. Recent literature estimates export boosting policies using quasi-experimental methods, contrasting the export performance of treated firms with that of the control group. As the selection to the export boosting policy is not random, several microeconometric methods are being used from which the majority use matching technique, but fixed effects, two-step estimation methods (instrumental variables or Heckman), fuzzy regression discontinuity design (RDD) and randomised control trials (RCT) are also employed. Our study aims to provide a structured literature review of robust microeconometric empirical evidence of export boosting policies on firm behaviour.

Since there is a thin line between any firm-level policy and exports, we made our research focus decision based on where our greatest contribution lies. We therefore do not focus on large research and development (R&D) grants, although international trade theories (e.g. Vernon's & Posner's) emphasise the importance of R&D for innovation and thus firm exports. The effectiveness of R&D grants was meticulously evaluated in reviews by Dimos and Pugh (2016) or Zúñiga-Vicente, Alonso-Borrego, Forcadell and Galán (2014). Furthermore, although most of export boosting policies fall under the umbrella of state aid in the European Union (EU), our review does not focus on other forms of state aid such as public grants without an explicit focus on exports. The effects of public grants on firm performance in the EU was reviewed by Dvouletý, Srhoj and Pantea (2020), whereas it is Kersten, Harms, Liket & Maas (2017) who provide a review of other forms of financing for SMEs in the developing countries. Note that there are recent papers by Aalto and Gustafsson (2020) and Olarreaga, Sperlich and Trachsel (2020) that deal with EPPs in many countries; however, these two papers have a different focus. Aalto and Gustafsson (2020) do not discuss the methods applied in selected studies in any detail, and Olarreaga et al. (2020) focus on EPAs in different countries, not on the effects on the firm level. Furthermore, these papers are not based on a systematic review of papers published in high-quality refereed economics journals.

In sum, our contribution lies in systematically reviewing robust empirical evidence of the effectiveness of direct export boosting policies which have not been analysed in reviews of R&D grants (Dimos & Pugh, 2016; Zúñiga-Vicente et al., 2014) or public non-R&D grants (Dvouletý et al., 2020). In doing so, we encompass a range of direct export boosting policies and provide a structured overview of 34 studies covering 26 countries around the world. Our review provides insights into policy effectiveness with respect to extensive and intensive export margins as well as firms' production function inputs and its outputs. We show the heterogeneity of effects in relation to several firms' characteristics and discuss new evidence on spillover effects of export policies. Going from micro to macro effects we provide a review of *back-of-the-envelope* calculations which shed light on aggregate macroeconomic effects. Finally, we discuss future research agenda and provide recommendations for policymakers.

2. Methodology and Selection of Articles

2.1. Methodology and Code

The main goal of our paper is to provide a systematic overview of microeconometric effects of export boosting policies on firm performance. We focus specifically on export boosting policies and firm performance in order to provide an analysis of a policy in as a homogenous nature as possible. Therefore, we do not focus on the microeconometric impact evaluations of other direct public policy schemes, including large R&D grants and smaller public SME grants. We argue this methodological angle improves the clarity of the paper, but we discuss the interconnection between export boosting policies and other direct public policies. In addition, we focus only on counterfactual impact evaluations in order to provide a systematic overview with the least biased results.

To systematically find articles, we developed a code based on the initial code of Dvouletý et al. (2020, p. 17). Previous authors aimed at conducting a systematic literature review of public SME grants in the EU, thus representing a similar code with focus on a different policy instrument.

Our code has four parts reflecting policy instruments for export boosting, the firm as a unit of observation, the outcome variables of interest and the counterfactual impact evaluation methods. Once the code was developed, we sent a request for feedback on the code to five senior respected scholars in the field of international economics, international trade and/or firm-level public policy evaluations. We received the feedback from the senior scholars in January 2020. The suggestions and comments were used to finalise the search code which can be found in the Appendix.

In order to find relevant articles, we applied the search code in the Web of Science database (Clarivate Analytics 2020) during 15-20 February, 2020. A total of 228 articles met the code criteria and were used in the primary analysis.

2.2. Selection of Articles

In the next step, we downloaded the abstracts for all the 228 articles that met the search criteria. Three authors independently graded each article from 5 (most relevant) down to 1 (least relevant) based on the relevance of the policy instrument, the unit of observation, outcome variables and the method applied. Mean and standard deviations were calculated from the three authors' scores, following which all papers with an average score of less than 3.67 were eliminated, we thus ended up at 55 articles which could be included in our paper's main table. In constructing the structured table we followed the work of Dvouletý et al. (2020) and focused on several key variables: country and its policy programme, sample and the period, policy type and target, dependent variables, methods and key results.

We obtained the full texts of the 55 selected articles and made an in-depth analysis of article relevance for our review. This includes the relevance of policy instrument, the unit of observation, outcome variables and the method applied. The key reasons for the exclusion of an article were *i)* lack of empirical rigour, e.g. studies based on unidentified ordinary least squares, survey data using structural equation modelling[4], *ii)* analyses were carried out on country or regional but not on firm level, and *iii)* policy instrument was not focused on enhancing exports, i.e. we excluded impact evaluations focusing on R&D grants or benefits of clusters. Based on article relevance we selected the 25 studies to be included in the main Table 1.

Upon writing the first manuscript draft, its structure and the table 1 draft, during the period 1-20 October, 2020, we conducted an in-depth analysis of the bibliography list of the core 25 studies in order to identify articles which might not have been selected by our search code. We also searched for studies via Google Scholar search and ResearchGate search to include relevant working papers and articles in press. We went through the content of the journals which published the core 25 studies in order to check whether there are any important studies which we might have missed. Finally, we received comments on our early draft by one of the leading scholars in the field, which also included two suggested studies. In total, we identified nine additional robust studies and therefore made the final list of 34 studies included in the Table 1.

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[4] For example, studies on EPPs with unidentified regressions, surveys or case studies can provide interesting insights (e.g. Miocevic, 2013); however, we exclude such studies as their interpretation is not causal.

Selected articles are published in journals including Quarterly Journal of Economics, European Economic Review, Journal of International Economics, Journal of Development Economics, American Economic Journal: Economic Policy, Review of World Economics, World Economy, Structural Change and Economic Dynamics, Canadian Journal of Economics, Economics Letters, Economics Bulletin, Applied Economics, Economic Policy, and Economia Politica.

3. Review of Empirical Studies

Research design: Most of the empirical studies can be classified as observational studies that use data from customs, surveys of official statistics or export promotion agencies to draw conclusions on the effects of export boosting policies by comparing the performance of firms that benefit from an export boosting policy measure (the treatment group of firms) with firms that do not take part in an export boosting programme (the control group of firms). Rare exceptions are studies that use an experimental approach. Here some firms are randomly selected to receive an export promotion measure and others are randomly allocated to the control group of non-treated firms (Atkin et al., 2017; Breinlich, Donaldson, Nolen, & Wright, 2017).

Methods: The observational studies have to deal with a problem that is familiar from the evaluation of any type of policy measures. A simple comparison of the average performance of firms with and without export promotion (treated vs. non-treated firms) cannot reveal any causal effect of export boosting policy because firms from the two groups may differ in several (observable and unobservable) characteristics that are relevant for performance. While a random allocation of firms to the two groups can deal with this problem, observational studies that compare firms from the two groups after this allocation has been done non-randomly (by a self-selection of the firms into the treatment group or by a selection performed by an agency based on criteria not completely known to the researcher) have to control for these pre-treatment differences of the treated and non-treated firms. Most of the studies reviewed here do so by applying variants of a matching approach, often combined with difference-in-differences (DiD). Some studies apply IV-methods (2SLS), fixed-effects regressions, fuzzy RDD or RCT[5].

The heterogeneity of research design applied, the methods used, and the data investigated makes it impossible to perform a formal meta-analysis of the quantitative estimates provided in the studies, which is why we have to conduct a more qualitative summary and review of the results.

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[5] We do not delve into issues related to each method (for more details on counterfactual methods see Angrist and Pischke (2008)).

Table 1. The review of papers focusing on impact evaluation of export promotion

Authors	Country of Analysis, Programme	Period, Sample	Policy Type & Target	Outcome Variables	Empirical Approach	Findings
Volpe Martincus, Carballo, and Garcia (2012)	Argentina; Trade supporting activities by Fundacion ExportAR	2002-2006, (almost) whole population of Argentine exporters (in 2006, 12649 firms with 526 assisted by ExportAR)	Export promotion policy	Firms' export performance along various margins	Matching DiD	Significant effects of support from ExportAR have resulted in increased exports of small- and medium-sized companies, and this has mostly occurred through the growth of the set of destination countries.
Van Biesebroeck, Konings, and Volpe Martincus (2016)	Belgium and Peru; Restoring the pre-crisis export level	2006-2011, 50,581 firms and 144,045 firm-year observations (Belgium); 22,747 and 49,197 (Peru)	Export promotion policy Flanders Investment and Trade (FIT) covers firms in Flanders and Peru's national public export promotion organisation (PROMPERU). Support activities provide: local market information, subsidies for foreign market prospecting, resolving specific transaction problems, or facilitating participation in industry events.	Export status, firm-level export, log(exports +1), firm-destination exports, binary support indicator	Propensity score matching (PSM), OLS regression, inverse probability weighting with regression adjustment	The firms that received export promotion support during the crisis performed better. They more likely remained active on export markets and exported higher volumes in contrast to control firms. The effects were strong for exports outside the EU for Belgium, while most exports for Peru left the region. The cost-benefit calculation indicated that export promotion is covering its own costs but the net gain in government revenue remains modest.

Broocks and Van Biesebroeck (2017)	Belgium; Flanders Investment & Trade (FIT)	2006-2010, 1788 treated firms, universe of control firms.	Export promotion policy All Flemish firms. FIT provided four different promotion instruments: 1. question, 2. action, 3. subsidy, and 4. communication.	Dummy firm enters the export market (outside EU), number of employees, log employment, percentage change in employment, log exports	Matching (PSM)	A positive effect of EPP on the probability of extra-EU export market entry. The effects are substantial for subsidy as a form of EPP. The evidence for a weak positive effect on employment growth, firm survival, and low spillover effects (e.g. demonstration effect or passing on the information) to other firms in the same 4-digit sector has been found. Finally, a *back-of-the-envelope* calculation shows each Euro in subsidies generates on average 16 to 29 Euros in additional export revenue during the next two years.
Cruz (2014)	Brasil; Assistance by Brazilian Trade and Investment Promotion Agency (Apex-Brasil)	2005-2010, manufacturing sector in Brazil (approx. 300000 firms)	Export promotion policy All firms. Services provided by Apex-Brasil are related to matching domestic sellers and foreign buyers and providing information on foreign markets, including export regulations and market prospects in partnership with industry associations.	Export status (t), export status (t+1), export dummy (t), export dummy (t+1)	PSM, Linear Probability Model (LPM) using panel fixed effects, DiD	Assistance by Apex has a positive effect on promoting new exporters resulting in 1.3 times more probability of average non-exporting treated firms to become a new exporter one year after the treatment. The average effect of the programme on treated firms is positive in the year of treatment. The impact is positive and statistically significant for micro, small, and medium, but not for large firms. Spillover effect exists on untreated firms that are in the same region and sector of Apex's treated exporting firms.
Van Biesebroeck, Yu, and Chen (2015)	Canada; Canadian Trade Commissioner Service (TCS)	1999-2006, all active exporting firms at some point in the analysed period	Export promotion policy Active exporters. Six groups of services: information on market prospects, key contacts search, local company information, visits information, face-to-	Total exports, total number of products exported, total number of export destinations served, and the average value of exports across all destination-product markets a firm	DiD with firm-fixed effects; Matching (nearest neighbor, kernel, and radius); GMM	Statistically significant effect of EPP on export within product-destination already served by firms, but no effect was found for expanding the number of products or the number of markets they serve. The effect on total exports comes exclusively from the intensive margin. Heterogenous effects suggest effects tend to be higher for first-time clients than from subsequent help. EPP takes a few years to kick in. In the case of EPP in form of local-specific assistance,

			face briefings and trouble shooting.	serves		the effects are more pronounced for larger, older firms and firms exporting to many markets, but less effective for experienced exporters which export many products.
Álvarez Espinoza and Crespi (2000)	Chile; Promoting exports and improving the insertion of the exporting firms into international markets	1992-1996, 187 treated and 178 control firms	Export promotion policy All firms. National Agency for Export Promotion (PROCHILE) assists through three programme areas: Economic Positioning Campaign, Export Promotion Programme, and Commercial Information System.	Technological innovation, export performance, change in markets, change in exported products, change in product diversification, and change in market diversification	Logit model, Tobit model	A positive impact of promotion instruments on firm technological innovation has been found. The results indicate positive actions in improving the competitiveness of firms in external markets. Promotion instruments increase the number of firm export markets and, after a period of four years, they generate more exports and a higher diversification by markets and products. Participation in export committees generates a higher positive impact than participation at fairs or the utilisation of the commercial information system.
Volpe Martincus and Carballo (2010a)	Chile, Assistance by PROCHILE export promotion agency	2002-2006, population of Chilean exporters (in 2006, 6879 firms with 1796 assisted by PROCHILE)	Export promotion policy Supporting small- and medium-sized firms in their internationalisation process.	Total sales and highly disaggregated export data by product and destination country	Semiparametric quantile treatment effect estimation using first differences	The results indicate heterogeneous effects over the distribution of export performance, along with both the extensive and intensive margins. Smaller firms as measured by their total export sales seem to benefit more from export promotion actions.
Volpe Martincus and Carballo (2010c)	Colombia; Export promotion activities	2003-2006, 10,484 treated firms	Export promotion policy PROEXPORT assists more than 2,500 firms per year. Services include information and market intelligence, development of export plans, organisation of trade missions	Growth of exports, growth of the number of countries, and growth of the number of products.	Matching DiD	Bundled services combining counselling, trade agenda, and trade missions and fairs are more effective than isolated assistance actions, e.g. trade missions and fairs alone. Bundled services can be thought of as providing exporters with an integral accompaniment throughout the process of starting export businesses and building up buyer-seller relationships with foreign partners.

			both for domestic sellers and foreign buyers and coordination of interviews with potential customers.			
Munch and Schaur (2018)	Denmark, export promotion services provided by Danish Trade Council	2002-2012, Universe of Danish firms, 7658 treated and control firms.	Export promotion policy	Export activities, sales, value added, employment, value added per worker	DiD PSM	Export promotion facilitates entry into export markets and the continuation of export activity across all types of firms. The effects are the largest for small firms. Export promotion increases sales, value added, employment, and value added per worker. For small firms, summing expenditures on export promotion, subsidies, and tax distortions, the gain in value added is roughly three times higher than the direct costs of export promotion.
Karoubi, Lecerf and Bertrand (2018)	France; Enhancing the exports of SMEs	2004-2009, 259 SMEs	Export promotion policy SMEs (5-249 employees), a consequent set of measures, i.e. four EPPs (Financial support, Competencies development, Network, Innovation) to remove export barriers by lowering the variable or fixed costs of international developments.	Export intensity, the probability of turning to exports	Matching (PSM)	EPPs increases firm export intensity by 16.27 % and its probability of turning to exports by roughly 25 %. The impact of public support holds for the sector of services but disappears for industrial firms. The impact of EPPs is significant for profitable enterprises but not for loss-making enterprises. The impact of EPPs is significant for enterprises that are exposed to positive externalities, but not for other SMEs. The efficiency of EPPs depends on the nature of the support, i.e. only financial and innovation EPPs have a significant impact on the increase of intensity (by about 13 % each). The only type of EPP that significantly increases the probability of switching to export is Network EPP with a roughly 25 % increase.
Comi and Resmini (2019)	Italy (Lombardia); Three types of vouchers (A, B and C)	2010-2014 period, 1260 treated firms, 6295 control firms; about	EPP Funds for activities: A - Providing technical assistance and counselling.	Export propensity and export intensity.	Fixed-effect DiD estimator with ex-ante matching	A positive effect of EPPs on export propensity and export intensity has been found. The effects are larger for services classified as "promotional" (e.g. participation at international trade fairs and exhibitions) than for "technical assistance and

		30,000 firm/year observations	B - Organising outgoing economic missions abroad. C - Encouraging participation at international fairs and exhibitions held abroad.			counselling" activities or "information and knowledge specific provision" services (e.g. participation in economic mission abroad). The joint use of multiple services is more effective in promoting exports than individual ones. The impact of trade fairs on export intensity is increased when accompanied by technical assistance and specialised counselling. Heterogenous effects show larger effects for firms with export experience, as well as for micro and small-sized firms. Other, non--promotional support activities are able to increase only the export propensity of non-exporting firms.
Volpe Martincus and Carballo (2008)	Peru; PROMPEX export promotion activities	2001-2005, all exporting firms (in 2005, 6027 firms with 709 assisted by PROMPEX)	EPP	Export performance of firms by intensive and extensive margins	DiD, Matching (nearest neighbor, radius, and kernel estimators), System GMM	The research has shown export promotion activities associated with increased exports, primarily along the extensive margin, both in terms of markets and products. The results are robust across alternative specifications and estimation methods.
Cansino, Lopez-Melendo, Pablo-Romero, and Sánchez-Braza (2013)	Spain; Promoting internationalisation of companies	2008, 77 treated and 86 control firms	EPP Diagnostic programmes (DP) promote the internationalisation of SMEs in Andalusia during their preliminary or initial stages of the internationalisation process.	Activity, location, sales and number of employees	Matching (PSM)	Companies participating in the DP have a higher exports/sales ratio than companies that have not been involved in the DP (on average 10 %). The results are significant for the four bandwidths used. On average, the DP seems to have significant positive effects on exports for small- and medium-sized companies which have never exported or that have a minimal experience of exporting.
Cadot, Fernandes, Gourdon, and Mattoo (2015)	Tunisia, FAMEX export promotion programme	2005-2009, 392 FAXEX beneficiaries, 2319 control firms	EPP Firms above a minimum size (measured by turnover) and minimum age of two years	Short run and longer term impact on export levels and export diversification across destination and products	Propensity score weighted regression, weights obtained from probit regression for	Positive short-run effects on intensive and extensive export margins, but no effects after three years have been found. The results indicate heterogeneous effects on size classes with a positive impact on export levels for medium-sized firms only.

					selection into FAMEX programme including fixed effects	
Breinlich, Donaldson, Nolen and Wright (2017)	United Kingdom; Export promotion information	July 2013-February 2014, 1000 UK manufacturing firms	EPP SMEs in the UK. A brochure was provided by the UK Trade and Investment. The brochure included information on benefits from exporting reported by other UK firms, and case studies describing the successful export experience of firms.	Perceived benefits of exporting, perceived export barriers and export status, export value, number of destination served, and number of products exported	RCT	The authors find providing information on exports has an asymmetrical effect on perceived exporting benefits, perceived export barriers, and actual export behaviour. The effect is negative on non-exporters' perceived exporting benefits and perceived exporting barriers with somewhat negative effects on exporting behaviour. On the other hand, the effects are positive for firms already exporting before the treatment.
Cassey and Cohen (2017)	United States; Export promotion	2004-2011, 72 unique firms reporting 220 cases of assistance	EPP All Washington State firms. Export assistance programme (EAP) is designed to directly address the needs of SMEs to access foreign markets by offering free services: (1) connecting interested firms with appropriate resources and (2) direct assistance in an export transaction.	Log of employment	PSM DiD	The results display that firm participation in an export assistance programme increases firm-level employment fleetingly, but not in subsequent periods, i.e. the employment effects of the policy are short-lived and disappear after at most two quarters. There is no statistically significant impact of programme participation on long-term employment.
Volpe Martincus and	Uruguay; Export promotion	2000-2007; 13904 firms	EPP Uruguay's Institute	Probability of entering a new	Matching DiD (for continuous	The authors find positive effect of export promotion activities on firms' new export

Carballo (2010)		from which 258 treated	for Promotion of Investments and Exports of Goods and Services (URUGUAY XXI). Activities related to trade promotion assistance.	country market; probability of entering a new OECD country market; probability of entering a new product market; Probability of entering a new differentiated product market; total exports; number of countries; products	outcomes) Discrete choice model with unobserved heterogeneity (for binary outcomes);	destination markets, especially within the Latin American and Caribbean regions as well as the introduction of the new differentiated products. There is no evidence of a positive effect on exporting to the more advanced OECD countries or on exporting new products in general.
Kim, Todo, Shimamoto and Matous (2018)	Vietnam; export seminars	2014-2016; 250 firms	EPP 1-day seminars on export promotion for SMEs in traditional industrial clusters in the apparel and textile industry.	Dummy for participation; index for preparation for exporting activity; Dummy for accessing e-customs website; Dummy for willingness to export	Two-stage least squares (IV)	The results show information provision did not encourage unproductive firms to engage in exporting activity. Large firms were more likely to start exporting directly to foreign buyers shortly after the seminars; however, these effects disappear two years after the seminar. The authors find positive spillover effects of the seminar on non-participants through information exchange networks of firms within each industrial cluster in the village.
Schminke and Van Biesebroeck (2013)	Belgium (Flanders and Brussels), export promotion policy by Flanders Investment & Trade (F.I.T.).	2006 2010, F.I.T data (detailed for type of assistance) and balance sheet data for all active firms. Sample has about 260,000 firms.	EPP Various types (action, communication, subsidy, question). Open for all firms.	Participation in exports (by region); total export value; number of export destinations, number of products exported, growth in export variables	Fixed effects regression; Probit and Linear Probability Model with fixed effects	Export promotion increases export propensity and is more effective in reaching destinations outside the EU. Experienced exporters benefit threefold: on the product and destination extensive margin, and on the intensive margin.
Rincón, Riley and Rosso	United Kingdom, UK Trade and	2005 2010, UKTI client	EPP Thirty-two different	Growth in turnover, employment,	DiD PSM	UKTI support had a positive impact on turnover growth and a more modest impact on labour

(2015)	Investment (UKTI) services	data base matched with firm-level data from other sources	UKTI service categories.	productivity and overseas turnover; probability of reporting overseas turnover, probability of survival		productivity, but none on employment expansion. Support is positively linked with firm survival and improvement in the total value of exports of a firm, the value of turnover of its subsidiaries abroad or a combination of the two.
Mion and Muuls (2015)	United Kingdom, UL Trade and Investment (UKTI) services	2008 2012, UKTI client data base matched with firm level data from other sources	EPP Services provided by UKTI.	Growth of firms' goods exports	PSM; Heckman selection model	Strong evidence that the use of UKTI services positively affects firms' goods export performance along the intensive and extensive margins as well as across different markets and groups of firms. The fmpact of UKTI support spans on both, new exporters and current exporters.
Hiller (2012)	Denmark, Danish Export Association (DEA) membership (private organisation)	1995 2007, firm-level data (machinery sector)	EPP Promotion of trade between Danish and foreign firms.	Export sales, coverage of foreign markets, number of traded products	Matching (PSM)	Positive causal effect of membership in private export association on growth of exports and average value per product in the first year after entry, and on growth rate of country coverage two years after entry.
Atkin, Khandelwal, and Osman, (2017)	Egypt; randomised experiment	2011-2014, Egypt, 303 firms	Foreign demand shock (arranging a foreign business opportunity) Rug producers with less than 5 employees. Initial opportunity to fill the orders by producing 110 m2 of rugs (approx. 11 weeks of work).	Profits, quality, productivity, technical efficiency.	RCT	A positive effect on profits and quality, as well as a negative effect on output per hour have been found. The authors argue for *learning-by-exporting* whereby exporting improves technical efficiency. This is argued with documented positive effects on quality and productivity, in addition to showing, when asked to produce an identical domestic rug, treatment firms produce higher-quality rugs and do not take long to do so. This evidence is accompanied by improvements in learning curves and documented knowledge flowing between foreign buyers, the intermediary, and the producers and no evidence that firms make monetary or time investments in upgrading, or pay, even implicitly, for the knowledge they receive.
Badinger and Url (2013)	Austria, Public export credit guarantees	2008, 71 firms 63 % used export credit	Public export credit guarantees Alleviate trade	Firms' exports	Two-stage least squares (IV)	A substantial, economically and statistically significant effect of export credit guarantees on exports, ranging from 80 to 100 percent.

			guarantees	frictions arising from difficulties in financing exports.		
Agarwal, Lodefalk, Tang, Tano, and Wang (2018)	Sweden, Public export credit guarantees	2000-2015, 1032 treated firms	Public export credit guarantees	Export status, export value, value added, employment, value added per employee	Matching DiD, Fuzzy RDD	No effect on employment, value added and value added per employee, but positive effects on export status and export value. Authors find effects to be strongest for firms of smaller size. Effects are also pronounced for first time users and in service sectors.
Girma, Görg, and Stepanok (2020)	China; Production subsidies	2004-2006, firms with more than $800,000 annual turnover in Chinese manufacturing industry; 36495 treated and 130201 control firms.	Public grants for exporting	Dummy: for firms' export status, for firms' involvement in exports processing, for exporting final products, total exports divided by sales, export processing divided by sales, final products exported divided by sales	Generalised PSM	The direct effect of subsidies on the probability to export to be always positive was found. The effect is increasing for firms in clusters with low levels but diminishes for high levels of subsidisation. Spillover effects show subsidising firms had a negative impact on the export propensity of non-subsidised firms. This effect becomes stronger with a higher proportion of subsidised firms in a cluster. For a very large share of subsidised firms, the effect decreases but remains negative.
Helmers and Trofimenko (2015)	Colombia, Export subsidies	1981-1991, 1423 manufacturing firms with ten or more workers	Public grants for exporting Supporting exporters and domestic firms producing intermediate goods for exporters. A subsidy rate of 2-20 % per peso of the export sales value.	Total export value	Heckman model; ANOVA; Autoregressive Distributed Lag (ADL); GMM	The results indicate a positive effect of subsidies on export (intensive margin). The effect is diminishing with the amount of subsidy and the degree of a firm's connectedness to the government.
Srhoj and Walde (2020)	Croatia; Strengthening international competitiveness	2009-2012, 361 treated and 2911 control firms	Public grants for exporting Firms of all size. The programme provides grant schemes to firms exclusively for	Firm-level growth in: exports, sales, value added, profits, employees, capital stock, intermediate inputs, TFP, and LP	Matching DiD	The export grant scheme induces additionality on firm performance but with no effects on employment and mixed findings for TFP. Technology-oriented grants have consistent and more significant effects compared to commercialisation activities (e.g. subsidising

			export-oriented commercialisation or technology development activities.			consulting for markets abroad, trade fairs). The cost-benefit analysis shows value-added created by the export grant scheme is 39.5 % higher than the grant scheme cost.
Girma, Görg, and Wagner (2009)	Germany, Production-related subsidies	1999-2002, sample size varies from 16 (treated/control) firms to 89 firms	Public grants for exporting	Export start, share of exports in total sales	Matching (PSM)	The research has shown exports and subsidies are positively related. No impact of subsidies on the probability to start exporting. Weak evidence for the impact of subsidies on the share of exports in total sales in West Germany, and no effect in East Germany.
Görg, Henry, and Strobl (2008)	Ireland; Increasing exporting activity	1986-2002, 5,002 treated and 5,533 control firms	Public grants for exporting Supporting all firms that were export oriented, entrepreneurial, technology intensive, skill intensive, linked to the local economy, and likely to be financially constrained.	Log of total exports and incidence of exporting	Matching DiD	Grants can encourage already exporting firms to compete more effectively on the international market. While all sizes of grants may have a positive effect on firms' incidence of exporting, the larger the grant the more likely a firm will export. However, there is no statistically significant evidence that grants encourage firms to become exporters.
Defever, Reyes, Riaño, and Varela (2020b)	Nepal, Cash Incentive Scheme for Exports (CISE) - an ad-valorem subsidy of 1 or 2 % of the value of select product exports.	Firms exporting selected: 24 industrial and 7 agricultural products; 2011-2014; about 1,300 firms per year. Usually large firms.	Public grants for exporting An ad-valorem cash subsidy offered to firms by the government of Nepal with the objective of increasing exports and fostering export diversification to countries other than India.	Total exports, extensive margin – number of export products, destinations, and product-destinations, intensive margin – average sales per product, destination, and product-destination	OLS, PSM, Mahalanobis matching, Inverse probability,	CISE did not have a robust positive effect on total exports. On the other hand, the effect was robust for encouraging firms to export CISE products to new markets. The effects are particularly pronounced for improving the performance of textiles and clothing exporters. The cost-benefit analysis on the costs' side gives about 3.2 million US dollars; however, the benefit side is lacking since the effect on exports is not robust, which leaves open the question on cost-effectiveness and thus policy success.
Chavez, Novelli and Leon (2020)	Peru, A large $ 300 million per year, subsidy programme	Exporters; 2008-2011 12,720 observations	Public grants for exporting A 5-8 % subsidy of the FOB value of	Intensive margin: total exports, extensive margin: export status	OLS; IPW, NN PSM with four neighbours mixed with	Treated firms experienced a lower decline in exports, in other words a 22 p.p. higher export growth rate and a lower export exit probability, that is reduced exit probability by 0.09 p.p. in the

					DiD	crisis (2009-2010). Importantly, subsidy rose from 5 % in 2008 to 8 % in 2009, and then fell back to its initial level in 2011.
	designed like a drawback system intended to refund import tariffs to exporting firms.		exports.			
Akgündüz, Kal, and Torun (2018)	Turkey; Subsidised export loan	2009-2014, 369 treated and 316 control firms	Subsidised export loan Turkey's (Central Bank of the Republic of Turkey (CBRT)) export rediscount credit programme provides credit to exporting firms. Export rediscount credit is a pre and postshipment export financing facility for both goods/services exports with maturities up to 360 days.	Exports, sales, domestic sales, operating profits, employees	PSM- DiD	The results indicate receiving firms exhibit higher exports and sales (65, 19 %). There is no similar increase in profits and domestic sales. Treatment group firms appear to become larger after receiving rediscount credits compared to the matched control firms as their number of employees rises. The firms that entered the programme in 2012 are quite different from the average exporting firm. Already exporting firms may be more likely to benefit from the programme. Also, the credit may have been particularly effective during the postcrisis period if firms had difficulties in financing.
Defever, Riano, and Varela (2020a)	Pakistan, The Export Finance Scheme (EFS) and the Long-Term Finance Facility for Plant & Machinery (LTFF)	Exporters; 2015-2017; about 14,500 firms per year	Subsidised export loan 1. EFS short-term loan for working capital 2. LTFF long-term loan for machinery purchase	Total exports, number of export products and number of destinations	OLS, PSM, Mahalanobis matching, Inverse probability	Both policies had a positive effect on total exports (7 and 8-11 p.p.). Neither policy had a positive effect on firms' number of export product and the number of export destinations. Cost benefit analysis of the two instruments gives the conclusion that subsidising long-term investment in physical capital is a more cost-effective way to boost exports in comparison to subsidising exporters' working capital needs.

Note: Table 1 is sorted in the alphabetical order of the policy instrument type. Table 1 starts with 23 export promotion policy studies, one foreign demand shock (arranging a foreign business opportunity) study, two public export credit guarantees studies, seven public grants for exporting studies and one subsidised export loan study.

4. Effectiveness of Policies

4.1. Heterogenous policy design

As can be observed in the Table 1, there could be an underlying heterogeneity of effects because export boosting policies are not homogeneous. We start with an in-depth analysis by dividing policies into the demand-side and supply-side export boosting policies. This division is followed by a subdivision of supply-side types and a review of supply-side policy bundle.

The only article on the demand side, which is also the most rigorously conducted research paper, is Atkin et al. (2017) who evaluate the effect of a demand shock on firm performance. They investigate *learning-by-exporting* hypothesis[6], i.e. they randomly allocate the opportunities to fill the orders by producing 110 m^2 of rugs which is approximately 11 weeks of work. The authors find that foreign demand shock leads to an improvement in technical efficiency, as well as to a positive effect on the product quality, productivity and profits. While Atkin et al. (2017) is the only demand-side study in this literature, there are other studies investigating the effects of other demand shocks on firm performance. For example, Gugler, Weichselbaumer and Zulehner (2020) evaluate the impact of public procurement contracts on firm employment in Austria and find a positive effect on employment. Similarly, in a catching-up context of eight Central and Eastern European countries, Stojčić, Srhoj and Coad (2020) find a positive association between public procurement for innovative products and firms' revenue from innovation, thus opening up debates with respect to the usage of public procurement contracts as a catalyst of capability building. The key distinction between Atkin et al. (2017) and the other two studies is whether the demand shock stems from an international (e.g. foreign firms) or a governmental (domestic) source. Initial cross-country evidence provided by Hoekman and Sanfilippo (2020) in 19 low-income sub-Saharan African countries shows a greater foreign participation in public procurement is positively associated with a higher firm performance.

There is only one demand-side policy study, but there are 33 supply-side studies, which aim to stimulate the supply of firms' products. In order to delve deeper into the supply-side policies we subdivide them into five types (Table 2). All five types exhibit a positive effect on firm behaviour. Eight articles find positive effects of *Information provided by public export promotion agency on foreign market prospects and key contact search* on firm behaviour (Álvarez Espinoza & Crespi, 2000; Breinlich et al., 2017; Broocks & Van Biesebroeck, 2017; Cruz, 2014; Kim et al., 2018; Munch & Schaur, 2018; Schminke & Van Biesebroeck, 2013; Van Biesebroeck et al., 2015) with two articles

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[6] This is the only demand-side study in exporting; however, other studies investigate the effects of demand shocks on firm performance, for example, by evaluating the impact of public procurement contracts (e.g. Gugler, Weichselbaumer & Zulehner, 2020). The key distinction between these studies is whether the demand shock stems from a governmental or an international (e.g. foreign firm) source.

finding positive effects on firm behaviour of activities described in more detail: i) *Partner search and matchmaking* and ii) *Intelligence and analysis* (Broocks & Van Biesebroeck, 2017; Munch & Schaur, 2018).

Table 2. Heterogeneity of export boosting policy design

Export policy type	Article
A. Demand side	
Policy directly increasing the firms' export product demand	
1. Randomised foreign market access programme	Atkin et al. (2017)
B. Supply side	
Policy indirectly increasing firms' product export demand by loosening the firms' informational asymmetries or capital constraints	
1. Information provided by a public export promotion agency on foreign market prospects and key contact search	e.g. Álvarez Espinoza & Crespi (2000); Breinlich et al. (2017); Broocks & Van Biesebroeck (2017); Cruz (2014); Kim et al. (2018); Munch & Schaur (2018); Schminke & Van Biesebroeck, 2013; Van Biesebroeck et al. (2015)
1.1. Partner search and matchmaking	Broocks & Van Biesebroeck (2017); Munch & Schaur (2018)
1.2. Intelligence and analysis	Broocks & Van Biesebroeck (2017); Munch & Schaur (2018)
2. Grants, subsidies and vouchers for commercialisation activities	Broocks & Van Biesebroeck (2017); Comi & Resmini (2019); Hiller (2012); Schminke & Van Biesebroeck, 2013; Srhoj & Walde (2020)
2.1. Vouchers for encouraging firm's participation at international fairs and exhibitions abroad	Comi & Resmini (2019)
2.2. Vouchers for outgoing economic missions abroad	Comi & Resmini (2019)
2.3. Vouchers for external counseling	Comi & Resmini (2019)
3. Grants and subsidies for export production activities	Girma et al., (2020, 2009); Görg, Henry & Strobl (2008); Helmers & Trofimenko (2010); Srhoj & Walde (2020); Defever et al. (2020a); Chavez et al. (2020)
4. Subsidised export loans (i.e. export discount credit programme; subsidising long-term investment in physical equipment, short-term working capital)	Akgündüz et al. (2018); Defever et al. (2020a)
5. Public export credit guarantees	Badinger & Url (2013); Agarwal et al. (2018)
C. Supply side bundle	
A combination of supply-side policies with the aim to indirectly increase firms' product export demand by loosening the firms' informational asymmetries or capital constraints	
1. Trade agenda *AND* counselling	
2. Trade agenda *AND* trade missions	Volpe Martincus & Carballo (2010c)
3. Counselling *AND* trade missions	
4. Trade agenda *AND* counselling *AND* trade	

missions *AND* fairs	
5. Subsidy for commercialisation activities *AND* requests for information that involve research by public public export promotion agency employees	Broocks & Van Biesebroeck (2017)
6. Events organised by export promotion agency such as support to participate at a trade fair abroad, organise prospection tours, or domestic seminars *AND* requests for information that involve research by public public export promotion agency employees	Broocks & Van Biesebroeck (2017)
7. Vouchers for: counselling *AND* outgoing missions *AND* trade fairs	Comi & Resmini (2019)
8. Matching grants for: market prospection *AND* promotion *AND* product development *AND* firm development *AND* foreign subsidiary creation	Cadot et al. (2015)

Note: The studies are grouped by institutional setting and policy information provided in the articles. Some articles were ambiguous in the policy description, in these cases we restrained from grouping a particular study. When possible, we made policy subdivision. The *Supply side bundle* list provides a non-exhaustive list with bundles of programmes which were shown to work better than a single programme. For more details on bundles, readers are directed to the four referenced studies.

Five articles (Broocks & Van Biesebroeck, 2017; Comi & Resmini, 2019; Hiller (2012); Schminke & Van Biesebroeck, 2013; Srhoj & Walde, 2020) find positive effects of *Grants, subsidies and vouchers for commercialisation activities* on firm behaviour. Comi and Resmini (2019) are able to estimate the effects of vouchers for encouraging firm's participation at international fairs and exhibitions abroad, for outgoing economic missions abroad, and for external counseling, finding positive effects of each of the supported activities. It should be noted that the policy evaluated by Comi and Resmini (2019) is an EPP; however, the stark difference to other EPPs (in the point 1 of the Table 2) is that the end provider of service to the potential exporter is a private firm or an individual expert, while the end service in other EPPs (in the point 1 of the Table 2) are provided by public officials. Six articles (Chavez et al., 2020; Girma et al., 2020, 2009; Görg et al., 2008; Helmers & Trofimenko, 2010; Srhoj & Walde, 2020) find positive effects of *Grants and subsidies for export production activities* on firm behaviour. Two articles find positive effect of *Subsidised export loans* (i.e. export discount credit programme) (Akgündüz et al., 2018; Defever et al., 2020a) on firm behaviour and two articles find a positive effect (Badinger & Url, 2013; Agarwal et al., 2018) of *Public export credit guarantees on firm behaviour*. Reported microeconometric effects of public export credit guarantees on firm behaviour can be supplemented with a country-level study using the gravity model (Moser, Nestmann & Wedow, 2008) which finds credit export guarantees to be particularly relevant for opening up difficult markets with a higher political risk. Three articles (Broocks & Van Biesebroeck, 2017; Comi & Resmini, 2019; Volpe Martincus & Carballo, 2010) show evidence for the combination of export promotion activities

working better in comparison to benefitting from a single activity; however, this evidence so far only focuses on export promotion policies. Comi and Resmini (2019) show a combination of vouchers for counselling, outgoing missions and trade fairs works better than a single export promotion activity. In a similar vein, Broocks and Van Biesebroeck (2017) show a combination of public grants with research information provided by public EPA, or a combination of participating on events organised by EPAs and research information provided by a public EPA has a stronger positive effect than a single intervention. Finally, Volpe Martincus and Carballo (2010c) give evidence showing bundled services combining counselling, trade agenda, and trade missions and fairs have the highest positive effect.

In sum, although export boosting policies are heterogenous, there is evidence for positive effectiveness of both the demand- and supply-side policies, with additional evidence in support of the *"bundle works better"* argument of supply-side policies. While we acknowledge the heterogeneity of policy design, given positive effects across different policy designs, we continue our structured overview without the division of policy effects across policy types (as in the Table 2).

4.2. Policy effects

We continue with an overview of studies based on the World Bank's World Development report country grouping (2014; p. 295). No studies are found in the lower-income countries and only four studies (Atkin et al., 2017; Defever et al., 2020a; Defever et al. 2020b; Kim et al., 2018) in the lower-middle-income countries (Egypt, Nepal, Pakistan, and Vietnam). Nine studies (Akgündüz et al., 2018; Cadot et al., 2015; Cruz, 2014; Girma et al., 2020; Helmers & Trofimenko, 2015; Van Biesebroeck, Konings, & Martincus, 2016; Volpe Martincus & Carballo, 2008, 2010c; Volpe Martincus et al., 2012) evaluate effects in seven upper-middle-income countries (Argentina, Brasil, Colombia, Peru, Tunisia, Turkey, and China) while 21 studies (Álvarez Espinoza & Crespi, 2000; Badinger & Url, 2013; Breinlich et al., 2017; Broocks & Van Biesebroeck, 2017; Cansino et al., 2013; Cassey & Cohen, 2017; Comi & Resmini, 2019; Girma et al., 2009; Görg et al., 2008; Hiller, 2012; Karoubi, Lecerf and Bertrand, 2018; Martincus & Carballo, 2010; Mion & Muuls, 2015; Munch & Schaur, 2018; Rincón et al., 2015; Schminke & Van Biesebroeck, 2013; Srhoj & Walde, 2020; Van Biesebroeck et al., 2016; Van Biesebroeck et al., 2015; Volpe Martincus & Carballo, 2010a) evaluate effects in 15 high-income countries (Austria, Belgium, Denmark, Croatia, France, Germany, Ireland, Italy, Spain, Sweden, United Kingdom, Canada, United States of America, Chile, and Uruguay). Studies in lower-middle, upper-middle, and high-income countries report the existence and therefore a possibility of export boosting policies having positive effects on firm behaviour; we refrain from giving general country grouping statements on policy effectiveness, but provide a systematic review of

studies across reported outcome variables, firm characteristics, policy design, spillover effects and *back-of-the-envelope* calculation of macroeconomic effects.

Since the aim of export boosting policies is to increase exports, the first-order effects are the export-related outcome variables. For the first-order effects, in addition to reporting the direction of effects (i.e. positive, negative or no significance), we also report exemplary magnitudes with point estimates and standard errors in the brackets. We classify first-order variables into five main types: firstly, the start of exporting by non-exporters, secondly and thirdly, the export intensive margin variables: export volume and export intensity, these are followed by two extensive margin variables: the number of goods exported and the number of countries exported to. Eleven articles evaluate the effect of export boosting policies on the start of exporting, from which eight find positive effects (Van Biesebroeck et al., 2016; Broocks & Van Biesebroeck, 2017; Comi & Resmini, 2019; Cruz, 2014; Girma et al., 2020; Hiller, 2012; Mion & Muuls, 2015; Munch & Schaur, 2018) for example, Munch and Schaur (2018) find on average 3.9 percentage points (p.p.) (+/- 0.4 p.p.)[7] higher probability of export start in the year of support, and 5.9 p.p. (+/- 0.5 p.p.) two years later, Van Biesebroeck et al. (2016) find 4.1 (+/- 0.9 p.p.) to 8.6 (+/- 1 p.p.) p.p. in Belgium and 6.8 (+/- 1.4 p.p.) to 13.1 p.p. (+/- 1.6 p.p.) in Peru, Girma et al. (2020) find 6 p.p. (n.a.), Broocks and Van Biesebroeck (2017) find 8.5 p.p. (+/- 1 p.p.) while Comi and Resmini (2019) a 14.2 p.p. (+/- 2.7 p.p.). On the other hand, three studies find no significant effect on the start of exporting (Breinlich et al., 2017; Girma et al., 2009; Görg et al., 2008). In regard to the the start of exporting, Görg et al. (2008) find larger grants increase the probability of firms starting to export. Four articles evaluate the effect on export intensity, from which three find positive effects (Cansino et al., 2013; Comi & Resmini, 2019; Karoubi et al., 2018). The positive effects on export intensity range from on average 1.8 % (+/- 0.4 p.p.) (Comi & Resmini, 2019) to 10 % (+/- 4.2 p.p.) (Cansino et al., 2013), while one paper finds only weak evidence (Girma et al., 2009).

Twentytwo articles evaluate the effect on total exports, from which nineteen find positive effects (Agarwal et al., 2018; Akgündüz et al., 2018; Álvarez Espinoza & Crespi, 2000; Broocks & Van Biesebroeck, 2017; Cadot et al., 2015; Chavez et al., 2020; Defever et al., 2020a; Helmers & Trofimenko, 2015; Hiller, 2012; Karoubi et al., 2018; Volpe Martincus & Carballo, 2008, 2010a, 2010c; Mion & Muuls, 2015; Munch & Schaur, 2018; Schminke & Van Biesebroeck, 2013; Srhoj & Walde, 2020; Van Biesebroeck, Yu & Chen, 2015; Van Biesebroeck et al., 2016), for example, Munch & Schaur (2018) document a weak positive effect on exports in the magnitude of 5.8 % (+/- 3.3 p.p.) two years after receiving support, Van Biesebroeck et al. (2015) find 9.8 % (+/- 2.1 p.p.), Srhoj & Walde (2020) find 12.7 % (+/- 4 p.p.)[8], Van Biesebroeck et al. (2016) a range from 19.5 (+/- 6.7 p.p.)

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[7] Standard errors (s.e.) provided in brackets. Munch and Schaur (2018) provide ATT and t-statistic, and we calculate s.e. = estimate/t-statistic.

[8] It should be noted, in comparison to other point estimates provided in this sentence, apart from Srhoj and Walde (2020) who estimate the effects of public grants for exporters, other studies in the sentence estimate the effects of EPP.

to 24.2 % (+/- 7.3 p.p.) (in Belgium) and 13.4 (+/- 8.1 p.p.) to 22.5 % (+/- 6.3 p.p.) (in Peru), Broocks and Van Biesebroeck (2017) find 14.4 % (+/- 0.5 p.p.), while Volpe Martincus and Carballo (2010c) find 13.8 % (+/- 3.5 p.p.) (for trade agenda) and 28.5 % (+/- 5.4 p.p.) (for the bundle of services), on the other hand, three studies find no evidence of a positive effect (Breinlich et al., 2017; Defever et al., 2020b; Girma et al., 2009).

Twelve articles evaluate the effect on the number of goods exported, from which nine find positive effects (Álvarez Espinoza & Crespi, 2000; Cadot et al., 2015; Defever et al., 2020b; Hiller, 2012; Mion & Muuls, 2015; Schminke & Van Biesebroeck, 2013; Van Biesebroeck et al., 2015; Volpe Martincus & Carballo, 2008, 2010c), for example, Van Biesebroeck et al. (2015) show on average a positive effect on the number of goods exported of 2.1 % (+/- 1 p.p.)[9], Cadot et al. (2015) find 8.6 % (+/- 3.1 p.p.), and Volpe Martincus and Carballo (2008) find 9.4 % (+/- 3 p.p.), while on the other hand, three studies find no effects (Breinlich et al., 2017; Defever et al., 2020a; Martincus & Carballo, 2010). Volpe Martincus and Carballo (2010) in Uruguay find higher probability for firms with a higher share of differentiated products to start exporting additional differentiated products, but they do not find a positive effect on exporting new products in general.

Twelve articles evaluate the effect on the number of countries exported to, from which 11 find positive effects (Álvarez Espinoza & Crespi, 2000; Cadot et al., 2015; Hiller, 2012; Mion & Muuls, 2015; Schminke & Van Biesebroeck, 2013; Volpe Martincus & Carballo, 2010a; Van Biesebroeck et al., 2016; Van Biesebroeck et al., 2015; Volpe Martincus & Carballo, 2008, 2010c), for example, Van Biesebroeck et al. (2015) find on average a positive effect on the number of export markets of 2.5 % (+/-0.7 p.p.)[10], Volpe Martincus & Carballo (2008) find 7.5 % (+/- 2 p.p.), and Cadot et al. (2015) find 10.4 % (+/- 2.2 p.p.), while one article finds no effect (Defever et al., 2020a).

In addition to the extensive margin with respect to the number of countries served, it is worth stressing mixed findings regarding the type of new countries served. Broocks & Van Biesebroeck (2017) in Belgium find on average positive effects on entering market of non-EU countries, which include non-OECD countries (6.1 p.p. (+/- 0.7 p.p.)), OECD countries (4.8 p.p. (+/- 0.6 p.p.)), non-OECD G20 countries (2.6 p.p. (+/- 0.4 p.p.)), and Switzerland and Norway (2.5 p.p. (+/- 0.4 p.p.)). On the other hand, Volpe Martincus and Carballo (2010) in Uruguay find positive effect on new export markets when export markets are neighbouring countries in the Latin America and Caribbean regions, but not in the more advanced OECD countries.

Second-order effects of interest for economists and policymakers are inputs to the firms' production function and its outputs, including sales, value added, profits, employment, capital and productivity. Nine articles evaluate the effect of export boosting policies on sales, and they all find positive effects

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[9] This estimate is sensitive in some specifications.
[10] This estimate is sensitive in some specifications.

(Akgündüz et al., 2018; Cansino et al., 2013; Comi & Resmini, 2019; Helmers & Trofimenko, 2015; Hiller, 2012; Munch & Schaur, 2018; Rincón et al., 2015; Srhoj & Walde, 2020; Volpe Martincus, & Carballo, 2010a). Three articles evaluate the effect on value added from which two find positive effects (Munch & Schaur, 2018; Srhoj & Walde, 2020) and one no effects (Agarwal et al., 2018)[11]. Three articles evaluate the effect on profits, from which two find positive effects (Atkin et al., 2017; Srhoj & Walde, 2020) and one study finds no effects (Akgündüz et al., 2018). Srhoj & Walde (2020) find positive effects of export-oriented grants on capital. Eight articles evaluate the effect on employment out of which five find positive effects (Akgündüz et al., 2018; Broocks & Van Biesebroeck, 2017; Cansino et al., 2013; Cassey & Cohen, 2017; Munch & Schaur, 2018), one article finds positive effects to be shortlived (Cassey & Cohen, 2017) and three articles find no effects (Rincón et al., 2015; Agarwal et al., 2018; Srhoj & Walde, 2020). Four articles evaluate the effect on productivity, from which two find positive effects (Atkin et al., 2017; Munch & Schaur, 2018) and two article finds no effects (Agarwal et al., 2018; Srhoj & Walde, 2020).

We now delve deeper into several study details: heterogeneity by firm size, export experience, and sector. We then report and discuss policy spillover effects and the documented *back-of-the-envelope* calculations of macroeconomic effects based on microeconometric estimates.

4.3.   Heterogeneity of Effects

Empirically identified heterogeneity of effects can assist researchers in understanding mechanisms by which export boosting policies work and can assist policymakers in designing more effective policies. It is worth stressing heterogeneity is identified across several dimensions and still much remains to be learned. From what is identified in the structured overview, most evidence is found for firm size and some evidence for export experience and sectors.

Fourteen articles evaluate the effect on firms of different sizes or focus only on small firms, from which eleven[12] find positive effects on firms of small size (Agarwal et al., 2018; Akgündüz et al., 2018; Atkin et al., 2017; Broocks & Van Biesebroeck, 2017; Cansino et al., 2013; Comi & Resmini, 2019; Cruz, 2014; Munch & Schaur, 2018; Schminke & Van Biesebroeck, 2013; Volpe Martincus & Carballo, 2010a; Volpe Martincus et al., 2012), six find positive effects on firms of medium size (Agarwal et al., 2018; Akgündüz et al., 2018; Cadot et al., 2015; Cansino et al., 2013; Cruz, 2014; Schminke & Van Biesebroeck, 2013) and only three articles find positive effects on firms of larger size (Agarwal et al., 2018; Kim et al., 2018; Van Biesebroeck et al., 2015). Technically, these studies use quite different thresholds for grouping firms by size, for example, Atkin et al. (2017) focuses only

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[11] Agarwal et al. (2018) find positive effect on the subsample of small firms and for novice users.
[12] Please note that some articles find positive effects on small firms and medium firms, which is why the number of studies with positive effects across small, medium and large size is more than 13.

on firms with up to five employees, Munch and Schaur (2018) splits firms into categories based on the number of employees, up to 20, 20-50 and more than 50 employees, Cadot et al. (2015) defines medium sized firms to have between 20 and 100 employees, Volpe Martincus and Carballo (2010), and Akgündüz et al., (2018) divides firm size based on firms' exports distribution.

Fifteen articles investigate heterogeneity with respect to export experience, from which ten find positive effects on firms with some export experience (Agarwal et al., 2018; Akgündüz et al., 2018; Breinlich et al., 2017; Broocks & Van Biesebroeck, 2017; Comi & Resmini, 2019; Görg et al., 2008; Kim et al., 2018; Mion & Muuls, 2015; Van Biesebroeck et al., 2015; Volpe Martincus & Carballo, 2010b; Volpe Martincus et al., 2012), while six find positive effects on firms with no export experience (Cansino et al., 2013; Cruz, 2014; Schminke & Van Biesebroeck, 2013; Mion & Muuls, 2015; Volpe Martincus & Carballo, 2010a; Volpe Martincus et al., 2012). Along this line, Van Biesebroeck et al. (2015) and Agarwal et al. (2018) find the effects to be higher for first-time clients of the export policy in comparison to experienced users.

Ten articles find positive effects and investigate timing until the positive effect (Cadot et al., 2015; Cruz, 2014; Hiller, 2012; Munch & Schaur, 2018; Srhoj & Walde, 2020; Van Biesebroeck et al., 2016; Volpe Martincus & Carballo, 2010a), from which two find the effects do not occur in the first year (Akgündüz et al., 2018; Van Biesebroeck et al., 2015). Most of studies finding positive effects focus on firms in manufacturing sectors; one study finds positive effects on service and manufacturing sectors (Agarwal et al., 2018), while one study finds heterogeneity (Karoubi et al., 2018) with positive effects on firms in service sectors but no effects on firms in manufacturing sectors. Karoubi et al. (2018) also find positive effects for profitable but not for loss-making firms.

In sum, evidence on heterogeneity with respect to firm characteristics shows stronger effects of export boosting policies on smaller firms, firms with previous exporting experience, first-time users, and firms in manufacturing sectors.

4.4. Spillovers and Aggregate Effects

As shown in the Table 1, all 34 articles evaluate direct effects on intensive, extensive export margin or firm performance. From 34, six articles investigate potential spillover effects on firms not directly benefitting from the export boosting policy (Atkin et al., 2017; Cadot et al., 2015; Broocks & Van Biesebroeck, 2017; Cruz, 2014; Girma et al., 2020; Kim et al., 2018). Investigating spillover effects is important for at least two reasons – economic and methodological. Economically, to correctly evaluate the effect of export policy on firms and on the aggregate economy one should calculate not just direct but also indirect, spillover effects. Particularly if spillovers are large in magnitude they should be integrated in the calculation of aggregate effects. Along this line, one of economic rationales for a

government intervention with EPPs is solving for market failure in the form of information spillovers, which is why investigating spillovers is particularly relevant. Evidence from France (i.e. Koenig, Mayneris, & Poncet, 2010) suggests that if a firm is active on a foreign market, the probability of exporting increaeses for firms located nearby the exporter. In regard to the methodological reason, it should be noted that 28 articles identify effects of export boosting policies with matching algorithms (alone or with DiD), two used IV approach, two using RCT, and two using fixed-effects estimation (see Table 1). Matching, IV and RCT are all counterfactual methods with the same foundamental assumption, the stable unit treatment value assumption (SUTVA) which in essence assumes there is no spillovers of treated firms on control firms. If SUTVA is violated, the estimates are biased: on the one hand, if there are negative spillovers on the control group, so that benefitting from export boosting policy leads to a decline of the control group there would be an overestimation of the effect, while on the other hand, if the treatment leads to an increase of the control group, there would be an underestimation of the effect.

Six studies use five different approaches to identify spillovers. Atkin et al. (2017) use geographical proximity, Kim et al. (2018) assume information exchange networks within the same village, Broocks and Van Biesebroeck (2017) use NACE 4-digit sectors, Cruz (2014), Cadot et al. (2015) look at the same region and sector, and Girma et al. (2020) use membership within a cluster. From these six articles, three report positive spillover effects (Broocks & Van Biesebroeck, 2017; Cruz, 2014; Kim et al., 2018), two report no spillover effects (Atkin et al., 2017; Cadot et al., 2015), and one articles finds negative effects (Girma et al., 2020). Two studies require further comments. Broocks and Van Biesebroeck (2017), within the same NACE 4-digit industry, show spillover (indirect) effects of an EPP on the probability to start exporting are positive, on average 0.7 p.p., which is ten times smaller than the direct positive effect. Girma et al. (2020) estimate spillover effects of export subsidies within a cluster to find a large negative impact (about 30 p.p.) on the export propensity of non-treated firms in the cluster. In addition, this negative effect increases the higher the proportion of treated firms in a cluster, while the negative effect decreases once there is a very large share of treated firms in a cluster.

The results for spillover effects are still mixed; however, if positive, they should be included in the *back-of-the envelope* calculation of aggregate effects. Six articles use this simple calculation to provide insights into the aggregate effects, by comparing direct export boosting policy costs with created benefits, where benefits are measured based on microeconometric causal effects on value added in two articles (Munch & Schaur, 2018; Srhoj & Walde, 2020) and on export amount in four articles (Cadot, et al., 2015; Broocks & Van Biesebroeck, 2017; Comi & Resmini, 2019; Defever et al., 2020a). Using additionality in value added to estimate benefits in two small open economies, Croatia and Denmark, Srhoj and Walde (2020) find for public grants for exporters the benefits to be 139.5 %, while Munch and Schaur (2018) find for EPP the benefits to be 300 % of the direct policy costs. Using additionality in export, the benefits are reported to massively outweigh the EPP costs,

namely 16 to 29 times in Belgium (Broocks & Van Biesebroeck, 2017), 19 times in Tunisia (Cadot et al., 2015)[13], 9 times in Italy (Comi & Resmini, 2019) and 1.2 to 11.7 times in Pakistan (Defever et al., 2020a). Rare studies report programme costs and find no effect on export value. For example, Defever et al. (2020b) reports programme costs of about 4 million US dollars a year for a cash transfer programme in Nepal, which was an ad-valorem subsidy of 1 or 2 % of the exports value of government-selected export products types, but find no positive effect on export value which is why the scheme was not cost-effective.

Defever et al. (2020a) show additional exports induced by subsidised loans for long-term investments in physical equipment (the LTFF) outweighted the direct scheme costs 11.7 times, while additional exports induced by subsidised loans for working capital (the EFS) outweighted the direct scheme costs 1.2 times. Defever et al. (2020a) provide the initial cost-effectiveness analysis, giving evidence that subsidised loans for long-term investments in physical equipment improve export value more than the subsidised loans for working capital. Along this line, Srhoj and Walde (2020) suggest public grants for technological upgrading of exporters creates more value added in the economy than the grants for commercialisation activities like international product placement.

Finally, two studies go a step further and try to provide a cost-benefit analysis with benefits based on tax revenue (Cadot et al., 2015; Defever et al., 2020a). Firstly, Cadot et al. (2015) shows for Tunisia that additional tax revenues and net after-tax profits are 2 times larger than the total cost of the programme. Secondly, Defever et al. (2020a) shows both types of subsidised loans in Pakistan (the EFS and the LTFF) yield 7.18 % (EFS) and 69.6 % (LTFF) shares of tax revenues in the financial costs of the two types of subsidised loans.

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[13] In the paper by Cadot et al. (2015) we compare additional exports from table 15, row "c" (TY) and total private and public cost of the FAMEX programme.

5. Conclusions

Boosting exports is a policy goal for countries worldwide, and is particularly important for small open economies aiming to increase the well-being of their citizens. However, to boost the exports, firms have to be internationally competitive and innovative. We define export boosting policies as a group of policies including export promotion policies, financial subsidies, subsidised export loans (i.e. export discount credit programme), and public export credit guarantees, which all aim to increase firm export behaviour. Export boosting policies assist firms in the end commercialisation phase of the innovation process, and although export boosting policies should be "*under one roof*" with other innovation policies (Altomonte, Aquilante, Bekes, & Ottaviano, 2013), they are usually analysed separately. In other words, there is a distinction between export boosting policies on the one hand, and R&D or capital investment grants on the other, although in small open economies both have the end goal of increasing exports. Our article relates to these review studies on effectiveness of R&D grants (see Dimos & Pugh, 2016; Zúñiga-Vicente et al., 2014) and SME grants (within EU see Dvouletý et al., 2020; in developing countries see Kersten et al., 2017). Our aim was to answer the question of whether export boosting policies are effective. We did so by providing a structured overview of thirty-tree rigorous microeconometric studies covering 26 countries on five continents, in Europe (Austria, Belgium, Croatia, Denmark, France, Germany, Ireland, Italy, Spain, Sweden, UK), in Asia (China, Nepal, Pakistan, Turkey, Vietnam), in South America (Argentina, Brasil, Chile, Colombia, Peru, Uruguay), in North America (Canada, USA), and in Africa (Egypt, Tunisia). In doing so, we provide nine important findings.

This article points towards an arsenal of export boosting policies, which are split into two layers, the supply side and the demand side. First, we show evidence for a positive effect of five types of supply-side export boosting policies. These five policies include: *i*) information provided by a public export promotion agency on foreign market prospects and key contact search, *ii*) grants, subsidies, and vouchers for commercialisation activities, *iii*) grants and subsidies for export production activities, *iv*) subsidised export loans (i.e. export discount credit programme), and *v*) public export credit guarantees, with the least evidence for the latter two types. These supply-side policies ease different types of market failures, and as such the policies *i)* and *ii)* can be termed *export promotion policies* since they ease information asymmetries and provide information spillovers. The policies *iii*), *iv*) and *v*) can be designed to ease information asymmetries, but they also ease credit market imperfections and capital constraints. While we cannot provide conclusions as to which of the supply-side policies brings the most benefit per public Euro invested, we show evidence for a positive effect of each policy. Two studies suggest giving subsidies or subsidised loans for technological upgrading and machinery is more cost-effective than subsidising working capital and commercialisation activities.

Second, evidence shows a combination of several supply-side policies has a more favourable effect than a single policy (Table 2). Third, we show there is evidence for a favourable positive effect of demand-side randomised foreign market access programme on firm performance, with the mechanism being *learning-by-exporting*. The results suggest exports can increase technical efficiency, product quality and productivity of firms provided with an export opportunity. This stream of literature opens up a debate on the usage of public procurement contracts as a way of capability building (e.g. Stojčić et al., 2020), and initial evidence in 19 low-income Sub-Saharan African countries shows how cross-border procurement auctions can provide growth opportunities for firms (Hoekman & Sanfilippo, 2020).

Fourth, this article provides a systematic overview of export boosting policy microeconometric effects in 26 countries, from which four are lower-middle, seven are upper-middle and 15 are high-income countries. The results show the existence of positive effects across country development groups.

Fifth, most of studies find positive effects on non-exporters starting to export, total exports and export intensity (intensive margin) as well as positive effects on the number of countries and the number of products expoerted (extensive margin). Sixth, there are also positive effects on sales, value added, profits, capital, employment, and productivity.

Seventh, export boosting policy effects are heterogenous across several firm characteristics, policies are more effective for small firms, firms with some export experience, first-time EPP users and firms in manufacturing sectors. While a bundle of policies exhibits a higher positive effect on firm behaviour, there is some evidence showing first-time EPP clients had higher positive effects in comparison to experienced users.

Eighth, although three out of five studies investigating spillovers find positive spillover effects, there are studies showing no effects and negative effects, which is why more evidence is needed to support the positive spillovers argument. Depending on the identified microeconometric effects, the macroeconomic effects could differ. Ninth, *back-of-the-envelope* calculations of aggregate macroeconomic effects show value added or exports generated by the policy are considerably larger than direct export boosting policy costs. These estimates are usually focused on causally identified benefits and only direct costs, and as such these do not include the costs of public employees working on design, implementation costs, monitoring costs, and spillover benefits. We encourage future research work to include these in the estimation.

For our search code, one of the key ideas was to select robust microeconometric studies. A word of caution is needed here. While all reported studies do use robust microeconometric methods, within the set of these microeconometric tools, matching algorithms are probably the least convincing but are used in 28 out of 34 included articles. Matching is a method which has an *Achilles heel* – unobservable

confounders, and this can be even more pronounced when control group did not have an intention to participate in the export boosting policy. This opens up a question on the potential bias: how large is the effect of selection into export boosting policy as opposed to the effect of export boosting policy? This question will be difficult to answer given that EPPs are run by public institutions who do not like to reject export firms – EPP candidates, and since the marginal cost of providing additional service is small, there might not be enough applicants to form a suitable control group in a research setting such as regression discontinuity design. We leave this interesting question for researchers to improve the answers on the size of the bias.

In sum, we provide nine findings and show export boosting policies are relevant and *proven-to-be-effective* policy instruments.

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Appendix: Search code.

TS = (export subsid OR export-promotion service OR export promotion OR export grant OR export credit guarantee OR export credit insurance facilit OR export rediscount credit OR subsid export loans OR trade missions)

AND

TS = (business OR firm OR enterprise OR compan)

AND

TS = (firm performance OR productivity OR profit OR employment OR sales OR revenue OR turnover OR value added OR export status OR export intensity OR import intensity OR capital OR raw material OR intermediate input OR wage bill OR destination countr OR number of product OR age OR location)

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 OLS OR fixed-effect OR instrumental variable OR identification strategy OR impact on OR impact of OR causal

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