# Evaluating the Impact of Export Finance Support on Firm-level Export Performance: Evidence from Pakistan*

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July 17, 2023

**Abstract**

This paper evaluates the impact of two large export finance support schemes on firm-level export performance. The Export Finance Scheme (EFS) and the Long-Term Finance Facility for Plant & Machinery (LTFF), administered by the central bank of Pakistan, provide loans at subsidized interest rates for exporters to finance working capital and the purchase of machinery and equipment respectively. We combine customs data with information on firms' participation in each scheme between 2015 and 2017 with information on future rejection of applications to the schemes and use matching combined with difference-in-differences to estimate the effect of the schemes on firms' export values, the number of products exported and the number of destinations they serve. We find that EFS has a large and positive impact on firms' export values and a smaller effect on the number of destinations served, while LTFF, on the other hand, does not have a discernable impact on export performance in the short run. A back-of-the-envelope cost-benefit analysis suggests that EFS is an effective instrument to boost exports, particularly for new users of the scheme.

**Keywords:** Trade Finance; Export Subsidies; Working Capital; Machinery and Equipment; Export margins; Pakistan.

**JEL classification:** G21; F13; F14; F61; F65.

*We would like to thank Peter Morrow (the Editor), two anonymous referees, Farooq Arby, Ali Choudhary, Banu Demir, Andreas Eberhard, Sourafel Girma, Syed Samar Husnain, Tim Schmidth-Eisenlohr and participants at the CESifo and LINER-AUEB conference on the role of institutions and policies in firm exporting for helpful comments and for clarifying different aspects of the policies that we evaluate in this paper. All remaining errors are our own. Juan Pedro Gambetta provided excellent research assistance. The findings, interpretations, and conclusions expressed in this paper are entirely those of the authors. They do not represent the views of the World Bank, its Executive Directors, or the countries they represent.

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# 1 Introduction

The global financial crisis of 2008 has forcefully demonstrated that access to finance is vital for firms to survive and grow—particularly when operating in foreign markets.[1] In the short run, longer lags between production and payment make exporters more reliant on working capital financing, and therefore more vulnerable to liquidity shocks to their credit providers and defaults than domestic firms (Amiti and Weinstein, 2011; Manova, 2013; Feenstra et al., 2014; Paravisini et al., 2015). In the long run, exporters need to be more capital intensive to remain competitive in international markets (Bernard et al., 2007), but since investment in machinery and equipment is subject to large adjustment costs, credit constraints can severely hinder exporters' ability to invest, stunting their growth (Riaño, 2011; Rho and Rodrigue, 2016; Brooks and Dovis, 2020; Leibovici, 2021; Kohn et al., 2022). According to the World Economic Forum (2016), trade finance is one of the top three obstacles for exporters in developing countries.

Governments around the world have a long history of providing credit to exporters at subsidized interest rates to mitigate the pervasive financial frictions that affect international trade transactions (Fleisig and Hill, 1984).[2] While developed countries have moved away from direct subsidized credit (Melitz and Messerlin, 1987), subsidized loans for exporters, nevertheless, remain popular in developing countries.[3]

In this paper we investigate whether this class of policies improves firms' export performance, and which policy instrument—supporting firms' working capital needs over the short-run or facilitating long-term investment in machinery and equipment—is more effective

[1] See e.g. Chor and Manova (2012), Bricongne et al. (2012), Paravisini et al. (2015).

[2] Fleisig and Hill (1984) report that in 1978, Canada, France, Germany, Italy, Japan, the United Kingdom, and the United States provided direct subsidized export credit worth 55 billion US dollars.

[3] For instance, the central bank of Bangladesh maintains an Export Development Fund of 3 billion US dollars that intends to facilitate access to financing in foreign exchange at subsidized interest rates for input procurements by manufacturing exporters (WTO, 2019). The Interest Equalisation Scheme on Pre and Post Shipment Rupee Export Credit offered by the government of India allows manufacturing exporters an interest subsidy of 3 percent on pre-and-post-shipment rupee credit for exports of 416 products. The central bank of Turkey's rediscount credit program is a pre and post shipment export financing facility that provides subsidized credit to exporters at low interest rates with little collateral requirement (Akgündüz et al., 2018), to name but a few examples.

to promote exports. To do so, we analyze two large export finance support schemes offered by the State Bank of Pakistan (Pakistan's central bank, SBP hereafter)—The Export Finance Scheme (EFS) and the Long-Term Finance Facility for Plant & Machinery (LTFF) between 2015 and 2017. EFS allows exporters to borrow funds over a period of up to 180 days to finance working capital needs at an interest rate 7 percentage points lower than the average lending rate during our period of analysis. LTFF, in turn, is targeted towards the purchase of machinery and equipment, offering exporters loans at a fixed interest rate of 6 percent per annum over the duration of the credit, with a maturity of up to 10 years. During the period of analysis, the average value of loans provided by EFS was 3.8 billion US dollars per annum—or 17.4 percent of Pakistan's total exports—while loans financed by LTFF amounted to 280 million US dollars per annum, or 1.3 percent of total exports. These figures are orders of magnitude larger than the expenditure in most subsidies and instruments of export promotion studied in the literature evaluating the impact of export promotion policies on firm-level export performance (see e.g. Volpe Martincus and Carballo, 2008; Görg et al., 2008; Volpe Martincus and Carballo, 2010a; Cadot et al., 2015; Van Biesebroeck et al., 2015, 2016; Munch and Schaur, 2018; Defever et al., 2019, 2020; Chávez et al., 2020)—and thus provides a unique window into the potential of trade policy to affect export performance at the aggregate level.

Both schemes operate in two stages: first, a commercial bank screens and makes a decision about whether to grant a firm the loan it has requested; upon approval, the commercial bank submits an application (supported by documentation provided by the firm) to refinance the loan with SBP. Approval of the application by SBP in the second stage determines both the interest rate that the firm pays to the commercial bank providing the credit and the interest rate at which said bank borrows from SBP to refinance the loan granted to the firm.

We estimate the effect of using EFS and LTFF on firm-level export performance using a range of matching estimators combined with difference-in-differences to control for the non-random selection of firms into the export finance support schemes. The empirical analysis

leverages novel data that allows us to control for a broad range of pre-treatment observables and exploits institutional details about the allocation of the schemes' funds to gauge their effect on exports along both the intensive and extensive margins.

The first identification challenge we face pertains to the fact that firms that experience a positive demand shock—e.g. meeting a new foreign buyer—are also more likely to use export finance support schemes. Thus, if we were not fully controlling for firms' export trajectories prior to treatment, we would be incorrectly ascribing the positive effect on exports to the use of the schemes. To allay this concern, we include a broad range of firm-level pre-treatment characteristics that provide a well-rounded characterization of firms' pre-treatment export performance in the estimation of the probability that a firm uses a given export finance support scheme. Among the variables included (both in levels and growth rates) we have firms' export sales, the number of products exported and destination market served—and crucially—the number of foreign buyers that an exporter sells to. While it is still possible that time-varying unobservable shocks contaminate our estimates of treatment effects, the inclusion of these controls makes it more plausible to justify the underlying assumption behind matching—i.e. that after controlling for observables, any differences in performance between treated and control firms that we estimate are due to the use of export finance schemes rather than to a confounding factor that drives both firms' exports and their participation in the schemes.

As we noted above, a necessary step for a firm to take advantage of the schemes is first to successfully secure a loan from a commercial bank. Thus, another key aspect that is critical to control for in terms of firms' selection into using the schemes is their creditworthiness. Since the commercial bank bears the credit risk associated with a firm defaulting on its obligation, it must screen the firm's ability to repay as it would do so for any other loan. While firm size (in terms of export sales) contributes to this end, we also include an indicator of whether a firm's second-stage application to either EFS or LTFF has been rejected by SBP in the *future*—i.e. over the period 2018-2020. The information on future rejections reveals

that they are not infrequent occurrences—approximately 8 percent of firms that use EFS between 2015 and 2017 face a rejection between 2018 and 2020, and one in three firms using LTFF are, in turn, rejected from the schemes in the future. Crucially for our purposes, future rejections show that exporters are sufficiently creditworthy to not only have a relationship with a commercial bank—many exporters in developing countries like Pakistan do not use banks to finance their operations—but are also able to secure loans from said banks.[4]

The last critical element that anchors the empirical strategy is to determine whether it is plausible that firms that are similar in terms of their observable pre-treatment observable characteristics exhibit different treatment status due to factors that are not correlated with their export performance. We argue that this is the case on the basis on the rules governing the allocation of funds to final users and anecdotal evidence obtained from SBP officials and commercial bank managers. Every year, SBP sets the total amount of funds to be allocated to each scheme, which are, in turn, disbursed on a first-come, first-served basis. Crucially, every fiscal year SBP also sets bank-specific refinancing limits which are chosen on the basis of objective characteristics like the composition of banks' lending portfolios and activity in the foreign exchange market, as well as *other* considerations that were not disclosed by SBP officials. Interviews with commercial bank managers responsible for trade finance, in turn, revealed that not only did managers not know what were the specific refinancing limits their banks faced, but they even provided different accounts of the way that SBP set these limits. Lastly, SBP officials also indicated that the main reason for firms' applications to the schemes being rejected by SBP in the second-stage of the process was that the bank from which they have requested credit had reached its refinancing limit. These institutional features enable us to construct appropriate comparison groups to estimate the counterfactual export performance of firms that participated in EFS and LTFF had they not made use of these schemes.

[4]Unfortunately, there is no firm-level data available for Pakistan that could be merged with the customs data for our period of study that could allows to include other control variables that are useful to characterize firms' creditworthiness. Similarly, while ideally we would have preferred to use information on rejections that took place during our period of analysis (2015-2017), those data were, unfortunately, unavailable from SBP.

Moving on to our results, we find that firms that participate in EFS experience a large, positive and robust improvement in their export performance—primarily along the intensive margin—suggesting that a lower user cost of working capital reduces firms' marginal costs, as in the theoretical models of Manova (2013) and Feenstra et al. (2014). When we consider all firms that use EFS between 2016 and 2017, we find that participation in the scheme increases the yearly growth rate of exports by 3.5 to 5.8 percentage points. These estimates, however, could be affected by the fact that a substantial share of firms used EFS in all three years in our data and could therefore mask very different exposure to the treatment—a feature that has been shown to significantly affect the impact of export promotion policies (Cadot et al., 2015; Van Biesebroeck et al., 2015). Narrowing down the definition of treatment to only consider firms that did not use EFS in 2015 but did so in 2016 or 2017, we find that treated firms experience a much larger effect on their export sales that ranges from 13 to 19 percentage points. While the higher magnitude of the impact of EFS partly reflects that these 'first-instance' treated firms are substantially smaller than those using the scheme every year, it is also consistent with the high elasticity of exports with respect to changes in trade finance identified in the literature (Zia, 2008; Paravisini et al., 2015; Demir et al., 2017; Akgündüz et al., 2018). The effect we estimate for EFS on the extensive margin is more muted and is manifested primarily along the number of destinations margin.

On the other hand, we only find a small and marginally significant effect of LTFF on export performance. This could reflect the narrower scope of the scheme in terms of the products that a firm has to produce in order to be eligible to participate in it. Along similar lines, while a relaxation of credit frictions could boost firms' capital accumulation and subsequently induce them to increase the scale of their operations and sales, as shown by Brooks and Dovis (2020) and Leibovici (2021), we are likely to miss this effect by focusing only on the impact on exports one or two years after a firm participates in LTFF.

While the effect on exports we estimate for EFS is indeed large, the financial cost for SBP is also be quite substantial. Thus, it is important to provide a sense of the scheme's

effectiveness as a policy to foster exports—its main stated objective. This issue is all the more pressing because the government of Pakistan consistently runs large budget deficits that are financed to a great extent by direct borrowing from SBP. Following the approach employed by Cadot et al. (2015) and Munch and Schaur (2018), we carry out a back-of-the-envelope cost-benefit analysis of both schemes in which we compare the value of additional exports generated by the schemes—calculated using our estimates of the average treatment effect for first-treated firms—with the direct financial cost incurred by SBP. The latter is calculated as the amount of loans outstanding for each program, multiplied by the difference between the opportunity cost that SBP bears from 'printing money' to finance the schemes—which we take as the yield of the 6-month treasury bill—and the refinancing rate it offers commercial banks. This exercise shows that EFS is a highly effective instrument to boost exports—particularly for firms that have recently started using the scheme.

These results, however, need to be interpreted with caution. First, since a substantial share of the funds devoted to EFS go to very large firms that are perennial users of the scheme, for which the potential positive effects of the program are much lower and financial costs significantly higher, a cost-benefit analysis based on the full set of firms participating in the program might yield different conclusions from our analysis. Second, it is important to note that our exercise does not constitute a full-fledged welfare analysis that would shed light on the extent to which EFS eases credit constraints for certain exporters; general equilibrium effects; the distribution of costs and benefits across manufacturing firms; and the marginal cost of public funds.

Evaluating two policy instruments that target distinct margins of exporters' finance requirements, allows us to provide a broad perspective about the central role that access to external finance plays in shaping firms' performance in international commerce. In so doing, we complement the growing literature on trade and finance, which has primarily focused on the financial arrangements that firms use to conduct international transactions (see e.g. Amiti and Weinstein, 2011; Schmidt-Eisenlohr, 2013; Feenstra et al., 2014; Antràs and Foley,

2015; Paravisini et al., 2015; Demir et al., 2017; Niepmann and Schmidt-Eisenlohr, 2017). Our work is closely related to Zia (2008) and Akgündüz et al. (2018), who also investigate the consequences of subsidized short-term working capital loans for exporters' on firm-level performance in Pakistan and Turkey respectively.[5] We add to these papers by not only evaluating the impact of subsidized working capital loans, but, as noted above, considering incentives to long-term investment in physical capital too. We also evaluate whether export finance support schemes affect firms' export diversification along the extensive margin—i.e. in terms of the number of products exported and the number of countries that firms sell to.

Pakistan offers a unique environment to investigate the effect of subsidizing credit to exporters. After undertaking major trade liberalization reforms in the 1990s, Pakistan's trade policy has significantly turned inwards over the last two decades. High levels of protectionism have produced lacklustre export performance relative to comparable countries in South Asia (Reis and Taglioni, 2013), while limited support for export promotion and political favoritism in the allocation of credit have lowered firms' productivity and increased barriers for firms to export (Khwaja and Mian, 2005; Zia, 2008; World Bank, 2021). This paper sheds light on the role that lowering the cost of short and long-term financing can play in (at least partially) alleviating distortions hindering firms' export performance. These lessons are not only relevant for Pakistan, but also to other developing countries struggling to improve the dynamism of their exports.

The rest of the paper is structured as follows: Section 2 describes the two export finance support schemes we evaluate. Section 3 introduces the data we employ and provides summary statistics on firm-level export performance, usage of export finance support schemes and SBP rejection of firms' applications to the schemes. Section 4 describes our empirical strategy. Section 5 presents our estimates and Section 6 presents a back-of-the-envelope cost-benefit analysis of both schemes; Section 7 concludes.

[5] Zia (2008) also studies EFS and exploits the unexpected exclusion of cotton yarn exporters from the scheme in 2000 to investigate how the subsidy affects firms' sales, profits and whether it relaxes their financial constraints.

# 2 Export Finance Support Schemes

This section describes the main features of the two export finance support schemes we evaluate in this paper: The Export Finance Scheme (EFS) and the Long-Term Finance Facility for Plant & Machinery (LTFF).

## 2.1 The Export Finance Scheme (EFS)

EFS was established in 1973 with the objective of increasing Pakistan's manufacturing exports. The program offers short-term loans (with a maturity up to 180 days) to finance working capital needs of exporters at subsidized interest rates. While the subsidy is provided by the State Bank of Pakistan (SBP), the program operates through commercial banks—SBP does *not* provide loans directly to exporters. EFS is available to firms exporting most manufacturing products, with the exception of 20 products included in a negative list, which was last updated in 2011.[6]

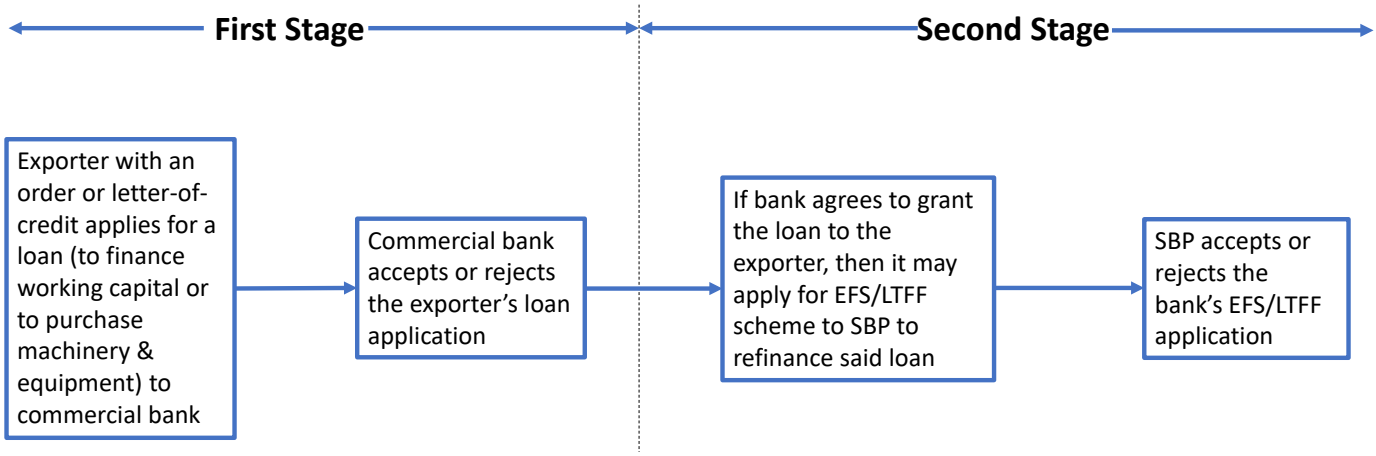
The scheme operates in two stages summarized in Figure 1. First, a firm with an export order or letter of credit at hand approaches a commercial bank to request a working capital loan. The commercial bank evaluates the firm's request as it does any standard loan application—i.e. on factors such as the firm's credit risk and the history of the relationship between the firm and the bank. If the commercial bank decides to extend credit to the exporter, then—in the second stage—the commercial bank has the option to submit an application to SBP, supported by documentation provided by the exporter, to take advantage of the refinancing facility offered by EFS.

If SBP approves the application submitted in the second stage, then the commercial bank obtains funds from SBP equal to the value of the loan it disbursed to the exporter. The EFS scheme specifies both the interest rate that the commercial bank charges to the exporter and the refinancing rate at which the commercial bank borrows from SBP, and

[6]The list of products in the negative list can be found here: http://www.sbp.org.pk/incentives/efs/efs-negative.htm.

therefore the intermediation margin that the commercial bank earns by providing the loan to the exporter. Thus, even though commercial banks still bear the credit risk if the export defaults on the loan, EFS provides incentives for commercial banks to finance the working capital needs of exporters by making liquid funds available to them at below-market interest rates. Conversations with bank managers indicated that the intermediation margin provided by EFS is sufficiently attractive to motivate commercial banks to participate in the scheme.

Figure 1: Export Finance Support Schemes Timeline




Between 2015 and 2017, the interest rate charged to exporters borrowing under EFS was 2 percent per annum and the refinancing rate for commercial banks was 1 percent. Since the average market lending rate over the same period was 9 percent, the interest rate subsidy provided to exporters—i.e. the difference between the market lending rate and interest rate charged on EFS loans—was 7 percentage points, a close figure to the subsidization rate of 6 percentage points calculated by Zia (2008) during the 1990s and early 2000s.

## 2.2 The Long-Term Finance Facility for Plant & Machinery (LTFF)

The LTFF is a financing facility set up by SBP in 2007 with the objective of promoting export-led industrial growth. It offers subsidized loans in local currency with a maximum maturity of 10 years to export-oriented firms (i.e. firms that either export at least 50 per-

cent of their sales, or have an export turnover of at least 5 million US dollars) to finance long-term investments in physical capital such as plant and machinery of up to 1.5 billion Pakistani rupees (approximately 9 million US dollars). Unlike EFS, which is available to firms producing most manufacturing products as noted above, LTFF was only available to firms operating in 20 sectors during our period of study (the scheme became available to exporters in all sectors in January 2020).[7]

LTFF operates in two stages in a similar manner to EFS. A firm first approaches a commercial bank to obtain a loan for the purchase of new machinery or equipment. Conditionally on granting the loan to the exporter, the commercial bank then submits an application to SBP to refinance the loan making use of the LTFF financing facility. Upon approval of the second stage, LTFF specifies the interest rate that an exporter pays for the loan and the refinancing rate for the commercial bank. During our period of analysis, the interest rate faced by firms was 6 percent per annum throughout the term of the loan and regardless of its maturity; the refinancing rate for commercial banks, on the other hand, decreased with the loan's maturity, from 4.5 percent per annum for loans up to 3 years to 3 percent for loans up to 10 years.

## 2.3 How are the Schemes Administered by the SBP?

The total allocation of funds for export finance support schemes is set by SBP every fiscal year, while disbursement is carried out on a first-come, first-served basis subject to commercial banks not surpassing their specific refinancing limit, which is also set by SBP. Conversations with SBP officials revealed that these limits are set on the basis of a wide range of factors including banks' rating given by SBP inspectors, volume of foreign exchange deposits, market share in trade and long-term financing, in addition to other unspecified

[7]The sectors for which LTFF is available are: textiles and garments; rice processing; leather and leather products; sports goods; carpets and wools; surgical instruments; fisheries; poultry and meat; processing of fruits and vegetables; IT software and services; marble and granite cutting; gems and jewellery cutting; engineering goods; electrical generators; ethanol; pharmaceutical products; regeneration of textile waste; glass production; dairy and soda ash production.

considerations. Notably, when we asked commercial bank managers about their refinancing limits, not only did they not know the limit for their own institution—but each listed different criteria when we asked them about how SBP determined such limits!

Due to the institutional design of export finance support schemes, there is ample scope for creditworthy exporters to not being able to take advantage of them. This could happen, for instance, when the commercial bank from which they have requested a loan has exceeded its refinancing limit with SBP or if it does not satisfy other criteria set forth by SBP (e.g. not reaching a certain level of foreign exchange deposits or fall short in terms of its market share in trade and long-term financing), since, as Khwaja and Mian (2008) and Zia (2008) document, most firms in Pakistan are unable to substitute away from their primary banks towards other financial institutions. In the event that an exporter's application to an export finance support scheme is rejected by SBP in the second stage of the process, the exporter still has the option to obtain the credit from the commercial bank, but paying a higher interest rate.

As we show in Section 3 below, rejection of commercial banks' applications to export finance schemes by SBP are not unfrequent. In Section 4 we discuss how we leverage information on 'future' rejections (i.e. between 2018 and 2020) to control for the creditworthiness of exporters that benefit from EFS and LTFF. The idea is that knowing that an exporter will be rejected from the scheme in the future tells us that this is a firm that is sufficiently healthy, from a financial standpoint, to not only have a relationship with a commercial bank (many exporters use working capital credit directly from foreign buyers, see e.g. Petersen and Rajan (1997), Auboin (2007)), but also to be able to raise external finance from said bank.

# 3 Data and Summary Statistics

This section describes the data used in the empirical analysis. It provides summary statistics regarding firm-level export performance, participation in the two export finance support schemes we study, and future rejection rates and their relationship with participation in the schemes over the 2015-2017 period.

We use three data sets in this paper. Customs data collected by the Federal Board of Revenue contain the universe of export and import transactions for firms in Pakistan over the period 2014-2017. These data have information on the value of firms' exports and imports by product at the HS 8-digit level as well as the country of origin and destination of trade flows. For the years 2014 and 2015 we also observe the number of foreign buyers that exporters sell to. Between 2015 and 2017 there are 20,052 firms reporting at least one positive export transaction in at least one of 2,844 HS 8-digit products sold to 202 countries. The data on export finance support schemes provided by SBP includes information on which firms used EFS and LTFF and the value of the loans they received between 2015 and 2017.[8] Lastly, we have information provided by SBP indicating whether a firm's application to export financial schemes over the period 2018-2020 has been rejected by SBP in the second stage of its application. All data sets are linked together using firms' National Tax Number.

Table 1 provides a first look at the number of exporters and their performance over the period of analysis. The number of active exporters remains stable, with around 14,500 firms exporting each year. On average, Pakistani firms export five HS 8-digit products and serve four foreign markets. As usual, the large difference between the median and mean export sales per exporter reflect the fact that the distribution of exports is highly skewed to the right and large exporters account for a substantial share of the country's total exports. The statistics reported in Table 1 are in line with figures for countries in a similar stage of development as Pakistan (Fernandes et al., 2016).

[8]It is important to note that we only observe the total value of loans obtained by a given firm through each scheme. Thus, the data does not allow us to distinguish if loans are provided for certain export transactions and not others.

Table 1: Export Patterns in Pakistan, 2015-2017

| Year | # Exporters | Median exports per exporter | Mean exports per exporter | Mean # HS-8 per exporter | Mean # destinations per exporter |
|---|---|---|---|---|---|
| 2015 | 14,765 | 92.10 | 1,639.67 | 5.12 | 3.48 |
| 2016 | 14,433 | 88.93 | 1,491.54 | 5.12 | 3.50 |
| 2017 | 14,536 | 85.80 | 1,441.30 | 5.17 | 3.35 |

Export values are denominated in thousand US dollars.

We now turn to document the extent to which firms utilize export finance support schemes. The first two columns of Table 2 reveal that approximately 5 percent of exporters participate in EFS and fewer than 1 percent utilize LTFF in a given fiscal year. While the number of exporters using EFS remains roughly constant between 2015 and 2017, the number of exporters taking advantage from LTFF doubled, albeit from a much lower base.

The last four columns of Table 2 report the value of loans outstanding for each scheme and their size relative to Pakistan's total exports. Loans granted under EFS amount to 3.8 billion US dollars per year on average, or 17.4 percent of Pakistan's exports between 2015 and 2017. Perhaps due to its narrower scope or because it has been implemented more recently, LTFF is significantly smaller in magnitude than EFS, financing loans worth 280 million US dollars per year on average, or 1.3 percent of total exports over the same period. The sheer magnitude of the financing made available by EFS and LTFF is notable. To put these figures in context, the entire annual budget of export promotion agencies (including those of developed countries like Australia, Japan and the UK) does not exceed 500 million US dollars (Volpe Martincus, 2010).

A novel feature of our paper is the fact that we information on firms' applications to export finance support schemes submitted by commercial banks, which have subsequently been rejected by SBP for the period 2018-2020. These data are critical for our empirical strategy because they allow us to explicitly identify firms that have a relationship with commercial banks and, more importantly, infer that firms experiencing rejections are sufficiently

creditworthy to secure loans to finance their working capital or investment in machinery needs from said banks.

Table 2: Usage of Export Finance Support Schemes, 2015-2017

| Year | # of exporters receiving | | Total Value of Loans outstanding | | Value of loans / total exports (%) | |
|---|---|---|---|---|---|---|
| | EFS | LTFF | EFS | LTFF | EFS | LTFF |
| 2015 | 832 | 64 | 3.56 | 0.14 | 14.6 | 0.6 |
| 2016 | 812 | 80 | 3.90 | 0.24 | 17.8 | 1.0 |
| 2017 | 814 | 125 | 3.96 | 0.45 | 18.1 | 2.1 |

Total value of loans outstanding is denominated in billion US dollars.

Table 3 compares the frequency of rejections from either EFS or LTFF by SBP over the period 2018-2020 against treatment status during our period of analysis. Two main conclusions can be drawn from the table: first, SBP rejects a non-negligible number of firms' applications to the export finance support schemes—103 over the course of two years. Second—and crucially for our analysis—we see that a substantial share of firms that use EFS and LTFF between 2015 and 2017 experience rejections from SBP in the future. The high incidence of future rejections suggests that it is possible for a firm with an export order or letter of credit at hand to not be able to avail of the export finance schemes because of circumstances unrelated to its export performance, like its commercial bank reaching its refinancing limit with SBP.

Summing up, although only a minority of exporters take advantage of the export finance support schemes offered by SBP, these programs finance a substantial share of Pakistan's exports. EFS is more important than LTFF both in terms of number of firms using it and the value of loans financed, although there is a large increase in the use of LTFF between 2015 and 2017. In the next section we describe the empirical strategy we employ to investigate the impact that EFS and LTFF have had on firms' export performance.

Table 3: Number of Firms using Export Finance Schemes between 2015 and 2017 and Experiencing Rejections between 2018-2020

| Panel A | | |
|---|---|---|
| | Used EFS in 2015-2017 | |
| Rejected in 2018-2020 | No | Yes |
| No | 13,756 | 906 |
| Yes | 26 | 77 |

| Panel B | | |
|---|---|---|
| | Used LTFF in 2015-2017 | |
| Rejected in 2018-2020 | No | Yes |
| No | 14,565 | 97 |
| Yes | 54 | 49 |

Entries in the columns of Panel A indicate the number of exporters that have used EFS at least once between 2015 and 2017, while entries in the columns of Panel B indicate the number of exporters that have used LTFF at least once between 2015 and 2017. Entries in the rows of both panels indicate the number of exporters whose application to any export finance support scheme (either EFS or LTFF) between 2018 and 2020 has been rejected by SBP.

# 4 Empirical Strategy

Our objective is to estimate the effect of firms' use of export finance support schemes—EFS and LTFF (the treatments)— between 2015 and 2017 on their export performance, defined as firms' export value, number of destination countries served and number of products exported.

The main challenge we face is to estimate what would have been the export outcomes of treated firms had they not participated in the programs. Since firms deliberately choose to use the export finance support schemes, it is unlikely that the performance of non-participating firms would provide an unbiased estimate of counterfactual outcomes for treated firms. Following the literature that evaluates the effects of export promotion on firm-level export performance (see e.g. Volpe Martincus and Carballo, 2008; Görg et al., 2008; Cadot et al., 2015; Van Biesebroeck et al., 2015; Munch and Schaur, 2018, among others), we use

matching estimators combined with difference-in-differences to estimate the average treatment effect of participating in export finance support schemes.[9],[10]

There are two critical identification assumptions that underpin the empirical strategy. The first, is that selection into treatment is fully determined by observable characteristics. This means that once we control for observable pre-treatment characteristics, the evolution of firms' potential outcomes without treatment would be similar for both treated and untreated firms, and therefore, that we can attribute any differences in export performance between the two groups of firms as being due to the usage of export finance schemes. In order to satisfy the aforementioned conditional independence assumption, we need to control for any factors that affect both export performance and the choice of using export finance support schemes.

The covariates we include in our estimation to explain firms' selection into treatment include firm size (in terms of exports sales), the importance of products eligible to participate in the schemes in firms' exports, the number of foreign buyers, exported products and destination markets reached, both in levels and growth rates, importing status and an indicator of whether SBP rejects a firm's application to EFS or LTFF in the future—i.e. between 2018 and 2020. Larger firms are more likely to continue exporting in the future (Blum et al., 2013), to have a relationship with a commercial bank and to rely on external finance to fund their working capital needs and investment in machinery and equipment (Beck et al., 2008). Similarly, firms for which a high share of their export sales is accounted for products included in the EFS negative list or excluded from the sectors targeted by LTFF

[9]One alternative empirical strategy to estimate the effect of LTFF could have been to use employ a regression discontinuity design or intention-to-treat regression exploiting the 5 million US dollar turnover threshold required to participate in the scheme. However, only one of the firms using LTFF has export sales below this threshold. Excluding all firms that do not use LTFF and have a turnover below 5 million US dollars from our estimation has a negligible impact on our estimates based on matching.

[10]Another estimation alternative could have been to employ a difference-in-differences design using the exports of non-eligible products as a control group for the exports of eligible products. The main drawback of this strategy is that for most firms that use EFS, e.g. eligible products account for approximately 90 percent of their export sales. Accounting for a very small share of these firms' exports, non-eligible products display large swings in their annual growth rates and thus it is hard to justify that their performance provides an adequate counterfactual for the growth rate in exports of eligible products if a firm were not to use EFS.

are less likely to use the schemes. The inclusion of firms' exports, number of foreign buyers, number of exported products and destination markets, both in levels and growth rates intends to compare firms experiencing similar trajectories in terms of export performance and control for firm-specific demand shocks that could improve firms' export performance and make them more likely to use export finance support schemes (Munch and Schaur, 2018). As we have discussed in Section 2.3 above, before an exporter takes advantage of the export finance support schemes, a commercial bank first needs to approve its loan application. While we do not have data on firms' balance sheets that allows us to incorporate measures of creditworthiness, we know whether a firm's application for EFS or LTFF over the period 2018-2020 was rejected by SBP. As Table 3 shows, a non-negligible number of firms using EFS or LTFF between 2015 and 2017 experience a rejection between 2018 and 2020. The information that a firm's application to an export finance support scheme in the future is highly indicative of its ability to raise external finance during our period of analysis. Of course, as with any matching estimator, the presence of time-varying unobservable shocks that affect both selection into treatment and the outcome variable would contaminate the average treatment effect estimates we obtain.

Our empirical strategy critically hinges upon the reasons why firms that are similar in terms of their observable characteristics prior to treatment exhibit different treatment status afterwards (Imbens and Rubin, 2015; McKenzie, 2021). Thus, the second key identification assumption we rely upon, is that based on the way that SBP administers the export finance support schemes, it is plausible to assume that the reasons why firms' treatment status differ, conditional on pre-treatment characteristics, are not correlated with their individual export performance. Namely, otherwise creditworthy exporters with an order to fulfill or a letter of credit might be prevented from taking advantage of an export finance support scheme if the commercial bank they are borrowing from has already reached its refinancing limit, or if it does not satisfy the internal requirements set by SBP.

We use the doubly robust estimator proposed by Wooldridge (2007), which integrates

inverse probability weighing with covariate adjustment, to implement our different matching estimators. This estimator provides two opportunities to adjust for selection on observables, thus delivering unbiased inference of causal effects, as long as either the conditional mean regression or the selection-into-treatment models are correctly specified. The estimation proceeds in two steps; first, we estimate the probability that a firm is treated as a function of a vector of observable characteristics by means of a probit model—$\hat{P}\left(T_i = 1|\mathbf{X_i}\right)$, where $T_i$ is an indicator taking the value 1 when firm $i$ is treated (we discuss the different definitions of treatment we employ below), $\mathbf{X_i}$ is a vector of covariates measured in 2015 and $\hat{P}$ denotes the estimated propensity score. In the second stage we estimate outcome regressions of the following type:

$$g_i = \alpha + \beta T_i + \mathbf{X_i}'\gamma + \varepsilon_i, \tag{1}$$

for each measure of export performance and export finance support scheme.[11] The dependent variable $g_i$ is the average growth rate of a given export performance outcome for firm $i$ between 2015 and 2017, calculated using the mid-point annual growth rate between two years, $t$ and $t-1$—i.e. $g_{i,t} = \left(y_{i,t} - y_{i,t-1}\right)/\left[0.5 \times \left(y_{i,t} + y_{i,t-1}\right)\right]$.[12] Estimating the outcome regression (1) in growth rates ensures that time-invariant factors that affect both the use of export finance support schemes and export performance are duly controlled for.

We use the propensity score estimated in the first stage to construct three different set of weights for treated and untreated firms when we estimate (1); namely, (i) inverse probability (IPW), (ii) propensity score matching (PSM) and (iii) Mahalanobis or nearest neighbor matching (NNM). When using IPW, we give the weight $1/\hat{P}$ to treated firms and $1/(1-\hat{P})$ to control firms. Doing so gives greater importance to both treated firms that had a lower estimated probability of using export finance support schemes and untreated firms that are

[11] An important caveat of our analysis is that we evaluate the impact of each export finance support scheme independently, and therefore we are not able to determine whether there are synergies between the two schemes in terms of their impact on export performance. Unfortunately, there are only a handful of firms in our data that use LTFF without using EFS, thus precluding us from estimating the joint effect of both schemes, as Volpe Martincus and Carballo (2010b) do, for instance.

[12] Using the mid-point growth rate bounds the growth rate between -2 and +2, thus limiting the influence of large swings in export values.

more likely to use the schemes based on their observed characteristics in the comparison used to estimate the average treatment effect. Propensity score matching assigns a weight of 1 to every treated firm and its respective control, i.e. the untreated firm that is closest in terms of its propensity score and 0 otherwise. Nearest-neighbor matching operates in the same way as PSM but treated and control firms are matched according to the Mahalanobis norm between covariates rather than their propensity score (using only the closest neighbor for the match). Note that we always include the vector of covariates $\mathbf{X_i}$ we used to estimate the propensity score in the outcome regression (1). We ensure that the estimation of (1) only includes observations for which there is overlap in the distribution of the propensity score between treated and non-treated firms in order to maintain the common support assumption.

We now discuss the two different ways in which we define the event of a firm receiving treatment. We begin the empirical analysis by considering a firm being treated if it participates in a given export finance scheme in 2016 and/or 2017 regardless of their treatment status in 2015, and call this the 'all treated' treatment hereafter. This allows us to consider the highest number of firms taking advantage of export finance support schemes, as the only restriction we impose is to observe firms both in 2015 and 2017 to calculate the growth rate of their different indicators of export performance. The main disadvantage of doing so is that we do not know for how long have firms that we observe participating in a scheme in 2015 have actually been receiving that treatment for. As Cadot et al. (2015) and Van Biesebroeck et al. (2015) find for Tunisian and Canadian firms, the effect of export promotion on export performance is strongly influenced by the extent to which firms use a given export support policy. This is important in our case, because as we noted in Section 3, there is high persistence in firms' usage of export finance support schemes—particularly for EFS.

To allay the concern raised above, in our second treatment, we focus instead on the first instance of participation in export finance support schemes during the period of study—which we denote as 'first instance' treatment hereafter. Thus, we exclude from our estimation all firms that participated in a scheme in 2015 and define a treated firm as one that did not

participate in an export finance scheme in 2015, but did so in 2016 and/or 2017.

# 5 Results

In this section we present the estimates of the effect of export finance support schemes on export performance. We begin by discussing the estimates of the model predicting the probability that an exporter uses a given export finance scheme and assess the quality of the matching procedure. We then move to discuss the estimates of the average treatment effect of EFS and LTFF on firm-level export outcomes.

Table 4 presents the estimates of the probit models used to calculate the propensity score for each export finance support scheme under the all-treated and first-instance treatments defined in Section 4. While the key objective of propensity score estimation is to achieve a 'balancing score'—i.e. weighting the observations to eliminate biases in estimated treatment effects due to differences in the distribution of the baseline covariates—the estimates reported in Table 4 can shed light on the forces that determine firms' participation in the export finance schemes too.

Recall that a firm belongs to the 'all treated' group if it uses an export finance scheme either in 2016 or 2017 regardless of whether it used the same scheme in 2015; the 'first-instance' treatment only includes firms that use a scheme either in 2016 or 2017, but that did not use the program in 2015. The estimates in Table 4 show that larger exporters and those that experience a rejection of their application to any export finance scheme in the future (i.e. between 2018 and 2020), are consistently more likely to use export finance schemes regardless of the definition of treatment we use. These results are consistent with the empirical evidence showing that larger firms have greater working capital and machinery and equipment requirements and thus stem to benefit the most from the cheaper financing of these investments provided by the export finance support schemes; larger firms are also more likely to use commercial banks to finance their operation—a pre-requisite to use EFS

and LTFF—rather than relying on other methods like trade credit provided by suppliers or retained earnings (Petersen and Rajan, 1997; Auboin, 2007).

Table 4: First-Stage Probit for the Probability of Participating in an Export Finance Scheme

| | EFS | | LTFF | |
|---|---|---|---|---|
| | All Treated | First Instance | All Treated | First Instance |
| | (1) | (2) | (3) | (4) |
| Future rejection | 0.875*** | 0.872*** | 1.011*** | 0.957*** |
| | (0.159) | (0.274) | (0.159) | (0.186) |
| Share of exports in EFS negative list | -0.078 | 0.017 | | |
| | (0.082) | (0.144) | | |
| Share of exports in LTFF eligible list | | | 0.612*** | 0.778*** |
| | | | (0.150) | (0.191) |
| Log export value | 0.232*** | 0.195*** | 0.475*** | 0.482*** |
| | (0.015) | (0.024) | (0.047) | (0.056) |
| Log # buyers | -0.010 | -0.015 | -0.021 | 0.026 |
| | (0.033) | (0.053) | (0.066) | (0.074) |
| Log # destinations | 0.226*** | 0.093 | 0.133* | 0.082 |
| | (0.036) | (0.063) | (0.079) | (0.092) |
| Log # products | 0.030 | 0.020 | -0.098* | -0.151** |
| | (0.025) | (0.044) | (0.056) | (0.067) |
| Δ Log export value | -0.095*** | 0.005 | -0.048 | 0.092 |
| | (0.030) | (0.048) | (0.126) | (0.101) |
| Δ Log # buyers | -0.073 | -0.012 | 0.137 | -0.130 |
| | (0.048) | (0.083) | (0.140) | (0.158) |
| Δ Log # destinations | -0.100* | -0.042 | -0.108 | 0.061 |
| | (0.057) | (0.103) | (0.158) | (0.191) |
| Δ Log # products | -0.034 | -0.018 | 0.117 | 0.410*** |
| | (0.043) | (0.071) | (0.163) | (0.134) |
| Importer status | 0.013 | -0.153* | 0.719*** | 0.470** |
| | (0.047) | (0.086) | (0.212) | (0.221) |
| Observations | 8,901 | 8,135 | 8,901 | 8,839 |
| Pseudo R-squared | 0.217 | 0.115 | 0.527 | 0.492 |
| Joint significance test (p-value) | 0.00 | 0.00 | 0.00 | 0.00 |

The table reports the coefficients of a probit model estimated among the set of firms observed in 2015. The dependent variable in column (1) [(3)] take the value 1 if a firm participated in EFS [LTFF] in 2016 and/or 2017 regardless of their treatment status in 2015 and 0 otherwise. The dependent variable in column (2) [(4)] take the value 1 if a firm that did not participate in EFS [LTFF] in 2015 does so in 2016 and/or 2017. All covariates are measured in 2015 (Δ denotes the difference between the value of a given variable in 2015 relative to the value in 2014). Standard errors are in parenthesis. *, **, *** indicate significance at the 10 percent, 5 percent and 1 percent levels, respectively.

The fact that exporters that will experience a rejection of an export finance support application by SBP in the future are more likely to use the schemes between 2015 and 2017 suggests that these firms are sufficiently creditworthy to not only have a relationship with a commercial bank but also have their loan request approved by said bank. Consistent with the narrower scope of LTFF relative to EFS in terms of the exporter products eligible for support, we see that firms for which LTFF-eligible products account for a higher share of their exports in 2015 are more likely to use the scheme in 2016 and 2017, whereas the share of EFS-eligible products in total exports does not significantly influence the likelihood of participating in the program. Firms' importing status is also more important determinant of usage for LTFF than for EFS, which is consistent with the fact that most machinery and equipment purchased in developing countries is imported (Eaton and Kortum, 2001; Burstein et al., 2013).

All the propensity score specifications we estimate predict firms' usage of export finance schemes reasonably well, but crucially, there remains a substantial share of the variation in firms' treatment status left unexplained. This is important because as Blundell and Costa Dias (2009) note, on one hand, if the propensity score model predicts treatment 'too well' then the distribution of the propensity scores for treated and control firms does not overlap, making it hard to find suitable non-treated firms to match with treated ones. On the other hand, if the propensity score does not predict participation in the treatment, then the conditional independence assumption necessary to recover consistent average treatment effects is difficult to justify.

We next examine how the different matching procedures we employ perform in terms of achieving balance in the covariates used to predict treatment status. Table 6 presents standardized differences and variance ratios for all combinations of treatment, matching method and export finance support program. Large differences in covariates in the raw data reinforce the notion that export outcomes of firms that did not use the export finance support schemes do not provide an accurate estimate of the counterfactual outcome for

treated firms. Table 6 shows that weighting substantially reduces the differences in the first and second moments of covariates determining the probability of treatment. In most cases, the standardized differences of covariates fall well below the 20 percent threshold criterion commonly employed in the literature on treatment effects (Görg et al., 2008; Caliendo and Kopeinig, 2008); variance ratios tend to move closer to unity after weighting, although large differences between treated and control firms remain for certain covariates, particularly for EFS.

Table 7 presents the pseudo R-squared and joint significance tests obtained after re-estimating the propensity score probit model using only treated firms and their respective controls (Caliendo and Kopeinig, 2008). The pseudo R-squared of these regressions are all close to zero and we do not reject the null hypothesis of the joint insignificance across all covariates after weighting. These results provide further support about the pre-treatment covariates we use achieving balance between the treated and control groups.

We now move to discuss the impact of EFS and LTFF on export outcomes. The sample we use for the estimation consists of 9,873 firms which export both in 2015 and in 2017. Among these, 916 used EFS and 144 used LTFF in 2016 and/or 2017. Restricting the definition of treatment to consider only firms that did not use the schemes in 2015 but did so in 2016 or after, we have 147 and 82 firms making use of EFS and LTFF respectively. In all our estimations the distribution of propensity scores of treated and control firms exhibit full overlap and therefore we do not need to drop any treated firms off on this account.

Table 8 presents our estimates of the average treatment effect on the treated for EFS in terms of its impact on the growth rate of treated firms' total value of exports, number of products exported (at the HS 8-digit level) and the number of countries to which a firm exports. OLS estimates reveal a positive and highly significant effect of EFS on export performance across both intensive and extensive margins, with the former exhibiting a stronger impact. Controlling for the large degree on imbalance between firms in terms of their usage

Table 5: Indicators of Matching Quality

| | Standardized Differences | | | | Variance Ratio | | | |
|---|---|---|---|---|---|---|---|---|
| | Raw | IPW | PSM | NMM | Raw | IPW | PSM | NMM |
| **Panel A: EFS - All-Treated** | | | | | | | | |
| Future rejection | 0.41 | -0.10 | 0.09 | 0.00 | 25.92 | 0.76 | 1.36 | 1.00 |
| Share of exports of EFS in negative list | -0.58 | 0.03 | 0.01 | 0.04 | 0.40 | 1.00 | 0.98 | 1.03 |
| Log export value | 1.27 | -0.18 | -0.05 | 0.09 | 0.75 | 0.63 | 0.79 | 0.97 |
| Log # buyers | 1.01 | -0.18 | -0.05 | 0.05 | 0.99 | 0.58 | 0.72 | 1.01 |
| Log # destinations | 0.99 | -0.11 | 0.01 | 0.03 | 1.29 | 0.86 | 1.02 | 1.04 |
| Log # products | 0.62 | -0.11 | 0.03 | 0.02 | 1.15 | 0.89 | 0.94 | 1.08 |
| $\Delta$ Log export value | -0.11 | 0.02 | 0.05 | -0.04 | 0.22 | 0.44 | 0.44 | 1.29 |
| $\Delta$ Log # buyers | -0.10 | -0.03 | -0.02 | -0.07 | 0.42 | 0.78 | 0.72 | 1.27 |
| $\Delta$ Log # destinations | -0.02 | -0.02 | 0.02 | -0.03 | 0.73 | 1.22 | 0.97 | 1.35 |
| $\Delta$ Log # products | -0.06 | -0.02 | -0.00 | -0.05 | 0.59 | 0.97 | 0.93 | 1.21 |
| Importer status | 0.63 | -0.07 | -0.03 | -0.03 | 1.04 | 1.04 | 1.02 | 1.02 |
| **Panel B: EFS - First Instance** | | | | | | | | |
| Future rejection | 0.34 | -0.08 | 0.17 | 0.00 | 19.83 | 0.77 | 2.17 | 1.00 |
| Share of exports of EFS in negative list | -0.42 | 0.00 | 0.08 | 0.01 | 0.65 | 1.13 | 1.26 | 1.00 |
| Log export value | 1.14 | -0.13 | -0.14 | 0.14 | 0.59 | 0.51 | 0.78 | 0.84 |
| Log # buyers | 0.85 | -0.12 | 0.05 | 0.09 | 0.84 | 0.53 | 0.71 | 0.90 |
| Log # destinations | 0.70 | -0.09 | 0.15 | 0.07 | 1.16 | 0.76 | 0.87 | 1.02 |
| Log # products | 0.47 | -0.07 | -0.00 | 0.07 | 1.11 | 0.87 | 0.84 | 1.05 |
| $\Delta$ Log export value | 0.05 | -0.01 | -0.10 | 0.018 | 0.44 | 0.71 | 0.69 | 1.39 |
| $\Delta$ Log # buyers | 0.03 | -0.01 | -0.09 | 0.00 | 0.71 | 1.00 | 0.87 | 1.24 |
| $\Delta$ Log # destinations | 0.04 | -0.01 | -0.01 | -0.02 | 0.97 | 1.33 | 0.83 | 1.36 |
| $\Delta$ Log # products | 0.01 | -0.02 | -0.07 | -0.03 | 0.59 | 0.82 | 0.78 | 1.12 |
| Importer status | 0.34 | -0.06 | -0.01 | -0.06 | 1.13 | 1.00 | 1.00 | 1.00 |

The standardized difference for each covariate $X_k$ is given by $SD_k = (\overline{X}_{k,1} - \overline{X}_{k,0})/\sqrt{(s^2_{k,1} + s^2_{k,0})/2}$, where $\overline{X}_{k,1}$ and $\overline{X}_{k,0}$ denote the sample mean of covariate $X_k$ in the treatment and control groups respectively and $s^2_{k,1}$ and $s^2_{k,0}$ are the sample variances of covariate $X_k$ in the treatment and control groups respectively. The variance ratio is defined as $VR = s^2_{k,1}/s^2_{k,0}$. IPW stands for inverse probability weighting, PSM stands for propensity score matching weighting and NNM for Mahalanobis matching weighting.

Table 6: Indicators of Matching Quality

| | Standardized Differences | | | | Variance Ratio | | | |
|---|---|---|---|---|---|---|---|---|
| | Raw | IPW | PSM | NMM | Raw | IPW | PSM | NMM |
| **Panel C: LTFF - All-Treated** | | | | | | | | |
| Future rejection | 0.98 | -0.10 | -0.10 | 0.00 | 38.29 | 0.95 | 0.94 | 1.00 |
| Share of exports of LTFF in eligible list | 0.59 | 0.08 | 0.13 | -0.01 | 0.66 | 0.89 | 0.84 | 0.99 |
| Log export value | 2.60 | -0.03 | 0.05 | 0.45 | 0.47 | 0.95 | 0.96 | 1.13 |
| Log # buyers | 2.01 | 0.18 | 0.12 | 0.27 | 1.09 | 1.33 | 1.45 | 1.33 |
| Log # destinations | 1.89 | -0.00 | -0.05 | 0.19 | 1.00 | 0.96 | 1.14 | 1.24 |
| Log # products | 1.17 | 0.27 | 0.15 | 0.18 | 1.06 | 1.25 | 1.62 | 1.26 |
| $\Delta$ Log export value | -0.03 | -0.02 | -0.11 | 0.03 | 0.33 | 0.78 | 0.86 | 1.17 |
| $\Delta$ Log # buyers | 0.05 | 0.04 | -0.04 | 0.07 | 0.37 | 1.02 | 0.70 | 1.58 |
| $\Delta$ Log # destinations | 0.07 | -0.07 | -0.10 | -0.01 | 0.37 | 0.96 | 0.77 | 1.45 |
| $\Delta$ Log # products | 0.07 | 0.09 | 0.08 | 0.19 | 0.39 | 0.94 | 0.66 | 1.11 |
| Importer status | 1.71 | -0.02 | -0.04 | 0.00 | 0.12 | 1.12 | 1.32 | 1.00 |
| **Panel D: LTFF - First Instance** | | | | | | | | |
| Future rejection | 0.95 | -0.11 | 0.11 | 0.00 | 37.87 | 0.94 | 1.09 | 1.00 |
| Share of exports of LTFF in eligible list | 0.63 | 0.03 | 0.19 | -0.00 | 0.62 | 0.94 | 0.77 | 0.98 |
| Log export value | 2.58 | -0.12 | -0.10 | 0.47 | 0.43 | 0.85 | 1.10 | 1.20 |
| Log # buyers | 1.91 | 0.06 | 0.15 | 0.25 | 1.04 | 1.18 | 1.21 | 1.25 |
| Log # destinations | 1.73 | -0.09 | 0.02 | 0.19 | 1.09 | 0.97 | 0.99 | 1.28 |
| Log # products | 1.10 | 0.18 | 0.25 | 0.18 | 1.05 | 1.23 | 1.34 | 1.35 |
| $\Delta$ Log export value | 0.05 | -0.08 | -0.08 | 0.08 | 0.45 | 0.66 | 0.78 | 1.03 |
| $\Delta$ Log # buyers | 0.04 | 0.04 | 0.03 | 0.04 | 0.46 | 1.13 | 1.51 | 1.50 |
| $\Delta$ Log # destinations | 0.13 | -0.09 | -0.10 | 0.04 | 0.44 | 1.09 | 1.38 | 1.59 |
| $\Delta$ Log # products | 0.20 | 0.03 | -0.09 | 0.24 | 0.28 | 0.58 | 0.94 | 0.92 |
| Importer status | 1.60 | -0.04 | 0.10 | 0.00 | 0.20 | 1.17 | 0.68 | 1.00 |

The standardized difference for each covariate $X_k$ is given by $SD_k = (\overline{X}_{k,1} - \overline{X}_{k,0})/\sqrt{(s^2_{k,1} + s^2_{k,0})/2}$, where $\overline{X}_{k,1}$ and $\overline{X}_{k,0}$ denote the sample mean of covariate $X_k$ in the treatment and control groups respectively and $s^2_{k,1}$ and $s^2_{k,0}$ are the sample variances of covariate $X_k$ in the treatment and control groups respectively. The variance ratio is defined as $VR = s^2_{k,1}/s^2_{k,0}$. IPW stands for inverse probability weighting, PSM stands for propensity score matching weighting and NNM for Mahalanobis matching weighting.

of EFS using matching, results still shows a positive and significant, albeit smaller impact relative to the OLS estimates, of EFS on the value of export sales of firms using the scheme. The results reported in rows 2 to 4 of column (1) in Table 8 indicate that using EFS increases the annual growth rate of exports for participant firms between 3.5 and 5.8 percentage points. In contrast, we now find that making use of EFS does not have a significant impact on the number of countries that participant firms exported to, or in terms of the number of products sold abroad (see columns (2) and (3) of Table 8 respectively).

Table 7: Joint Significance and Pseudo R-squared of Treatment Status Model

| **Panel A:** | Raw | Weighted | | |
|---|---|---|---|---|
| **EFS All-Treated** | | IPW | PSM | NNM |
| pseudo R-squared | 0.20 | 0.00 | 0.00 | 0.00 |
| Joint significance test (p-value) | 0.00 | 0.08 | 0.91 | 0.99 |
| **Panel B:** | Raw | Weighted | | |
| **EFS First-Instance** | | IPW | PSM | NNM |
| pseudo R-squared | 0.12 | 0.00 | 0.03 | 0.01 |
| Joint significance test (p-value) | 0.00 | 0.97 | 0.38 | 0.97 |
| **Panel C:** | Raw | Weighted | | |
| **LTFF All-Treated** | | IPW | PSM | NNM |
| pseudo R-squared | 0.50 | 0.00 | 0.01 | 0.00 |
| Joint significance test (p-value) | 0.00 | 0.90 | 0.20 | 0.99 |
| **Panel D:** | Raw | Weighted | | |
| **LTFF First-Instance** | | IPW | PSM | NNM |
| pseudo R-squared | 0.46 | 0.00 | 0.03 | 0.00 |
| Joint significance test (p-value) | 0.00 | 0.97 | 0.14 | 1.00 |

The table reports the pseudo R-squared and the p-value associated with the chi-squared joint significance test from running the probit model of the probability of participating in each export finance scheme and treatment type (all-treated and first-instance), and the same statistics when the model is estimated using only the recipient and relevant control firms. IPW stands for inverse probability weighting, PSM stands for propensity score matching weighting and NNM for Mahalanobis matching weighting.

As we noted in Section 4 above, there are two main problems that affect the results

Table 8: Average Treatment Effect of Export Finance Scheme (EFS) on the Average Growth Rate of Export Outcomes

| | All-Treated | | | First-Instance | | |
|---|---|---|---|---|---|---|
| | Export value | # destinations | # products | Export value | # destinations | # products |
| | (1) | (2) | (3) | (4) | (5) | (6) |
| OLS | 0.067*** | 0.033*** | 0.031*** | 0.180*** | 0.067*** | 0.032 |
| | (0.014) | (0.009) | (0.010) | (0.034) | (0.020) | (0.022) |
| Inverse probability | 0.035*** | 0.012 | 0.007 | 0.155*** | 0.054*** | 0.017 |
| (IPW) | (0.013) | (0.009) | (0.011) | (0.034) | (0.020) | (0.023) |
| Propensity score | 0.058*** | 0.015 | 0.008 | 0.188*** | 0.051** | 0.038 |
| (PSM) | (0.018) | (0.012) | (0.014) | (0.045) | (0.025) | (0.033) |
| Mahalanobis matching | 0.038** | 0.020* | 0.016 | 0.134*** | 0.031 | 0.013 |
| (NNM) | (0.018) | (0.011) | (0.014) | (0.044) | (0.027) | (0.032) |
| Average growth rate of treated firms | -0.088 | -0.021 | -0.022 | 0.030 | 0.030 | -0.022 |

Each entry in the table reports the average treatment effect on the treated firms that participated in EFS—i.e. the estimated coefficient associated with a given treatment dummy (either all-treated in columns (1)-(3) or first-instance in columns (4)-(6)) in outcome regression 1, where the dependent variable is the average growth rate of the corresponding export performance measure indicated in the column header. All the covariates used to estimate the propensity score are also included in the estimated regression. Number of exported products is defined at the HS 8-digit level. The sample of firms used in these estimations consists of 9,873 firms with positive export sales in both 2015 and 2017. The all-treated treatment consists of 916 firms that used EFS in 2016 and/or 2017 regardless of their treatment status in 2015; 147 firms that did not receive the EFS subsidy in 2015 but did so in 2016 and/or 2017 are included in the first-instance treatment. Standard errors in parenthesis ***, significant at the 1% level; **, significant at the 5% level; *, significant at the 10% level.

based on the all-treated specification. First, there might be substantial heterogeneity in the length of exposure to treatment among all-treated firms because a large share of them use EFS in every year for which we have data; second, because the covariates used to estimate the propensity score are all measured in 2015, it is possible that these could be affected by the treatment. Columns (4)-(6) of Table 8 report the average treatment effect estimated when we only considered firms that did not use EFS in 2015 but did so in 2016 and/or 2017 as being treated. We find that firms that use EFS for the first time experience a large and positive effect on their average growth rate of their export sales—ranging from 13 to 19 percentage points.[13] The larger effect stems from the fact that new EFS users are substantially smaller than continuing ones and exhibit much higher growth rates in their sales (Eaton et al., 2008; Fernandes et al., 2016). This effect remains stronger than what we find for the extensive margin, for which we estimate a 5 percentage point increase in the growth rate in the number of export destinations served by treated firms and no effect in terms of the number of products exported.

A reduction on the interest rate for working capital loans not only has a direct impact on firms' marginal costs, as emphasized by Manova (2013) and Feenstra et al. (2014), but as Arellano et al. (2019) show, it can also limit the need for firms to self-insure against negative shocks and would therefore allow them to expand their scale of operation. While exporters still have access to external finance from commercial banks in the event that their application to avail of EFS is rejected by SBP, it is likely that they would substantially curtail the scale of their operation in response given the large subsidy to the cost of external finance offered

[13]In results available upon request, we investigate the effect of the export finance support schemes on the value of exports of products according to whether they are eligible or not to participate in the scheme. The results for the growth rate of exports of EFS-eligible products are very similar both magnitude and significance to benchmark estimates reported in Table 8. Estimating the model for non-eligible exports, the identification relies on treated exporters that sell some products included in the negative list. Interestingly, some of the estimated coefficients are statistically significant at the 5% and 10% for the inverse-probability weighting (IPW) and nearest neighbor (NNM) weights respectively. These estimates are substantially less precise (standard errors almost tripled relative to the benchmark specification) and are not statistically different from the estimates for eligible products. These results suggest that there might be potential spillover effects from eligible to non-eligible products within a firm, suggesting that the use of EFS might improve the overall financial health of a firm.

by EFS—a 7 percentage point reduction in interest rate—and the importance of this source of financing. While we do not have access to balance sheet data that would allows us to determine the reliance on bank loans to finance working capital needs for the firms in our data, using information from the 2013 wave of the World Bank Enterprise Surveys reveals that, conditional on having a relationship with a commercial bank, Pakistani exporters finance close to 30 percent of their working capital using bank loans; as a point of reference, Kohn et al. (2016) report that 40 percent of working capital needs for Latin American exporters are paid for with external finance.

In terms of its magnitude, the impact on exports that we find for EFS is in line with the existing empirical evidence assessing this class of incentives. Zia (2008) finds that when cotton yarn was included in the negative list of EFS in 2001, yarn producers saw their exports decline by 31 percent vis-à-vis those of firms exporting non-yarn textiles. Akgündüz et al. (2018) in turn, find that firms that use the export rediscount credit program offered by the Central Bank of Turkey—an interest rate subsidy to working capital loans similar to EFS both in its scope and the magnitude of its outlays—increased their export sales by 65% following a substantial increase in the program's expenditure. Our finding that the interest rate subsidy to finance working capital affects primarily the intensive margin of exports echoes the findings of Paravisini et al. (2015) for Peruvian exporters affected by capital flow reversals during the 2008 global financial crisis impacting the banks they borrowed from. On the other hand, EFS appears to only have a minor effect on the extensive margin of exports, which is only manifested on the number of export destinations served. This result could indicate that diseconomies of scope and market access costs are not highly responsive to a lower finance cost of working capital.

Table 9 presents our estimates for the average impact of LTFF on export performance. While the OLS estimates also suggest a positive and significant impact of this scheme on export performance, the matching estimates are substantially smaller in magnitude and are,

Table 9: Average Treatment Effect of Long-Term Financing Facility for Machinery & Equipment (LTFF) on the Average Growth Rate of Export Outcomes

| | All-Treated | | | First-Instance | | |
|---|---|---|---|---|---|---|
| | Export value | # destinations | # products | Export value | # destinations | # products |
| | (1) | (2) | (3) | (4) | (5) | (6) |
| OLS | 0.175*** | 0.090*** | 0.061*** | 0.152*** | 0.084*** | 0.026 |
| | (0.027) | (0.017) | (0.023) | (0.031) | (0.021) | (0.030) |
| Inverse probability | 0.055* | 0.034* | -0.015 | 0.039 | 0.035 | -0.050 |
| (IPW) | (0.029) | (0.020) | (0.038) | (0.033) | (0.026) | (0.042) |
| Propensity score | 0.085** | 0.056** | 0.026 | 0.083* | 0.072** | -0.029 |
| (PSM) | (0.040) | (0.027) | (0.036) | (0.047) | (0.036) | (0.042) |
| Mahalanobis matching | 0.079* | 0.042 | -0.022 | 0.061 | 0.036 | -0.072 |
| (NNM) | (0.042) | (0.027) | (0.036) | (0.049) | (0.031) | (0.046) |
| Average growth rate of treated firms | -0.032 | 0.028 | 0.013 | -0.053 | 0.026 | -0.026 |

Each entry in the table reports the average treatment effect on the treated firms that participated in LTFF—i.e. the estimated coefficient associated with a given treatment dummy (either all-treated in columns (1)-(3) or first-instance in columns (4)-(6)) in outcome regression 1, where the dependent variable is the average growth rate of the corresponding export performance measure indicated in the column header. All the covariates used to estimate the propensity score are also included in the estimated regression. Number of exported products is defined at the HS 8-digit level. The sample of firms used in these estimations consists of 9,873 firms with positive export sales in both 2015 and 2017. The all-treated treatment consists of 144 firms that used LTFF in 2016 and/or 2017 regardless of their treatment status in 2015; 82 firms that did not receive the LTFF subsidy in 2015 but did so in 2016 and/or 2017 are included in the first-instance treatment. Standard errors in parenthesis ***, significant at the 1% level; **, significant at the 5% level; *, significant at the 10% level.

for the most part, statistically insignificant. It is important to note that the results for LTFF need to be interpreted with caution for two reasons. First, since LTFF is relatively new (at least compared to EFS), or because it was only available to firms exporting a narrow set of products during our period of analysis, we only observe a small number of firms participating in the scheme. Second, while a relaxation of credit frictions could boost firms' capital accumulation and subsequently induces them to increase the scale of their operations and sales (see e.g. Brooks and Dovis, 2020; Leibovici, 2021), it is possible that large adjustment costs could result in the effect of these investment only becoming apparent over a longer time horizon than what we are currently considering.

It is also useful to put our evaluation of the impact of export finance support schemes in context by comparing it to other broadly defined export promotion policies in developing countries (Álvarez and Crespi, 2000; Volpe Martincus and Carballo, 2008, 2010a; Cadot et al., 2015; Defever et al., 2020). In contrast to our results, this body of work finds a highly robust positive impact on the extensive margin and a more limited and often insignificant effect on export sales. Two main reasons might account for this difference. First, several interventions carried out by export promotion agencies such as offering logistic help to meet foreign buyers, provision of market research, and the provision of information on customs clearance, shipping and insurance act to lower fixed costs associated with product- and market-level access, whereas, as we noted above, a reduction in the user cost of capital—particularly for working capital—has a direct effect on firms' marginal cost and therefore their sales. Second, the export finance schemes offered by SBP critically differ from most instruments of export promotion investigated in the literature in terms of their scale. As we pointed out in Section 3, the loans financed by these programs account for a non-negligible share of Pakistan's total exports and dwarf the entire budget of export promotion agencies around the world. The size of the interest rate subsidy and the scale of the loans obtained by firms are likely to be a strong driving force in explaining the large impact we find, particularly

of EFS, in boosting exports.[14]

# 6 A Back-of-the-Envelope Cost-Benefit Analysis

The results presented above show that export finance schemes—and EFS in particular—have a large positive effect on the value of exports of firms that use them. That said, the substantial interest rate subsidy offered and the level of the expenditure allocated to the schemes, it is critical to provide a perspective about their effectiveness as a policy to promote exports. This concern is all the more pressing for Pakistan, a country that systematically runs large fiscal deficits that are considered an important risk to macroeconomic stability, and which are to a large extent financed by direct borrowing from SBP (IMF, 2019).

We conduct a back-of-the-envelope cost-benefit analysis, following the approach used by Cadot et al. (2015) and Munch and Schaur (2018), to infer the additional exports generated by firms participating in export finance schemes and contrast this figure with the financial cost borne by SBP; these figures are summarized in Table 10. Before we proceed, however, it is important to note that the following exercise does not constitute a fully-fledged welfare analysis. The latter should take into consideration important aspects like the extent to which EFS eases credit constraints for exporters, general equilibrium effects—which might be quite substantial given the magnitude of the subsidies offered under EFS; the distribution of costs and benefits across manufacturing firms, which can, in turn, shape selection into exporting, and the marginal cost of public funds required to administer the schemes, to name a few, that are outside the scope of our analysis. Notwithstanding the above limitations, the exercise we conduct is informative about the aggregate impact of the export finance schemes in terms of

[14] While we observe the value of the subsidized loans that firms obtain when using the schemes, using a continuous measure of treatment exposure to estimate a dose-response function along the lines of Hirano and Imbens (2004) lies beyond the scope of this paper because of the stronger identification assumptions and data requirements necessary. In terms of identification, the use of the generalized propensity score requires that assignment to treatment levels (i.e. the value of the loan that exporters receive) to be as good as random given pre-treatment covariates. This assumption is hard to defend without balance sheet data that allow us to control for the size of loans that a firm can obtain from a commercial bank. Furthermore, since this method aims at estimating counterfactual outcomes for each level of treatment, it is crucial to have a larger number of treated observations than what we currently have.

their primary objective of increasing manufacturing exports and their direct financial cost.

Table 10: Cost-Benefit Analysis

| | EFS (1) | LTFF (2) |
|---|---|---|
| **Benefits:** | | |
| Exports of first-treated firms in 2017 | 596 m | 3,018 m |
| Additional exports generated by scheme | 88 m | *176 m* |
| | | |
| **Costs:** | | |
| Loans outstanding | 108 m | 143 m |
| SBP opportunity cost | 6.5% | 6.5% |
| Refinancing rate | 1% | 4.5% |
| Financial cost SBP | 5.9 m | 2.9 m |

All monetary values (i.e. exports, loans outstanding and the financial cost for SBP) are denominated in millions of US dollars. Treated firms are those defined as belonging to the first-instance treatment, i.e. those firms that did not participate in EFS (LTFF) in 2015 but did so in at least one year in 2016 and 2017. The estimated average treatment effect for the treated used to estimate the additional exports generated by each scheme are the simple averages of the matching estimators reported in column (4) of Table 8 and 9 for EFS and LTFF respectively. These figures are 0.159 for EFS and 0.06 for LTFF. Outstanding loans refer to the total loans received by firms receiving the first-instance treatment averaged between 2016 and 2017. The opportunity cost for SBP to raise external funds is the 6-month treasury bill rate issued by the government of Pakistan, which averaged 6.5 percent during our period of analysis. The financial cost for SBP is calculated as Loans outstanding $\times$ (SBP opportunity cost $-$ Refinancing rate). The italics on the additional exports generated by LTFF indicate that the estimated effect of the scheme is only marginally significant.

We use the estimates for first-treated firms to infer the additional exports generated by the schemes, because this group constitutes the cleanest comparison group to estimate the treatment effect of the policies. We assume that the growth rate of exports for all treated firms increases by the level of the simple average of the estimates reported in column (4) of Tables 8 and 9 for EFS and LTFF respectively—which we denote by $\overline{\hat{\beta}}$. This figure is 0.159 for EFS and 0.06 for LTFF, although the latter is only marginally significant, and thus it could be argued that LTFF does not generate new additional exports for first-treated firms. Letting $Y_{2017,T} = \sum_{i \in T} y_{i,2017}$ denote the total export sales of first-treated firms in 2017, which total 596 million US dollars, then the value of exports for treated firms had they not participated in the export finance schemes would be $[1 - \overline{\hat{\beta}}/2]/[1 + \overline{\hat{\beta}}/2] \times Y_{2017,T} = 508$

million US dollars.[15] Thus the additional exports generated by EFS among first-treated firms equal 596-508=88 million US dollars. The corresponding figure for LTFF, calculated in the same way, would be $3,018 - 2,842 = 176$ million US dollars of additional exports—again, maintaining the generous assumption that the effect of scheme on the exports of treated firms is different from zero.

We calculate the financial cost for SBP as the difference between the interest rate at which SBP can raise funds, which we take as the yield of the 6-month treasury bill rate issued by the government of Pakistan (6.5 percent per annum on average between 2015 and 2017), and the corresponding refinancing rate it charges banks (1 percent for EFS and 4.5 percent for LTFF) times the amount of loans outstanding. We chose the yield of the 6-month Treasury bill to represent the opportunity cost that SBP bears from 'printing money' to finance the schemes both because the interest rate charged to exporters on their loans and the refinancing rate charged to commercial banks are linked to the this interest rate according to the EFS and LTFF guidelines, and also because the 6-month T-bill is the most important debt instrument used by the government (SBP, 2017). Nevertheless, the 2015-2017 period is characterized by low and stable interest rates, making the financial cost of the schemes quite similar regardless of whether we use the discount rate, money market rate, or the yield on Pakistan's sovereign bonds.[16] Since the value of loans outstanding for firms receiving the first-instance treatment are 108 and 143 million US dollars for EFS and LTFF respectively, the direct (i.e. without including potential overhead costs of administering the schemes) financial cost of these two schemes for SBP are $(0.065 - 0.01) \times 108 = 5.9$ and $(0.065 - 0.045) \times 143 = 2.9$ million US dollars.

At face value, the cost-benefit analysis indicates that EFS is a highly cost-effective instrument to boost exports, particularly when firms first utilize the scheme. Nevertheless, there are two important caveats that need to be considered when assessing the effectiveness of the program as a whole. First-treated firms constitute a relatively small group among all firms

[15] Recall that we have estimated the mid-point growth rate of sales.

[16] These rates range between 6 to 9 percent on average between 2015 and 2017.

taking advantage of EFS—accounting for 15 percent of participant firms and 15 percent of the value of all refinanced loans.[17] As the results reported in Table 8 show, the estimated average treatment effect for all firms using EFS is significantly lower than for first-treated firms, while the direct financial costs for SBP are much higher. Furthermore, it is likely that the large firms that are perennial users of EFS are less likely to be credit-constrained. Thus, even if the scheme remains effective in net terms, the expansion of large exporters can end up being welfare-reducing. A second important consideration is that SBP does not adjust refinancing rates frequently, even in response to large swings in market rates, which can substantially exacerbate the financial cost of the schemes. For instance, in order to rein in domestic demand and stave off a balance-of-payments crisis, SBP more than doubled the discount rate from 6.25 to 13.75 percent over the course of 2018 without changing the refinancing rate of either EFS or LTFF (ADB, 2020).

With regards to LTFF, one view is that the largely insignificant effect we estimate indicates that if the objective is to foster exports, the resources that currently SBP allocates to LTFF should be redirected to different programs. Alternatively, one could argue that since the scheme's objective is to foster long-term investment, the one/two year perspective we take (due to data limitations), to assess the effect on exports does not make justice to the program.

# 7 Conclusion

In this paper we evaluate the effect on export performance of two large export finance support schemes, the Export Finance Scheme (EFS) and the Long-Term Finance Facility for Plant & Machinery (LTFF), provided by the State Bank of Pakistan between 2015 and 2017. These programs offer loans to finance exporters' working capital and investment in machinery and equipment respectively at highly subsidized interest rates. The schemes operate through the

[17] Firms that receive EFS on first-instance are 2.7 times smaller than the firms belonging to in the all-treated treatment.

interaction between firms and commercial banks over two stages: first, a firm with an export order or letter of credit at hand approaches a commercial bank to request a loan, which the bank considers on the basis of the firm's creditworthiness, as it does any other loan. In the event that the commercial bank decides to extend credit to the exporter, then, in the second stage, it can submit an application to SBP to refinance the loan.

A notable feature of the export finance support schemes is their size, which is orders of magnitude larger than the expenditure in other instruments of export promotion that have previously been studied in the literature. While only 5 percent of Pakistani exporters utilize EFS, the value of loans outstanding under this program accounts for 17 percent of the country's total exports during our period of analysis; even LTFF, which is more limited in its scope and terms of eligibility, provides loans worth 1 percent of Pakistan's exports.

We find that the use of EFS increases the growth rate of exports among firms using the scheme for the first time either in 2016 or 2017 by between 13-19 percentage points—an effect that is highly significant and consistent across different specifications. Along the extensive margin we find a smaller and less precisely estimated effect on the growth rate in the number of destinations served by an exporter and no significant impact in terms of the number of products that firms export. For LTFF we find smaller and only marginally significant effects across all dimensions of export performance. A coarse back-of-the-envelop cost-benefit analysis shows that EFS is a highly effective policy instrument to boost exports, particularly for new users, although it is not clear whether a net benefit is also achieved when we consider all firms that use the scheme.

Our results suggest that the schemes might be more impactful if they are more clearly targeted to new exporters or firms that are diversifying into new markets or products rather than being available primarily to established exporters. The fact that the schemes are operated through commercial banks also limits their scope to reach a large number of exporters that might rely on other sources of finance not mediated by traditional financial markets such as trade credit from suppliers, retained earnings or funds raised from family members

at home or abroad.

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