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

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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 purchases of machinery and equipment respectively. We combine customs data with information on firms' participation in each scheme between 2015 and 2017 and use a range of matching estimators combined with difference-in-differences to estimate the impact of the schemes on firms' export values, the number of products exported and the number of destinations they serve. We find that both EFS and LTFF have a large and positive impact on the exports of participant firms. A cost-benefit analysis, however, suggests that the schemes are not effective instrument to boost exports from a fiscal standpoint.

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

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

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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). Because investment in machinery and equipment is subject to large adjustment costs, being lumpy and to a large extent irreversible, credit constraints can severely hinder exporters' ability to invest, stunting their growth (Riaño, 2011; Rho and Rodrigue, 2016; Kohn et al., 2020; Brooks and Dovis, 2020; Leibovici, 2021). According to the World Economic Forum (2016), trade finance is one of the top three obstacles for exporting 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 remain popular in developing countries.[3] In this paper we investigate whether this policy does, in effect, improve firms' export performance, and—if that is the case—whether it is more effective to support firms' working capital needs or if the focus should instead be on lowering the cost of acquiring machinery and equipment.

We answer these questions by evaluating the impact of 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). EFS allows exporters to borrow funds over a period of up to 180 days to finance working capital needs

[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, see https://rbidocs.rbi.org.in/rdocs/Notification/PDFs/257IE85A5E419354C4226B855C5C7E949DF9F.PDF. 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.

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. Under both schemes, commercial banks screen and provide loans to firms; upon approval, banks refinance these loans with funds obtained at subsidized rates from SBP.

To carry out our empirical analysis, we combine customs transaction data containing the universe of international trade transactions for firms in Pakistan with data from SBP on firms' usage of EFS and LTFF over the period 2015-2017. We use a range of doubly-robust matching estimators combined with difference-in-differences to control for the non-random selection of firms into the export finance support schemes. Crucially, for the identification of the average treatment effect, we argue that, because of the way that SBP administers the schemes, assignment to treatment is unlikely to be correlated with firms' export performance once we control for observable characteristics and time-invariant unobservable factors.

Every fiscal year SBP sets limits to the total value of loans that each bank can refinance on the basis of a wide range of performance indicators and other unspecified considerations that are not disclosed to bank managers. Conversations with SBP officials indicate that the main reason for firms' applications being rejected is that the bank from which they have requested credit has reached its refinancing limit with SBP. Therefore, there is significant scope for otherwise creditworthy exporters to be prevented from taking advantage of subsidized loans when their respective banks would be willing to lend to them under the conditions specified by the export finance support schemes. 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.

We find that both EFS and LTFF have a large, positive and robust effect on the value of treated firms' exports. 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 7.5 to 9.3 percentage points. Because a substantial share of firms use EFS every year, however, these estimates could be affected by the fact that treated firms may have been using the scheme for different time horizons—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 after allays this concern and ensures that the probability of a firm using the scheme is estimated only on the basis of pre-treatment observable characteristics. In doing so, we find that EFS produces an increase of 35 to 38 percentage points in the average yearly growth rate of export sales among firms that participate in the program for the first time within our period of analysis. This is consistent with a 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). Participating in LTFF increases the growth rate of exports between 7 to 11 percentage points for treated firms, the difference between the all-treated and first-instance treatments being substantially smaller than for EFS, as a higher share of firms used LTFF for the first time during our period of study. The positive effect on exports that we estimate for subsidizing the purchase of physical capital is consistent with the predictions of models of trade with heterogeneous firms featuring financial frictions such as Kohn et al. (2020), Brooks and Dovis (2020), and Leibovici (2021). The effect of both export finance support schemes on the number of products firms' export and the number of destinations they serve, while generally positive, are less robust than those we find for export values.

With our estimates of the impact of EFS and LTFF on firms' exports sales at hand, we then turn to the second question we posed above: are export finance support schemes a cost-effective instrument for the government to foster exports? This is an issue of critical policy importance for Pakistan, which has consistently run large budget deficits that have triggered severe crises (the most recent one occurring in 2018-19), and that have been financed, to a large extent, by borrowing from SBP. Following the approach of Cadot et al. (2015), we calculate the benefits to the government as the additional tax revenue it would receive if the exports generated by each scheme increase firms' profits, which would then be taxed at the statutory corporate income tax. The cost for SBP is calculated as the amount of loans outstanding for each program, multiplied by the difference between the interest rate at which SBP can raise funds and the refinancing rate it offers commercial banks. Our analysis suggests that the export finance support schemes offered by SBP do not provide a cost-effective way to boost exports—even without taking into account administrative costs, the high incidence of tax evasion, and the widespread use of tax concessions and exemptions available in Pakistan. From a fiscal standpoint, due to the magnitude of the interest

rate subsidy and the value of loans outstanding, EFS delivers a net loss, while LTFF results in a small gain. Thus, our results indicate that, in relative terms, it would be more beneficial for the government to concentrate its limited fiscal capacity on fostering firms' accumulation of physical capital, rather than lowering their short-term working capital costs.

By evaluating two policy instruments that target very distinct margins of exporters' finance requirements—the need to raise working capital and the acquisition of machinery and equipment—we offer 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 short-term 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.[4] 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.

The sheer scale of the support schemes we study also provides a unique window into the potential of trade policy to affect export performance at the aggregate level. The value of total loans financed under EFS amounted to 3.8 billion US dollars per annum on average between 2015 and 2017—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 over the same period. These figures exceed by far the expenditure of most subsidies and instruments of export promotion studied in the literature that evaluates 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).

[4] 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.

Pakistan offers a unique environment to investigate the effect of subsidizing credit to exporters. After undertaking major trade liberalization reforms in the 1990s, over the last two decades, Pakistan's trade policy has turned inwards and protectionism has increased. Consequently, its export performance has been lacklustre and lagged relative to comparable countries in South Asia (Reis and Taglioni, 2013). High levels of effective protection, 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). Our analysis 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 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 and usage of export finance support schemes. Section 4 describes our empirical strategy. Section 5 presents the results of our estimation and the cost-benefit analysis of both schemes; Section 6 concludes and offers some policy recommendations.

2 Export Finance Support Schemes

This section describes the key characteristics 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 first introduced 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 to exporters at subsidized interest rates. EFS is available to firms exporting most manufacturing products, with the exception of a negative list of 20 sectors that includes, among others, raw cotton, yarn, grains and minerals and ores; the negative list was last updated in 2011.[5]

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

The program operates as follows. First, a firm with an export order or letter of credit approaches a commercial bank to request a working capital loan. If the commercial bank decides to extend the credit to the exporter, it then charges it an interest rate set by SBP at a lower level than the average lending rate prevailing in the market. Once the commercial bank awards a credit, it applies to SBP to refinance the loans at a subsidized rate, also set by SBP, which provides a low, but positive intermediation charge to the commercial bank. While the credit risk for the loans is still borne by the commercial bank, the SBP provides incentives for the commercial bank to offer short-term working capital finance to exporters by transferring liquid funds to it at a very low interest rate.

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.[6]

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 percent 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. Unlike EFS, which is available to firms producing a broader range of manufacturing products, 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 a similar fashion to EFS. A firm first approaches a commercial bank to obtain a long-term loan for the purchase of new machinery or equipment of up to 1.5 billion Pakistani rupees (approximately 9 million US dollars) at a subsidized interest rate set by SBP. Once the commercial

[6] For reference, Zia (2008) calculates an average subsidization rate of 6 percentage points during the 1990s and early 2000s.

[7] The sectors for which the 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.

bank approves the loan, it obtains refinance from SBP and earns a pre-specified spread on the loan. The interest rate faced by the firm is 6 percent per annum regardless of the loan's maturity and stays fixed throughout the loan's duration; the refinancing rate available to commercial banks, on the other hand, decreases 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?

Every fiscal year, the SBP allocates a limit for EFS and LTFF and loans under each scheme are disbursed on a first-come, first-served basis subject to commercial banks not surpassing their specific refinancing limit 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 deposits, market share in trade and long-term financing, in addition to 'other considerations'. Interestingly, commercial banks are not to be well aware of the factors that determine their own limit—when we asked managers in three commercial banks about the criteria that SBP used to allocate refinancing limits, we received three very different answers! Thus, there is substantial scope for otherwise credit-worthy exporters to not be able to make use of the export finance support schemes because the banks they have a relationship with experienced a negative liquidity shock (Khwaja and Mian, 2008; Paravisini et al., 2015), or because they have fulfilled their refinancing limit. As Khwaja and Mian (2008) and Zia (2008) document, swaths of firms in Pakistan are not able to substitute away from their primary banks towards other financial institutions or to obtain unsubsidized credit.

3 Data and Summary Statistics

This section describes the data we use in our empirical analysis. It provides summary statistics regarding firm-level export performance and participation in the two export finance support schemes we study.

We use two 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 2015-2017. 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. Throughout our period of analysis 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 requested each year.[8] The two data sets are linked at the firm level using National Tax Numbers.

Table 1 provides a first look at the number of exporters and their performance over our 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).

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 in Pakistan rely on 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 throughout our period of analysis, the number of exporters taking advantage from LTFF doubled between 2015 and 2017, albeit from a much lower base.

The last four columns of Table 2 provide the value of loans outstanding for each scheme and

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

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).

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.

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 during our period of analysis. 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.

4 Empirical Strategy

Our objective in this paper is to estimate the effect of the Export Finance Scheme and the Long-Term Financing Facility for Plant & Machinery on the export performance of firms that used these programs between 2015 and 2017. We use the value of firms' exports, the number of destination countries that firms export to and the number of products they export as our indicators of export performance.

In order to evaluate the effect of the schemes, we need to estimate what the export performance of firms that participated in them would have been, had they not done so—i.e. the counterfactual outcomes. Because firms have control over the decision to participate in the schemes, the average export performance of non-participating firms is unlikely to provide an adequate estimate for the counterfactual performance of treated firms. Taking advantage of the panel structure of our data, we use matching estimators combined with difference in differences to estimate the counterfactual export performance of firms that benefited from the EFS and LTFF schemes. This estimation method has been used to evaluate the impact of a wide range of export promotion policies 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).

The key identifying assumption underpinning the matching coupled with difference in differences estimator is that the evolution of the potential outcome when a firm is not treated is independent of treatment once we have conditioned on observable characteristics and time-invariant unobservable factors. If this is the case, we can then attribute any difference in export performance between treated firms and their comparison group as being due to the export finance schemes.

The issue, as McKenzie (2021) puts it, is whether it is plausible that conditional on matched observables, the reasons why one firm participates in a given export finance support scheme and another does not, are not correlated with export performance. We argue that this is the case, based on the way that export finance support schemes operate, as discussed in Section 2. Once we control for exporters' pre-treatment performance, the composition of their exports—the variables included in the propensity score—and time-invariant unobservable factors such as political connectedness, some firms might end up not being treated because the bank they would borrow from cannot participate in the export finance support scheme. This could be due to the bank having reached its refinancing limit, or simply because it does not satisfy the internal requirements set by the SBP—both factors that are not correlated with the potential borrower's export performance. Of course, if there are time-varying unobservable factors that affect both the decision of firms to use export finance support and their export performance, these could contaminate our estimates.

We use the doubly robust estimator proposed by Wooldridge (2007), which integrates propensity score weighing with covariate adjustment, to implement our different matching estimators. This estimator offers 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. We proceed 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—$\widehat{P}\left(T_i = 1|\mathbf{X_i}\right)$, 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 (the first year for which we have data available) and $\widehat{P}$ 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.[9] The dependent variable g_i is the average growth rate of a given export performance outcome for firm i between 2015 and 2017—i.e. $g_i = \left(y_{i,2017}/y_{i,2015}\right)^{1/2} - 1$. 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 $1/\widehat{P}$ to treated firms and $1/(1-\widehat{P})$ to control firms. Doing so gives giving greater importance in the comparison used to estimate the average treatment effect to both treated firms that had a lower estimated probability of using export finance support schemes and untreated firms that were more likely to use the schemes based on their observed characteristics. 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 one neighbor for the match). Note that we include the vector of covariates $\mathbf{X_i}$ we used to estimate the propensity score in the outcome regression (1) as well. 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 so as to maintain

[9] 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.

the common support assumption.

We now discuss the two ways we define the event of a firm receiving treatment. We begin our 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 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 impact 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, a large share of exporters, particularly those using EFS, take advantage of it in every year during our period of analysis.

To allay the concern raised above, in our second treatment, we focus instead on the first instance of participation in export finance support schemes (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. The first-instance treatment offers a cleaner comparison because the firms that begin to use export finance support schemes are more similar to firms that do not use the scheme not only in terms of size, but arguably across other unobservable characteristics such as political and business connections, given that bank lending and the allocation of credit subsidies in Pakistan is biased towards larger and better connected firms, as Khwaja and Mian (2005), Khwaja and Mian (2008) and Zia (2008) document.[10] The second advantage is that in the first-instance comparison we estimate the probability of participating in the schemes in 2016 and 2017 using covariates observed prior to treatment. The downside, of course, is that number of treated firms is substantially reduced, particularly for EFS.

[10]Firms that receive EFS on first-instance are 2.7 times smaller than the firms considered in the all-treated treatment. Firms that receive LTFF in the first-instance treatment are 41.5 percent smaller than those in the all-treated group.

5 Results

In this section we present the results of our evaluation. We begin by discussing the estimates of the model predicting the probability that an exporter receives treatment and evaluate the quality of the matching procedure we use. We then move to discuss our estimates of the average treatment effect of EFS and LTFF on firm-level export outcomes.

Table 3: 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)
Log export value	0.297***	0.221***	0.567***	0.547***
	(0.011)	(0.018)	(0.048)	(0.056)
Share of exports in EFS negative list	-0.211***	-0.064		
	(0.123)	(0.112)		
Share of exports in LTFF eligible list			0.547***	0.646***
			(0.128)	(0.161)
Importer status	0.098**	-0.101	0.679***	0.407*
	(0.043)	(0.081)	(0.204)	(0.209)
Observations	9,873	9,104	9,873	9,811
Pseudo R-squared	0.200	0.109	0.503	0.459
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. Standard errors are in parenthesis. *, **, *** indicate significance at the 10 percent, 5 percent and 1 percent levels, respectively.

Table 3 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', in the sense of 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 3 can also shed light on the forces that drive firms' participation in the export finance schemes. The estimates show that firm size (measured in terms of export sales) is a strong predictor of participation in

both EFS and LTFF. Firms for which incentivized products account for a higher share of their export sales—i.e. firms with a low share of their export value accounted for by products included in the negative list for EFS and firms that export a high share of products eligible to participate in LTFF—are also more likely to participate in export finance schemes. Lastly, firms engaged in importing, which tend to be more productive than those that only source their inputs domestically (Kasahara and Lapham, 2013; Halpern et al., 2015), are more likely to use export finance schemes. The estimates reported in Table 3 show that the estimates of the propensity score are very similar for the two treatments we consider, although for the first-instance treatment of EFS, only firm size appears as a significant determinant of treatment status.

Crucially for our purposes, the pseudo R-squared across all export finance support schemes and treatments indicates that while our selection model does a good job in predicting firms' treatment status, there still is substantial variation left unexplained.[11] This allows us to find firms that did not use export finance support, but closely resemble treated firms in terms of their observable characteristics, and therefore provide a suitable control group to estimate the effects of the schemes on export outcomes.

The identification of treatment effects requires that the procedure used to match recipient and control firms achieves balancing of the covariates used to predict treatment status. Table 4 presents standardized differences and variance ratios for all combinations of treatment, matching weights scheme 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 4 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); similarly, variance ratios tend to move closer to unity after weighting, although large differences between treated and control firms remain, particularly for the first instance of treatment of LTFF.

[11] As Blundell and Costa Dias (2009) note, if the propensity score model predicts treatment 'too well' then the distribution of the propensity scores for treated and control firms will not overlap and we would not be able to find suitable non-treated firms to match with treated ones; conversely, if the propensity score model has very limited success in predicting treatment, then the conditional independence assumption necessary to recover a consistent average treatment effect would be harder to defend.

Table 5 presents the pseudo R-squared and joint significance tests obtained after running the treatment status probit model using only the treated firms and their respective controls (Caliendo and Kopeinig, 2008). The fact that the pseudo R-squared of these regressions are close to zero and that we do not reject the null hypothesis of the joint significance imply that covariates do not predict treatment after weighting and thus provides further support the identifying assumption that once we control for observable covariates and time-invariant unobservable factors, assignment into the treatment is as good as random.

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 6 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 large, positive and highly significant effect of EFS on the growth rate of export sales both when we consider all-treated firms and when we focus on firms that use the scheme for the first time. The effect on the extensive margin of exports—be it in terms of the number of markets served or products exported—while positive is more muted. While the OLS estimator controls for time-invariant unobserved factors, the substantial lack of covariate balance identified in Table 4 implies that simple regression adjustment would not be sufficient to provide credible inference regarding the expected counterfactual outcomes for treated firms (Imbens and Rubin, 2015). We now turn to discuss the estimates of the average treatment effect for each scheme.

Table 4: Indicators of Matching Quality

	Standardized Differences				Variance Ratio			
	Raw	IPW	PSM	NMM	Raw	IPW	PSM	NMM
Panel A: EFS - All-Treated								
Log export value	1.33	-0.09	0.00	-0.00	0.73	0.76	0.97	1.00
Shr. of exports in negative list	-0.59	0.00	0.02	0.00	0.39	0.90	0.94	1.00
Importer	0.66	-0.01	-0.01	0.00	1.06	1.00	1.01	1.00
Panel B: EFS - First Instance								
Log export value	1.18	-0.08	-0.01	0.00	0.59	0.60	1.00	1.00
Shr. of exports in negative list	-0.45	0.01	0.11	-0.00	0.59	1.03	1.26	0.99
Importer	0.37	-0.03	-0.11	0.00	1.15	1.00	1.01	1.00
Panel C: LTFF - All-Treated								
Log export value	2.65	0.11	-0.09	0.01	0.45	1.09	0.88	1.00
Shr. of exports in eligible list	0.60	0.11	0.33	-0.01	0.66	0.86	0.67	0.99
Importer	1.77	0.01	0.00	0.00	0.12	0.92	1.00	1.00
Panel D: LTFF - First Instance								
Log export value	2.65	0.08	-0.04	0.01	0.45	1.10	1.18	0.99
Shr. of exports in eligible list	1.77	0.02	0.14	0.00	0.12	0.91	0.51	0.12
Importer	-0.44	0.02	0.22	0.02	0.30	0.98	4.01	0.30

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 5: 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	0.11	0.00	0.00	0.00
Joint significance test (p-value)	0.00	0.75	0.57	1.00
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.

Reassuringly, the estimates of the treatment effect we obtain are highly robust with respect to the choice of weighting we use to construct the counterfactual performance of treated firms. The results reported in rows 2 to 4 of column (1) in Table 6 indicate that using EFS increases the annual growth rate of export sales for participant firms between 7.5 and 9.3 percentage points. In contrast, we do not find that usage of EFS had 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 6 respectively).

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

Table 6: 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	0.253***	0.025**	0.041***	0.523***	0.095***	0.035
	(0.033)	(0.010)	(0.012)	(0.102)	(0.030)	(0.024)
Inverse probability	0.075***	0.013	0.022*	0.353***	0.083***	0.017
(IPW)	(0.020)	(0.010)	(0.011)	(0.102)	(0.030)	(0.024)
Propensity score	0.093***	0.016	0.029*	0.380***	0.081**	0.025
(PSM)	(0.024)	(0.015)	(0.016)	(0.101)	(0.037)	(0.035)
Mahalanobis matching	0.081***	0.015	0.019	0.356***	0.092**	-0.023
(NNM)	(0.024)	(0.014)	(0.016)	(0.108)	(0.037)	(0.041)
Average growth rate of treated firms	-0.013	0.011	0.017	0.281	0.083	0.015

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.

all measured in 2015, it is possible that these could be affected by the treatment. Therefore, to allay these concerns, columns (4)-(6) of Table 6 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. Consistent with our previous results, we find that participating in EFS for the first time is most effective in increasing the growth rate of export sales, although we now also find a positive and significant impact on the number of destinations that participant exporters reach. Using EFS increases the growth rate of exports among treated firms between 35 to 38 percentage points. The large increase in the magnitude of the impact of EFS relative to the first-instance treatment stems from the fact that new EFS users are substantially smaller than continuing ones, and consistent with the empirical evidence, exhibit much higher growth rates in their sales (Eaton et al., 2008; Fernandes et al., 2016).

Table 7 presents our estimates for the average impact of LTFF on export performance. Our results show that LTFF also has a positive and significant impact on export performance, and similarly to EFS, it primarily affects the growth rate of export sales rather than the extensive margin of exports of participant firms. Since the number of firms participating in LTFF almost doubles between 2015 and 2017 (see Table 2), a higher share of them receive the subsidy for the first time after 2015—therefore, the estimated effect for the all-treated and first-instance treatments, are much closer in magnitude than for EFS. The estimates reported in columns (1) and (4) of Table 7 imply that LTFF raises the annual growth rate of export sales for firms that participate in the scheme by 7 to 11 percentage points between 2015 and 2017.

The estimates reported in Tables 6 and 7 are in line with previous work showing that interest rate subsidies to working capital have a strong positive impact on export performance. 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. Since EFS lowers the cost of financing working capital, our finding that participation in the scheme has a stronger and more robust impact on the

Table 7: 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	0.669***	0.099***	0.124***	0.621***	0.098***	0.076***
	(0.063)	(0.018)	(0.025)	(0.063)	(0.024)	(0.028)
Inverse probability	0.106***	0.042**	0.021	0.070***	0.043*	-0.025
(IPW)	(0.030)	(0.019)	(0.032)	(0.028)	(0.025)	(0.034)
Propensity score	0.112***	0.025	0.032	0.095**	0.056*	0.006
(PSM)	(0.040)	(0.029)	(0.043)	(0.037)	(0.033)	(0.080)
Mahalanobis matching	0.087**	0.012	-0.015	0.084**	0.033	-0.013
(NNM)	(0.035)	(0.030)	(0.050)	(0.036)	(0.036)	(0.048)
Average growth rate of treated firms	0.003	0.045	0.044	-0.031	0.046	-0.001

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.

value of firms' exports rather than on the product and destination extensive margins is consistent with theoretical models in which bank lending affects primarily the marginal cost of production such as Manova (2013) and Feenstra et al. (2014); it also echoes the results of Paravisini et al. (2015) regarding the impact of the reduction in the supply of credit triggered by the 2008 financial crisis on Peruvian exporters. The finding that participation in LTFF also has a positive impact on export sales is consistent with models of trade in which easing up credit frictions boost firms' capital accumulation and therefore allows them to increase the scale of their operations and their sales (Brooks and Dovis, 2020; Leibovici, 2021).

Our results stand in contrast with the fact that in developing countries instruments of export promotion tend to have a more robust positive impact on the extensive margin of firms' exports (Álvarez and Crespi, 2000; Volpe Martincus and Carballo, 2008, 2010a; Cadot et al., 2015; Defever et al., 2020). There are two reasons that might explain why export finance support schemes are more effective along the intensive rather than other instruments of export promotion. First, several policies deployed 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 penetration, whereas, as we noted above, a reduction in the user cost to finance working capital or machinery and equipment have a direct effect on firms' marginal cost and therefore their sales. The second key dimension in which EFS and LTFF differ from other instruments of export promotion is 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 level of expenditure is likely to be a strong driving force in explaining the large impact we find the schemes play in boosting exports. In the next section we investigate the costs and benefits of the export finance support schemes from a fiscal standpoint.

5.1 A Back-of-the-Envelope Cost-Benefit Analysis

Our results show that both EFS and LTFF have a positive impact on boosting participant firms' exports. At the same time, however, Pakistan's central government has continued to systematically run large fiscal deficits—largely financed by borrowing from SBP—which are considered an important risk to macroeconomic stability (IMF, 2019). Given the large interest rate subsidy that

exporters using EFS and LTFF enjoy and the magnitude of funds allocated to these schemes, we now turn to investigate whether export finance support schemes provide a cost-effective way to foster exports.

We use the estimates for the impact of EFS and LTFF to conduct a back-of-the-envelope cost-benefit of the export finance support schemes for the government of Pakistan, following the approach used by Cadot et al. (2015). The results are summarized in Table 8. Taking the observed value of exports in 2017 for first-instance treated firms and using the average across the three matching estimators reported in column (4) of Tables 6 and 7 for EFS and LTFF respectively, we calculate the additional exports generated by each export finance support scheme assuming that the growth rate of exports for all treated firms increases by the level of the average treatment effect.[12] Thus, EFS is estimated to have produced 159 million US dollars of new exports in 2017, while the corresponding figure for LTFF is 231 million US dollars. These figures correspond to approximately 0.5 and 1.1 percent of Pakistan's total exports in 2017.

The benefit for the government is the potential tax revenue that it could collect by taxing the additional profits participant firms obtain by exporting more. We assume that all firms earn a 10 percent profit margin on their export sales and that these additional profits are taxed at the statutory corporate income tax rate of 30 percent.[13] Based on these assumptions, we calculate that EFS and LTFF generate 4.8 and 6.9 million US dollars worth of additional tax revenue for the government respectively.

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. 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, it follows that the

[12]Letting $Y_{2017,T} = \sum_{i \in T} y_{i,2017}$ denote the total export sales of first-treated firms, then $Y_{2017,T}/(1+\widehat{\beta})$ would be the value of exports of the treated firms had they not participated in the export finance schemes, with $\widehat{\beta}$ denoting the simple average of the average treatment effect on the treated using the different matching estimators reported in column (4) of Tables 6 and 7 ($\widehat{\beta}$ is 0.363 for EFS and 0.083 for LTFF). Consequently, $Y_{2017,T} - Y_{2017,T}/(1+\widehat{\beta})$ is the value of 2017 exports generated by a given export finance support scheme.

[13]The empirical evidence indicates that there is a high degree of heterogeneity in markup rates and profit margins across sectors and firms in developing countries (De Loecker et al., 2016). The available estimates for Pakistan vary substantially as well. Atkin et al. (2015) document an average profit margin of 8 percent for soccer ball manufacturers, while Best et al. (2015) report mean profit margins ranging between 2 to 2.5 percent.

financial cost of these two schemes for SBP are 5.9 and 2.9 million US dollars. The bottom line is that while LTFF delivers a net benefit of approximately 4 million US dollars to the government of Pakistan, EFS results in net loss of 1.2 million US dollars.[14]

Table 8: Cost-Benefit Analysis

	EFS (1)	LTFF (2)
Benefits		
Exports of treated firms in 2017	596 m	3,018 m
Additional exports generated by scheme	159 m	231 m
Profit margin	10%	10%
Corporate income tax rate	30%	30%
Additional tax collected	4.8 m	6.9 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
Net benefit central government	-1.2 m	4.1 m

All monetary values (i.e. exports, additional taxes collected, loans outstanding, financial cost for SBP and the net benefit for the central government) 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 either 2016 or 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 6 and 7 for EFS and LTFF respectively. These figures are 0.363 for EFS and 0.083 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 isthe 6-month treasury bill rate issued by the government of Pakistan, which averaged 6.5 percent during our period of analysis. Additional tax collected is calculated as Additional exports $\times$ Corporate income tax rate $\times$ Profit margin. The financial cost for SBP is calculated as Loans outstanding $\times$ (SBP opportunity cost $-$ Refinancing rate). Net benefit for the central government is given by the difference between additional tax collected and the financial cost for SBP.

Because our analysis does not account administrative costs, the high incidence of tax evasion (Best et al., 2015), and the widespread use of Statutory Regulatory Orders that provide generous tax concessions and exemptions to firms (WTO, 2015), it is likely that it over-estimates the net benefits

[14] Alternatively, we could have calculated the potential tax revenue accruing to the government by assuming that additional exports are taxed at the 1 percent turnover tax rate (as Best et al. (2015) document, the tax rate applying to a firm is determined by whether its profit tax liability falls below or not of certain threshold). Doing so, would imply that the additional tax revenue brought about by the export finance support schemes are 1.08 million US dollars for EFS and 2.31 million US dollars for LTFF. Given our estimates of financial costs, this would imply that both schemes deliver a net loss for the government: 4.82 million US dollars for EFS and 0.6 million US dollars for LTFF.

of export finance support schemes. Critically, refinancing rates are not adjusted very frequently in response to changes in market rates, which can substantially exacerbate the financial cost of the schemes. For instance, in order to rein in domestic demand and stave of a balance-of-payments crisis, the 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). Going back to the question we posed at the beginning of this section, our results suggest that the export finance support schemes offered by SBP do not provide cost-effective way to boost exports, although in relative terms, providing incentives to finance long-term investment in machinery and equipment generates higher benefits than easing up the working capital needs of exporters.

6 Conclusion and Policy Implications

The availability of finance is crucial for exporters to thrive. Longer lags between production and payment make exporters more reliant on short-term working capital finance than purely domestic firms. Over the long run, tougher competition require exporters—particularly those in developing countries—to maintain a higher level of investment in physical capital to maintain their presence in foreign markets.

In this paper we evaluate two large export finance support schemes provided by the State Bank of Pakistan that offer loans to finance working capital and investment in machinery and equipment at highly subsidized interest rates in terms of their impact on firms' export performance. Exporters apply for the loans available under each scheme to commercial banks. These, in turn, refinance the loans from the central bank again at subsidized rates. The SBP allocates refinancing limits on the basis of a wide range of factors that are not clearly disclosed to commercial banks. This in turn, means that exporters might not be able to participate in the schemes, even if a commercial bank is willing to lend to them.

We combine customs data with information on firms' usage of each export finance scheme provided by SBP to estimate the effect of the Export Finance Scheme and the Long-Term Finance Facility for Plant & Machinery on participant firms' export performance over the period 2015-2017. We use a range of matching estimators combined with difference-in-differences to control for the non-random selection of firms into the schemes. Taking advantage of conversations with

commercial bank managers and SBP staff suggests that the participation of exporters in the schemes is determined by the availability of refinancing from SBP to commercial banks, which is unlikely to be affected by factors that are correlated with exporters' performance. This reassures us that we can construct appropriate comparison groups that allow us to estimate the counterfactual export performance of firms had they not been able to access the export finance support schemes.

We find that a consistently large and positive effect of both EFS and LTFF on the export sales of firms that participated in the schemes. We estimate that using EFS increased the growth rate of export sales by 35-38 percentage points for firms that received EFS for the first time within our period of analysis; we estimate that LTFF also raised the growth rate of exports by 7 to 11 percentage for participating exporters. In contrast, the effect of both schemes along the extensive margin of exports (number of products and destinations) while positive tended to be less robust.

While our estimates indicate that both EFS and LTFF generate a large increase on exports, the magnitude of the schemes in terms of the loans they finance and the substantial difference in the interest rates that exporters faced compared to prevailing market rates begs the question: do EFS and LTFF provide a cost-effective way to boost exports? This question is all the more pressing considering Pakistan's central government tendency to run large budget deficits financed by borrowing from SBP, which has triggered several economic crises as recently as 2018-19. Our back-of-the-envelope cost-benefit analysis suggests that export finance support schemes do not provide value-for-money. EFS in particular does not increase exports enough given the financial cost that SBP incurs to raise funds for the program. We find that the lower cost of finance for investment in machinery and equipment provided by LTFF delivers small but positive fiscal benefits for the government, although it is important to note that our analysis rests on potentially strong assumptions and that it does not take into account administrative costs or the high incidence of tax evasion documented in Pakistan.

In light of our results, some policy implications emerge. It is crucial that the SBP reassesses the refinancing rates it offers to commercial banks in order to make the schemes more cost effective. Providing such large interest rate subsidies is very costly and distorts the allocation of credit at the aggregate level as Khwaja and Mian (2005) and Zia (2008) have shown. The schemes could also be more impactful if they were targeted towards new exporters or firms that are diversifying into new markets or products rather than being available primarily to established exporters.

References

Akgündüz, Y. E., S. H. Kal, and H. Torun (2018): "Do subsidized export loans increase exports?" *The World Economy*, 41, 2200–2215.

Álvarez, R. E. and G. T. Crespi (2000): "Exporter performance and promotion instruments: Chilean empirical evidence," *Estudios de Economía*, 27, 225–241.

Amiti, M. and D. E. Weinstein (2011): "Exports and Financial Shocks," *The Quarterly Journal of Economics*, 126, 1841–1877.

Antràs, P. and C. F. Foley (2015): "Poultry in Motion: A Study of International Trade Finance Practices," *Journal of Political Economy*, 123, 853–901.

Asian Development Bank and Islamic Development Bank (2020): *Pakistan: Reviving Growth through Competitiveness*, Manila.

Atkin, D., A. Chaudhry, S. Chaudhry, A. K. Khandelwal, and E. Verhoogen (2015): "Markup and Cost Dispersion across Firms: Direct Evidence from Producer Surveys in Pakistan," *American Economic Review: Papers and Proceedings*, 105, 537–544.

Bernard, A. B., J. B. Jensen, S. J. Redding, and P. K. Schott (2007): "Firms in International Trade," *Journal of Economic Perspectives*, 21, 105–130.

Best, M. C., A. Brockmeyer, H. J. Kleven, J. Spinnewijn, and M. Waseem (2015): "Production versus Revenue Efficiency with Limited Tax Capacity: Theory and Evidence from Pakistan," *Journal of Political Economy*, 123, 1311–1355.

Blundell, R. and M. Costa Dias (2009): "Alternative Approaches to Evaluation in Empirical Microeconomics," *Journal of Human Resources*, 44, 565–640.

Bricongne, J.-C., L. Fontagné, G. Gaulier, D. Taglioni, and V. Vicard (2012): "Firms and the global crisis: French exports in the turmoil," *Journal of International Economics*, 87, 134–146.

Brooks, W. and A. Dovis (2020): "Credit market frictions and trade liberalizations," *Journal of Monetary Economics*, 111, 32–47.

Cadot, O., A. M. Fernandes, J. Gourdon, and A. Mattoo (2015): "Are the benefits of export support durable? Evidence from Tunisia," *Journal of International Economics*, 97, 310–324.

Caliendo, M. and S. Kopeinig (2008): "Some Practical Guidance for the Implementation of Propensity Score Matching," *Journal of Economic Surveys*, 22, 31–72.

Chávez, J. F., A. C. Novelli, and M. Perez Leon (2020): "Export Subsidies in Emerging Markets During the Great Trade Collapse," *Economics Bulletin*, 40, 1879–1892.

Chor, D. and K. Manova (2012): "Off the cliff and back? Credit conditions and international trade during the global financial crisis," *Journal of International Economics*, 87, 117–133.

De Loecker, J., P. K. Goldberg, A. K. Khandelwal, and N. Pavcnik (2016): "Prices, Markups, and Trade Reform," *Econometrica*, 84, 445–510.

Defever, F., J.-D. Reyes, A. Riaño, and M. E. Sánchez-Martín (2019): "Special Economic Zones and WTO Compliance: Evidence from the Dominican Republic," *Economica*, 86, 532–568.

Defever, F., J.-D. Reyes, A. Riaño, and G. Varela (2020): "All these worlds are yours, except India: The effectiveness of cash subsidies to export in Nepal," *European Economic Review*, 128, 103494.

Demir, B., T. K. Michalski, and E. Ors (2017): "Risk-Based Capital Requirements for Banks and International Trade," *Review of Financial Studies*, 30, 3970–4002.

Eaton, J., M. Eslava, M. Kugler, and J. R. Tybout (2008): "Export Dynamics in Colombia: Firm-Level Evidence," in *The Organization of Firms in a Global Economy*, ed. by E. Helpman, D. Marin, and T. Verdier, Harvard University Press, 231–272.

Feenstra, R. C., Z. Li, and M. Yu (2014): "Exports and Credit Constraints under Incomplete Information: Theory and Evidence from China," *The Review of Economics and Statistics*, 96, 729–744.

Fernandes, A. M., C. Freund, and M. D. Pierola (2016): "Exporter behavior, country size and stage of development: Evidence from the Exporter Dynamics Database," *Journal of Development Economics*, 119, 121–137.

Fleisig, H. and C. Hill (1984): "The Benefits and Costs of Official Export Credit Programs," in *The Structure and Evolution of Recent U.S. Trade Policy*, ed. by R. E. Baldwin and A. O. Kruger, Chicago, IL: University of Chicago Press, 321–358.

Görg, H., M. Henry, and E. Strobl (2008): "Grant Support and Exporting Activity," *The Review of Economics and Statistics*, 90, 168–174.

Halpern, L., M. Koren, and A. Szeidl (2015): "Imported Inputs and Productivity," *American Economic Review*, 105, 3660–3703.

Imbens, G. W. and D. B. Rubin (2015): *Causal Inference for Statistics, Social, and Biomedical Sciences: An Introduction*, Cambridge University Press.

International Monetary Fund (2019): "Pakistan Country Report," Country Report 19/212.

Kasahara, H. and B. Lapham (2013): "Productivity and the decision to import and export: Theory and evidence," *Journal of International Economics*, 89, 297–316.

Khwaja, A. I. and A. Mian (2005): "Do Lenders Favor Politically Connected Firms? Rent Provision in an Emerging Financial Market*," *The Quarterly Journal of Economics*, 120, 1371–1411.

——— (2008): "Tracing the Impact of Bank Liquidity Shocks: Evidence from an Emerging Market," *American Economic Review*, 98, 1413–1442.

Kohn, D., F. Leibovici, and M. Szkup (2020): "No Credit, No Gain: Trade Liberalization Dynamics, Production Inputs, and Financial Development," Federal Reserve Bank of St Louis Working Paper 2020-038C.

Leibovici, F. (2021): "Financial Development and International Trade," *Journal of Political Economy*, 129, 3405–3446.

Manova, K. (2013): "Credit Constraints, Heterogeneous Firms, and International Trade," *Review of Economic Studies*, 80, 711–744.

McKenzie, D. (2021): "What do you need to do to make a matching estimator convincing? Rhetorical vs statistical checks," https://blogs.worldbank.org/impactevaluations/what-do-you-need-do-make-matching-estimator-convincing-rhetorical-vs-statistical?cid=SHR_BlogSiteShare_EN_EXT, Accessed: November 21, 2021.

Melitz, J. and P. Messerlin (1987): "Export credit subsidies," *Economic Policy*, 2, 149–167.

Munch, J. and G. Schaur (2018): "The Effect of Export Promotion on Firm-Level Performance," *American Economic Journal: Economic Policy*, 10, 357–387.

Niepmann, F. and T. Schmidt-Eisenlohr (2017): "No guarantees, no trade: How banks affect export patterns," *Journal of International Economics*, 108, 338 – 350.

Paravisini, D., V. Rappoport, P. Schnabl, and D. Wolfenzon (2015): "Dissecting the Effect of Credit Supply on Trade: Evidence from Matched Credit-Export Data," *Review of Economic Studies*, 82, 333–359.

Reis, J. G. and D. Taglioni (2013): "Determinants of export growth at the extensive and intensive margins : evidence from product and firm-level data for Pakistan," Policy Research Working Paper Series 6341, The World Bank.

Rho, Y. and J. Rodrigue (2016): "Firm-Level Investment And Export Dynamics," *International Economic Review*, 57, 271–304.

Riaño, A. (2011): "Exports, Investment and Firm-level Sales Volatility," *Review of World Economics (Weltwirtschaftliches Archiv)*, 147, 643–663.

Schmidt-Eisenlohr, T. (2013): "Towards a theory of trade finance," *Journal of International Economics*, 91, 96–112.

Van Biesebroeck, J., J. Konings, and C. Volpe Martincus (2016): "Did export promotion help firms weather the crisis?" *Economic Policy*, 31, 653–702.

Van Biesebroeck, J., E. Yu, and S. Chen (2015): "The impact of trade promotion services on Canadian exporter performance," *Canadian Journal of Economics*, 48, 1481–1512.

Volpe Martincus, C. (2010): *Odyssey in International Markets: An Assessment of the Effectiveness of Export Promotion in Latin America and the Caribbean*, Washington, DC: Inter-American Development Bank.

Volpe Martincus, C. and J. Carballo (2008): "Is export promotion effective in developing countries? Firm-level evidence on the intensive and the extensive margins of exports," *Journal of International Economics*, 76, 89–106.

——— (2010a): "Beyond the average effects: The distributional impacts of export promotion programs in developing countries," *Journal of Development Economics*, 92, 201–214.

——— (2010b): "Export Promotion: Bundled Services Work Better," *The World Economy*, 33, 1718–1756.

Wooldridge, J. M. (2007): "Inverse probability weighted estimation for general missing data problems," *Journal of Econometrics*, 141, 1281–1301.

World Bank (2021): *Pakistan Development Update: Reviving Exports*, Washington, DC: World Bank.

World Economic Forum (2016): "The Global Enabling Trade Report," World Economic Forum and the Global Alliance for Trade Facilitation.

World Trade Organization (2015): *Trade Policy Review of Pakistan*, Geneva: World Trade Organization.

——— (2019): *Trade Policy Review of Bangladesh*, Geneva: World Trade Organization.

Zia, B. (2008): "Export incentives, financial constraints, and the (mis)allocation of credit: Micro-level evidence from subsidized export loans," *Journal of Financial Economics*, 87, 498–527.