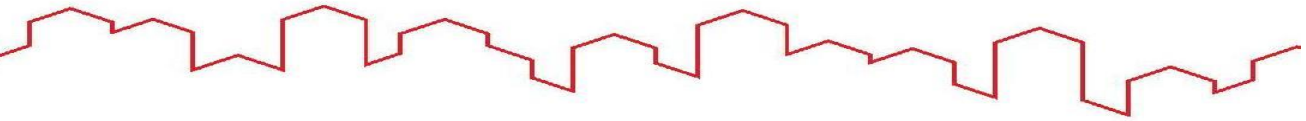

Department of Economics

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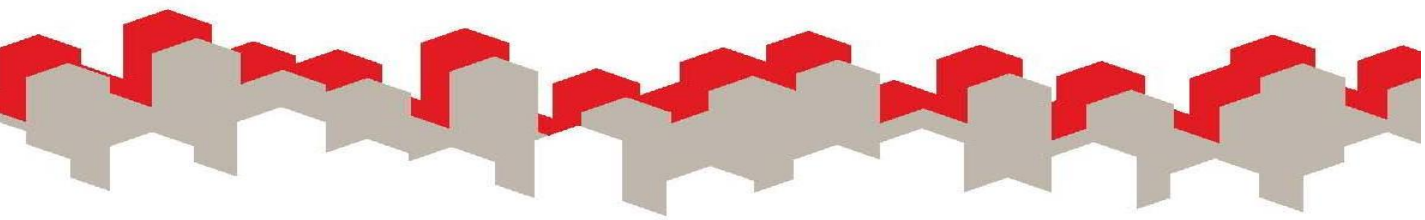

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Evaluating the Impact of Export Finance Support on Firm-level Export Performance: Evidence from Pakistan*

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Abstract

This paper evaluates the impact of two export finance support schemes: The Export Finance Scheme (EFS) and the Long-Term Finance Facility for Plant & Machinery (LTFF) on firm-level export performance. These policies offer loans to exporters at concessionary interest rates to finance short-term working capital and long-term investment in machinery and equipment respectively. To do so, we combine customs data with information about which firms participate in each scheme and the value of the loans they obtain between 2015 and 2017. We find that EFS and LTFF increased the growth rate of exports sales by 7 and 8-11 percentage points respectively. Neither policy exerts a significant impact on the number of products that a firm exports or the number of foreign countries it sells to. Our analysis indicates that facilitating long-term investment in physical capital is more cost effective to raise exports than subsidizing exporters' working capital needs.

Keywords: Trade finance; Export credit; Export subsidies; Export margins; Pakistan.

JEL classification: G21; G28; G32; F13; F65.

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1 Introduction

The global financial crisis of 2008 has forcefully demonstrated the central role that finance plays in making international trade possible. The fact that exporters are more dependent on external finance than domestic firms is well documented (Berman and Héricourt, 2010; Amiti and Weinstein, 2011; Chor and Manova, 2012; Manova, 2013; Feenstra et al., 2014). According to World Economic Forum (2016), trade finance is one of the top three export obstacles for half of the world's countries, and most notably for developing countries.

In the short run, the lag between production and payment is substantially longer for exports than for domestic transactions due to longer transit times and the time involved in clearing customs (Djankov et al., 2010; Hummels and Schaur, 2013). This in turn implies that exporters are more reliant than domestic firms on working-capital financing to cover the costs of goods that have been produced but not yet delivered, thus making them more vulnerable to shocks to their providers of credit and defaults (Amiti and Weinstein, 2011; Paravisini et al., 2015; Niepmann and Schmidt-Eisenlohr, 2017). In the long run, exporters also need to invest more heavily in physical capital to remain competitive in international markets (Bernard et al., 2007). Since investment in machinery and equipment is subject to large adjustment costs, being lumpy and to a large extent irreversible (Riaño, 2011; Rho and Rodrigue, 2016), credit constraints can severely hinder exporters to carry out the investments they require to grow.

Governments support credit for exporters either through direct concessionary loans or through insurance and guarantee programs (Fleisig and Hill, 1984). While developed countries have moved away from direct subsidized credit towards export credit guarantees since the 1980s at the behest of OECD (Melitz and Messerlin, 1987), subsidized loans for exporters remain popular in developing countries. A natural question to ask is, whether providing firms with subsidized loans to finance their short-term working capital and long-term physical capital needs improves their export performance. This is our goal in this paper.

To do so, we evaluate the impact of two policy programs 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)—that provide loans to exporters at concessionary interest rates to finance short-term working capital and long-term investment in machinery and equipment respectively. These schemes are large and well established in Pakistan. EFS, which started to operate in 1973, provided loans worth 3.8 billion US dollars per annum between 2015 and 2017, or 17.4 percent of Pakistan's total exports. While LTFF is more recent and smaller in size than EFS, its loans outstanding are equivalent to 1.3 percent of the country's exports over the same period.

Our analysis is unique in that it evaluates the impact of policies targeting two very different dimensions of the financial requirements faced by exporters. After estimating the effect that each scheme has on firm-level export performance, we go one step further and conduct a cost-benefit analysis to shed light on the effectiveness of these policies.

To carry out our empirical analysis we combine customs transaction data that contain the universe of international trade transactions for firms in Pakistan with data from SBP that tells us which firms used EFS and LTFF and the value of the loans they requested from commercial banks in each fiscal year over the period 2015-2017. Our data shows that the firms benefiting from these loans are substantially larger than the average exporter and are concentrated in the clothing, textiles and apparel sectors.

In order to address the non-random selection of exporters into the export finance support programs, we use a 'doubly robust' matching estimator combined with covariate adjustment developed by Wooldridge (2007), following the policy evaluation literature. Doing so allows us to construct an appropriate comparison group to estimate what would have been the export performance of firms that made use of EFS and LTFF had they not participated in these schemes. Our estimates of the probability that firms participate in each scheme confirm that size (in terms of export sales) is a very strong predictor of participation, as well as being an importer and exporting a large share of products for which the schemes are available.[1]

[1]EFS is available to firms in all sectors with the exception of products covered in a negative list while LTFF is available to firms exporting in 20 sectors. Details of the requirements and restrictions imposed on

Crucially, for the purposes of identification, even after controlling for the aforementioned observable characteristics determining firms' participation in the schemes, there remains substantial unexplained variation in firms' treatment status. This ensures that we can find suitable exporters that did not receive loans but that are very similar to subsidized firms in terms of their observables to estimate the latter's counterfactual outcomes.

Pakistan offers an excellent laboratory to investigate the effect of subsidized credit for exporters. While its exports have grown faster than world's exports over the last 30 years, Pakistan has experienced a notable deceleration after the 2008 financial crisis and has lagged relative to its peers in South Asia (Reis and Taglioni, 2013). It is therefore of critical importance to determine whether the schemes to support export finance currently in place are indeed effective in fostering exports, and if they are, whether they are cost-effective in pursuing this objective. The lessons drawn from our analysis are also valuable to other developing countries that are struggling to improve the dynamism of their export sectors.

We now summarize our results. We find that both EFS and LTFF have resulted in a large and positive effect on the export sales of participating firms between 2015 and 2017. More precisely, EFS led to an increase of 7 percentage points in the exports of treated firms relative to what they would have experienced had they not participated in the scheme. Similarly, LTFF generated an increase in the same performance indicator of between 8.7 and 11.2 percentage points. On the contrary, we do not find that neither export finance support scheme has had any impact on the extensive margin, be it the number of products a firm exports or the number of countries it sells to. Our results are interesting in two key respects: first, while EFS and LTFF reduce the cost of financing very different activities, they exert a similar qualitative and quantitative impact on firms' export performance. Second, the fact that both policies are only effective in increasing exports through the intensive margin stands in contrast with the findings of the literature evaluating export promotion policies in developing countries (summarized below), which finds that most of these interventions have

firms to participate in each scheme are summarized in Section 2.

a stronger impact on the extensive margin of exports.

With our estimates of the impact of EFS and LTFF on firms' exports sales at hand, we carry out a simple 'back-of-the-envelope' cost-benefit analysis of both schemes. We use two scenarios: one in which SBP's objective is to improve the consolidated fiscal position of the Government and one in which its goal is to increase foreign exchange inflows. Assuming that all firms that use the loans increase their exports by average treatment effect, they would bring 500 and 270 million US dollars worth of additional exports. We find that EFS brings in 30 million US dollars in additional tax revenues at a financial cost to SBP (borrowing in international bond markets) of 418 million US dollars; LTFF brings additional 16 million US dollars at a financial cost of 23 million US dollars. Our evaluation indicates that from a fiscal standpoint, EFS and LTFF offer an expensive way to increase tax revenues because they offer loans to firms at negative real interest rates. If we focus on foreign exchange inflows instead, the schemes appear to be more effective. We find that each additional dollar of exports due to the EFS costs SBP 83 cents of a dollar in foregone interest income while an additional dollar worth of exports due to LTFF costs SBP only 8.6 cents. Thus, our work suggests that facilitating firms' access to finance long-term investment in physical capital is a more cost-effective way to boost exports than subsidizing exporters' working capital needs.

1.1 Related Literature

Our paper contributes to the growing literature that evaluates the impact of export promotion policies on firm-level export performance (Volpe Martincus and Carballo, 2008; Görg et al., 2008; Volpe Martincus and Carballo, 2010; Cadot et al., 2015; Van Biesebroeck et al., 2015, 2016; Munch and Schaur, 2018; Defever et al., 2019, 2020; Chávez et al., 2020). This body of work has investigated a wide range of policies including a wide range of services offered by export promotion agencies such as co-financing of export business plans, logistic help in meeting foreign buyers, advertising and promotion in addition to other measures such as tax incentives granted to firms located in special economic zones and cash subsidies. We

contribute to this literature by investigating two policies that facilitate exporters' financing of working capital needs in the short-term and the purchase of machinery and equipment to expand their capital stock. As we noted above, subsidized loans to exporters is one of the two main ways in which governments can extend credit to exporters, the other being export credit guarantees. Thus, our paper is also closely related to the work by Moser et al. (2008), Felbermayr et al. (2012) and Felbermayr and Yalcin (2013) that evaluate the impact of credit guarantees on exports.

The two papers that are most closely related to ours are Zia (2008) and Akgündüz et al. (2018). Zia (2008) takes advantage of the unexpected inclusion of cotton yarn exporters in the negative list for EFS in 2000 to investigate the impact that the removal of subsidized credit has on exports and the balance sheet of affected firms. He finds that while privately-owned firms experience a substantial fall in their exports, the performance of large, publicly-listed firms is largely unaffected by the policy changes. Since approximately half of loans are assigned to large firms, EFS generates the misallocation of credit by providing subsidized credit to financially unconstrained firms. Akgündüz et al. (2018) evaluate the effect of a program of subsidized loans to exporters that is very similar to EFS on firm-level sales, exports and employment of Turkish exporters. Our work complements these papers in two key respects: first, we not only evaluate the impact of short maturity subsidized loans to working capital, but we also assess the impact of a policy that targets long-term investment in physical capital as LTFF does. Second, we not only investigate whether the export finance support policies affect total exports, but also investigate if they affect firms' diversification strategies, i.e. if they affect the number of products firms export and the number of countries they export to.

Lastly, by investigating the impact of subsidized access to both short- and long-term finance on firms' export performance, our work contributes to the flourishing literature that studies the interrelationship between international trade and finance, as exemplified by Greenaway et al. (2007), Amiti and Weinstein (2011), Manova (2013), Antràs and Fo-

ley (2015), Paravisini et al. (2015), Hoefele et al. (2016), Niepmann and Schmidt-Eisenlohr (2017), Demir et al. (2017) and many others.

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. Section 4 describes our empirical strategy. Section 5 presents our results. Finally, Section 6 concludes.

2 Export Finance Support Schemes

This section briefly describes the main 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 provides short-term working capital loans to exporters at concessionary interest rates. The scheme was first introduced in 1973 with the objective of increasing Pakistan's exports of manufacturing products, although only a small number of primary products and raw materials are excluded from the scheme.[2]

There are two variants of EFS: (i) a 'transaction-based' facility, known as Type I EFS, and (ii) a 'performance-based' facility, known as Type II EFS. Under Type I, exporters apply for loans based on individual (case-by-case) export transactions. Under Type II, firms are entitled to revolving export finance for the export transactions they conduct throughout the financial year.

Under Type I EFS, an exporter with an export letter of credit or a contract to export approaches a commercial bank (either before or after the goods have been exported) to request a loan to finance its working capital needs. The maximum maturity of a loan is 180

[2]The negative list of products excluded from EFS can be found here: http://www.sbp.org.pk/incentives/efs/efs-negative.htm.

days for direct exporters and 120 days for indirect exporters, with the option of a further 90 days rollover.[3] The loan can cover to 100 percent of the value of the export order.

The State Bank of Pakistan (SBP) determines both the interest rate that private banks charge to end users and the refinancing rate that it charges participating banks. The rate charged to end users is linked to the yield on 6-month U.S. Treasury bills, and at the beginning of 2020 it was set at 3 percent per annum. Upon disbursement of the funds to the exporter, the commercial bank obtains refinance from SBP, and earns a fixed spread between the lending and borrowing rates. During the period of our analysis, SBP set a a refinance rate of 2 percent for the loans they provide to large exporters, and 1 percent for loans to small and medium enterprises (SMEs).

Type II EFS intends to extend the benefits of Type I EFS to high-performance exporters. These firms have rolling access to loans throughout the fiscal year and at lower interest rates than under Type I EFS. The maximum maturity for a loan under Type II EFS is the same as under Type I (180 days). Every fiscal year, commercial banks are required to apply to SBP to set their refinancing limits for both parts of the scheme. Discussions with SBP staff indicate that when firms are rejected from the scheme, it is often because a bank has reached its refinancing limit.

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

The LTFF is a financing facility put in place by the SBP in 2007 with the objective of complementing EFS. It offers subsidized loans in local currency to export-oriented firms to finance long-term investments in physical capital such as plant and machinery.

To be considered 'export-oriented', a firm must either export at least 50 percent of its sales, or have an export turnover of at least 5 million US dollars. Export performance requirements such as this are commonly imposed in special economic zones, duty drawback regimes and other instruments of export promotion in developing countries, as documented

[3] An indirect exporter is defined, in the context of the rules and regulations governing EFS, as a manufacturer or supplier of goods or materials which are to be used as inputs for exports by a direct exporter.

by Defever and Riaño (2017a), Defever and Riaño (2017b) and Defever et al. (2019). A key difference between LTFF and EFS, besides the types of activities they seek to promote, is that while EFS is broadly available to firms operating in most manufacturing sectors, LTFF is only available to firms in 20 sectors.[4]

LTFF operates in a similar fashion to EFS. A firm approaches a commercial bank to obtain a long-term loan for the purchase of new machinery or equipment (which can either be imported or domestically produced). Once the commercial bank approves the loan, it obtains refinance from SBP and earns a fixed spread on the loan, which currently ranges from 4.5 percent per annum for loans up to 3 years to 3 percent for loans up to 10 years. The interest rate charged to end users is currently set at 6 percent per annum irrespective of the loan's maturity.

The maximum finance that a single firm can currently obtain through LTFF is Rs 1.5 billion (approximately 9 million US dollars) for a single loan. Each year, SBP allocates refinancing limits to each bank or financial institution participating in the scheme based on SBP's internal criteria.

3 Data and Summary Statistics

This section describes the data we use in our empirical analysis. It also provides summary statistics regarding firm-level export performance, as well as on firm- and sectoral-level patterns of participation in the two export finance support schemes we evaluate.

We use two data sets in this paper: (i) customs data, and (ii) information provided by SBP on the firms participating in EFS and LTFF. Customs data provided 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

[4]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.

imports by product at the HS 8-digit level denominated in Pakistani rupee as well as the country of origin and destination of trade flows. Throughout this period 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 the usage of export finance support schemes includes information on which firms made use of the EFS and LTFF financing facilities and the value of the loans they requested from commercial banks in each fiscal year.[5] The data are linked at the firm level using National Tax Numbers (NTN).

Table 1 provides a first pass at the export sector characteristics in our data. The number of active exporters remains stable throughout our period study, with around 14,500 firms exporting each year on average. On average, Pakistani firms export five HS 8-digit products and serve four foreign markets. Export sales per firm are highly skewed towards high values, which is reflected in the large difference between the mean and median exports per exporter. These figures are closely in line with those reported by Fernandes et al. (2016) for developing countries of a similar size.

Table 1: Export Patterns in Pakistan, 2015-2017

Year	# Firms	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, while fewer than 1 percent utilize LTFF in a given fiscal year.

[5]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. The data for EFS does not provide information about which variant(s) (Type I or II) a firm uses to obtain financing.

While the share of exporters using EFS has remained 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.

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

Year	# of exporters receiving		% of exporters receiving		Loans outstanding		Value of loans / total exports (%)	
	EFS	LTFF	EFS	LTFF	EFS	LTFF	EFS	LTFF
2015	832	64	5.6	0.4	3.56	0.14	14.6	0.6
2016	812	80	5.6	0.6	3.90	0.24	17.8	1.0
2017	814	125	5.6	0.9	3.96	0.45	18.1	2.1

Loans outstanding are denominated in billion US dollars.

The last four columns of Table 2 provide the value of loans outstanding every year for each scheme and the share of Pakistan's exports financed by them. Loans granted under EFS underwrite 3.8 billion US dollars worth of exports or 17.4 percent on average of the country's exports between 2015 and 2017. Consistent with its smaller scale and its shorter duration, LTFF accounted for 275 million US dollars or 1.3 percent of total exports over the same period. The magnitude of these figures underscores the importance of the export finance support schemes for the performance of Pakistan's export sector.

Figure 1 looks at the concentration of exports in Pakistan (measured as the percentage of exports accounted for by the largest exporting firms) and the concentration of the loans provided under the EFS and LTFF. The message provided by the picture is clear—the recipients of export finance support are among the largest exporters in Pakistan. While the largest 10 exporters in the country account for 10 percent of the country's exports, they receive more than 20 percent of the loans provided. The largest 100 exporters account for 40 percent of exports but receive two-thirds of the export finance funds. Figure 2 plots the distribution of (log) export sales according to firms' participation in the EFS and LTFF schemes and confirms the fact that firms that utilize the schemes are substantially larger

than those that do not.

Figure 1: Top Exporters and Concentration of Outstanding Loans, 2015-2017

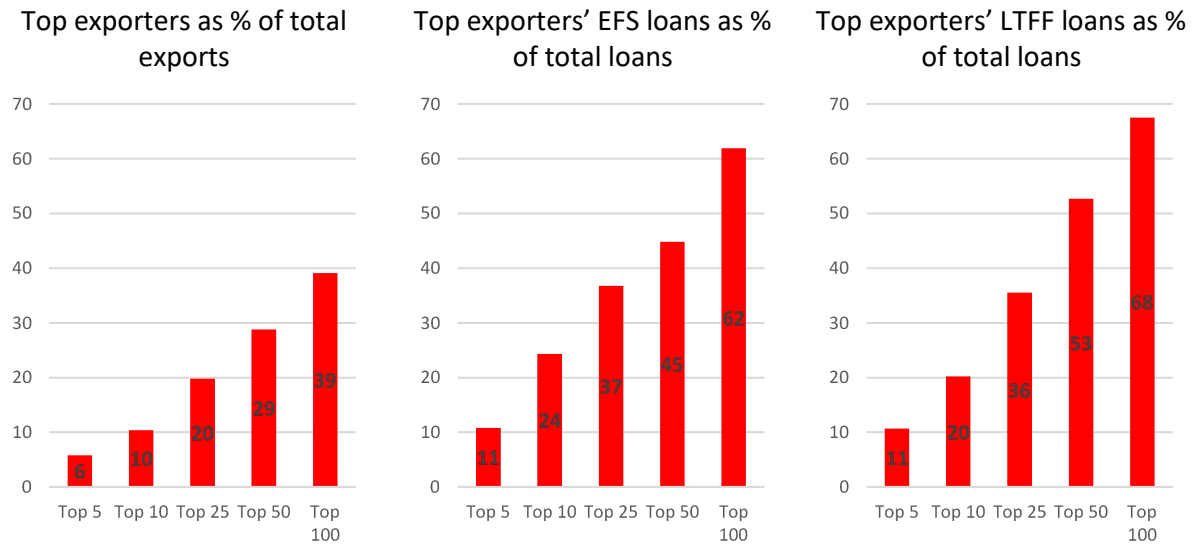
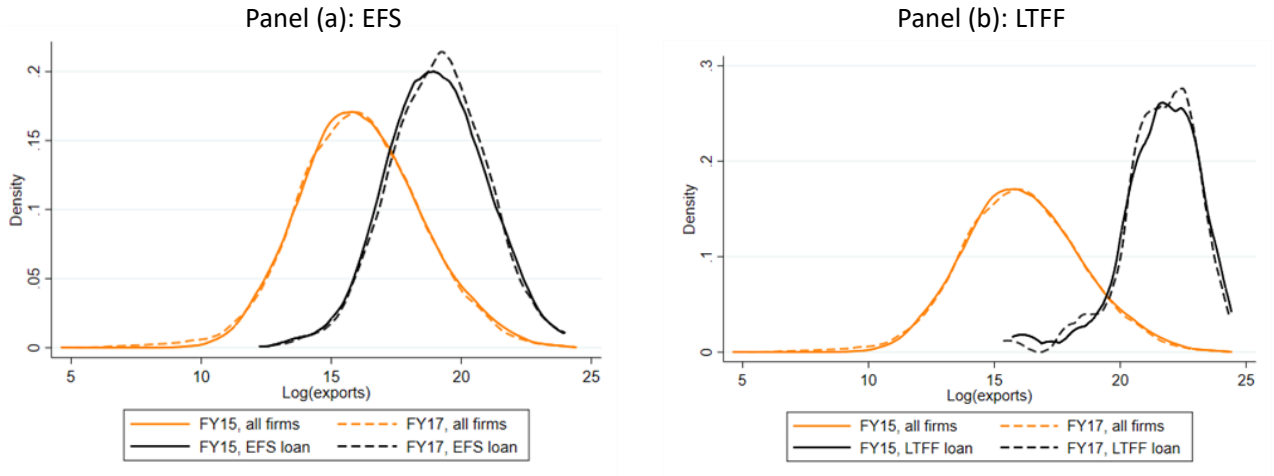


Figure 2: Distribution of Export Sales According to Participation in EFS and LTFF, 2015 and 2017



Lastly, we examine the importance of export finance support loans at the sectoral level. Table 3 presents the share of exports accounted for by ten largest sectors (in terms of export value) and the reliance of each sector on the export finance support schemes. Column 1

shows that Pakistan's exports are concentrated in very few HS 2-digit sectors; notably, the clothing and textile sectors 61-63 and 52 account for more than 55 percent of total exports over our period of study. 86 percent of LTFF loans are accounted for by exporters in these sectors, while EFS is only slightly less concentrated across sectors with 63.5 percent of loans granted to exporters in the aforementioned sectors. Two specific sectors stand out: Cotton (52) receives more than half of the LTFF funds while capturing a disproportionately lower share of EFS loans. Textiles (63) obtains a larger share of both EFS and LTFF loans relative to its contribution to aggregate exports. Interestingly, while most cereals are included in the negative list for EFS, rice is a notable exception and accounts for 17 percent of all loans granted to exporters under this scheme.

Table 3: Sectoral Export Patterns and Loan Disbursements, Top-10 Export Sectors, 2015-2017

Sector	% of total	% of loans	
HS 2-digit	exports	EFS	LTFF
Cotton (52)	17.4	10.8	48.3
Textiles (63)	17.3	27.0	26.3
Apparel and Clothing (61)	10.9	13.7	5.7
Apparel and Clothing (62)	10.1	11.8	6.1
Cereals (10)	8.5	17.1	1.0
Minerals (27)	3.3	0.0	0.0
Leather (42)	3.1	2.4	0.0
Salt, Stone, Cement (25)	2.3	0.3	0.0
Fruit and Nuts (08)	1.8	0.3	0.1
Raw Hides and Skins (41)	1.8	1.9	0.0

Summing up, EFS and LTFF finance a substantial share of Pakistan's exports, although EFS is quantitatively more important. The firms that take advantage of the subsidized loans are much larger than other exporters, and the bulk of the loans outstanding are accounted for by the largest exporting firms in the country. The usage of both schemes is also highly concentrated across sectors with clothing, textiles and apparel absorbing the vast majority of loans outstanding. 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 goal in this paper is to estimate the impact that the Export Finance Scheme and the Long-Term Financing Facility for Plant & Machinery schemes have had on the export performance of firms that participated in these programs. We evaluate the effect of the schemes on three measures of export performance at the firm-level; the average growth rate of: (i) export sales, (ii) number of destination countries in which a firm sells its output and (iii) the number of products exported between 2015 and 2017.

While we readily observe the different dimensions of export performance for firms that received support in our data, we cannot observe what would the exports of treated firms (i.e. those firms that participated in either the EFS and LTFF schemes) would had been had they not participated in the programs. This is the so called fundamental problem of policy evaluation—counterfactual outcomes cannot be observed and therefore need to be estimated. However, since firms do not randomly select themselves into participating in the schemes and treated firms differ considerably from untreated ones, most notably in terms of their size, as the previous section documents, it follows that the average export performance of non-participating firms cannot be used to estimate the counterfactual for recipient firms.

To carry out our empirical analysis we utilize matching techniques to construct an appropriate comparison group for treated firms, following the growing 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, 2010; Cadot et al., 2015; Van Biesebroeck et al., 2015, 2016; Munch and Schaur, 2018; Defever et al., 2020). That is, we use non-treated firms that are as similar as possible, along a range of observable characteristics to firms receiving support in order to estimate the expected counterfactual outcome for the latter group. Assuming that there are no systematic difference between

treatment and control groups once we control for the covariates used in the matching (i.e. if the conditional independence assumption holds), we can then attribute the differences in export performance between treated firms and the non-treated matched ones to the former group's use of export finance support schemes.

We use the so-called 'doubly robust' estimator proposed by Wooldridge (2007) to implement our matching estimators. This approach has been employed in the context of evaluating export promotion programs by Van Biesebroeck et al. (2015) and Defever et al. (2020). This estimation method entails two steps. In the first stage, we estimate the probability that a firm participates in one of the export finance schemes over the period 2015-2017 as a function 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 participates in an export finance scheme, $\mathbf{X_i}$ is the vector of covariates measured in 2015 (the first year in our data) used to do the matching and $\widehat{P}$ denotes the estimated propensity score. The variables included in $\mathbf{X_i}$ are the logarithm of a firm's export sales, the share of a firm's exports on the negative list in the case of EFS, the share of a firm's exports in the list of products eligible for LTFF, and an importer status dummy variable. It is important to note that one should not give a causal interpretation to the probit model—its purpose is to provide 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.

With the estimated propensity score at hand, in the second stage we estimate the following weighted outcomes regression:

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

The dependent variable g_i is the average growth rate of a given export performance outcome—namely, export sales, number of products exported, and number of destinations reached by firm i between 2015 and 2017. That is, for a given export outcome, y_i, $g_i = \left(y_{2017,i}/y_{2015,i}\right)^{0.5} -$

1. Note that in all outcome regressions we include the vector of covariates, $\mathbf{X_i}$, we used to estimate the propensity score. The coefficient β provides an estimate of the average treatment effect on the treated firms. We use the probability of participating in an export finance support scheme estimated in the first stage to construct three different set of weights that we use in the estimation of (1); namely, (i) inverse probability (IPW), (ii) propensity score matching (PSM) and (iii) Mahalanobis or nearest neighbor matching (NNM). To estimate the average treatment effect on the treated using IPW we assign a weight of 1 to treated firms and $\widehat{P}_i/\left(1-\widehat{P}_i\right)$ to control firms. PSM matching assigns a weight of 1 to each treated firm and its respective control, i.e. the untreated firm that is closest in terms of its propensity score and 0 otherwise. NNM works in the same way as PSM but treated and control firms are matched according to the Mahalanobis norm between covariates instead of the propensity score.

There are two conditions that need to be verified after the estimation of the propensity score: (i) the common support of the propensity scores of treated and untreated firms and (ii) that matching achieves balancing. In order to satisfy (i) we restrict the estimation of (1) to observations for which there is overlap in the distribution of the propensity score between treated and non-treated firms. For the second condition we look at standardized differences in the first moment and variance ratios before and after weighting for the covariates used to estimate the propensity score. We want our matching procedure to reduce, as much as possible, the difference in the first and second moments of the covariates for treated and control firms.

5 Results

In this section we first discuss the estimates of our model predicting the probability that an exporter participates in each of the export finance support schemes and evaluate the quality of the matching procedure for each scheme. We then move to discuss our estimates of the

average treatment effect of EFS and LTFF on firm-level export outcomes.

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

	EFS		LTFF	
	(1)	(2)	(3)	(4)
Log export value	0.320***	0.298***	0.589***	0.559***
	(0.009)	(0.010)	(0.044)	(0.044)
Shr. exports in negative list		-0.329***		
		(0.062)		
Shr. exports in eligible list				0.601**
				(0.256)
Importer		0.090**		0.707***
		(0.041)		(0.182)
Observations	14,765	13,468	14,765	14,765
Pseudo R-squared	0.224	0.238	0.488	0.505
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 columns (1) and (2) takes the value 1 if a firm participated in the Export Finance Scheme (EFS) at any point between 2015 and 2017 and 0 otherwise. The dependent variable in columns (3) and (4) takes the value 1 if a firm participated in the Long-Term Financing Facility for Machinery & Equipment (LTFF) at any point between 2015 and 2017 and 0 otherwise. All covariates are measured in 2015. The propensity score used to weight the regressions presented below corresponds to the specification in column (2) for EFS and in column (4) for LTFF. Standard errors are in parenthesis. *, **, *** indicate significance at the 10 percent, 5 percent and 1 percent levels, respectively.

Table 4 presents the estimates of the probit model used to calculate the propensity score for the Export Finance Scheme (EFS) and the Long-Term Financing Facility (LTFF). Columns (1) and (3) shows that exporter size (in terms of export sales) on its own is a strong predictor of treatment for firms' participation in both export finance support schemes. Recall from Section 2 that there is a negative list of sectors for which EFS is not available and that LTFF is in turn only available to firms in 20 sectors. Thus, in columns (2) and (4) we augment the specifications predicting firms' participating status with the share of value that firms export in sectors included in EFS' negative list and on the sectors for which LTFF is available respectively. We also include an importer status dummy in both estimations to account for the fact that firms that import goods from abroad tend to be more productive

than those that only source their inputs domestically and are therefore more likely to export and therefore require export finance (Kasahara and Lapham, 2013; Halpern et al., 2015).

The results reported in columns (2) and (4) of Table 4 indicate that larger exporters and those importing goods from abroad are more likely to take advantage of export finance support schemes. Firms for which products included in EFS' negative list account for a higher share of exports are less likely to use the program; analogously, firms for which products listed in LTFF account for a higher share of their exports are more like to participate in this scheme. Importantly, while the R-squared for both specifications, 0.238 for EFS and 0.505 for LTFF, indicate that the first-stage probit model does a good job in predicting firms' treatment status, there still is substantial variation left unexplained. This allows us to find untreated firms that closely resemble treated firms in terms of their observable characteristics, and therefore provide a suitable control group to estimate the effects of the support schemes on export outcomes.

The identification of the treatment effect requires that the procedure used to match recipient and control firms achieves balancing of the covariates used to predict treatment status. Table 5 presents standardized differences and variance ratios for each of the three weighting schemes we utilize. Large differences in covariates in the raw data reinforce the notion that the export outcomes of firms that did not took advantage of the export finance support schemes do not provide a good estimate of the counterfactual outcome for treated firms—the export performance of recipient firms had they not had access to the export finance support schemes. Table 5 shows that matching greatly reduces the differences in the first and second moments of covariates determining the probability of treatment. The standardized differences of all covariates, with one exception, fall well below the 20 percent criterion commonly employed in the literature on treatment effects (Görg et al., 2008; Caliendo and Kopeinig, 2008); similarly, the variance ratios move closer towards unity after weighting.

Table 6 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 results of this exercise—i.e. that the pseudo R-squared measures are very close to zero and that we do not reject the null hypothesis of the joint significance test—suggest that once we control for observable covariates, assignment into the treatment is as good as random. Putting it differently, covariates do not predict treatment after weighting. This message is consistent with the results we presented in Table 5—treated and untreated firms are very similar in terms of the observable characteristics we use in the estimation of the propensity score after weighting.

Table 5: Indicators of Matching Quality

	Standardized Differences				Variance Ratio			
	Raw	IPW	PSM	NMM	Raw	IPW	PSM	NMM
Panel A: EFS								
Log export value	1.50	-0.06	-0.01	0.00	0.75	0.81	0.96	1.00
Shr. of exports in negative list	0.69	0.00	0.03	0.00	1.12	1.00	0.99	1.00
Importer	-0.84	-0.01	-0.05	0.00	0.39	0.92	0.84	0.99
Panel B: LTFF								
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 $SD_k = \frac{\overline{X}_{k,1} - \overline{X}_{k,0}}{\sqrt{(s^2_{k,1} + s^2_{k,0})/2}}$, 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: Joint Significance and Pseudo R-squared of Treatment Status Model

Panel A: EFS	Raw	Weighted		
		IPW	PSM	NNM
pseudo R-squared	0.24	0.00	0.00	0.00
Joint significance test (p-value)	0.00	0.08	0.91	0.99
Panel B: LTFF	Raw	Weighted		
		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

The table reports the pseudo R-squared and p-value of the chi-squared joint significance test from running the probit model of the probability of participating in each trade finance scheme, and the same statistics when the model is estimated using only the recipient and matched control firms. IPW stands for inverse probability weighting, PSM stands for propensity score matching weighting and NNM for Mahalanobis matching weighting.

We now move to discuss the impact of EFS and LTFF on export outcomes. The sample we use in our estimation consists of 9,873 firms which export both in 2015 and in 2017 (a necessary condition to calculate the growth rate over the period). Among these, 769 participate in EFS and 62 in LTFF between 2015 and 2017. It is also worth noting that the distribution of propensity scores of treated and control firms exhibit full overlap—therefore enabling us to not exclude any treated firms from the analysis.

Tables 7 and 8 presents our estimates of the average treatment effect of EFS and LTFF respectively on the growth rate of treated firms' export performance outcomes, 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 are positive and highly significant for both schemes and across the three export performance indicators we consider. However, as we noted above, these estimates compare firms that received the trade finance support with those that did not, only controlling for the fact that treated firms are very different relative to the overall population of exporters. Table 4, however, shows that non-treated firms are systematically different from firms that actually received the treatment in terms of observable characteristics

that determine their likelihood to obtain the export scheme.

Our matching-based estimates control for selection into treatment based on observable characteristics and the use of different weights when we estimate regression 1 ensures that our results are robust with respect to the choice of firms we use as controls to estimate the counterfactual export performance of treated firms. We find a robust, positive and significant effect of both export finance support schemes on the growth rate of export value of treated firms between 2015 and 2017. More precisely, our estimates indicate that firms that took advantage of EFS to finance their working capital needs have an annual growth rate of exports that would have been 7 percentage points higher relative to what they would have experienced had they not participated in the scheme. On average, the value of exports of firms that used EFS declined by 1.3 percent between 2015 and 2017; in contrast, the much smaller firms that did not use EFS grew at 18.6 percent over the same period. Thus, if the firms that participated in EFS had not used the scheme, they would have seen the value of their exports decline by 8.3 percent between 2015 and 2017 instead of the actual 1.3 percent.

Our estimates suggests that EFS has had a large impact on aggregate exports. Assuming that the impact of the EFS scheme on all recipient firms was the same as the average treatment reported in the first column of 7, Pakistan's exports in 2017 would have been half a billion US dollars lower in the absence of EFS. EFS, however, has not had a significant effect on the growth rate of the number of products exported or on the number of foreign markets served. The estimates reported in columns 2 and 3 of 7 show that EFS did not induce exporters to diversify their export basket, either by increasing the number of products exported or by adding new foreign destinations.

Table 7: Average Treatment Effect of Export Finance Scheme (EFS) on the Average Growth Rate of Export Outcomes

	Export value (1)	# products (2)	# destinations (3)
OLS	0.258***	0.023**	0.042***
	(0.035)	(0.011)	(0.012)
Inverse probability	0.070***	0.007	0.018
(IPW)	(0.021)	(0.010)	(0.012)
Propensity score	0.071***	0.003	0.021
(PSM)	(0.025)	(0.016)	(0.016)
Mahalanobis matching	0.072***	0.004	0.013
(NNM)	(0.025)	(0.014)	(0.016)
Average growth rate of treated firms	-0.013	0.011	0.017

The table reports the average treatment effect on the treated firms that participated in EFS—the estimated coefficient associated with the EFS dummy in regression 1. All the covariates used for matching 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 which exported in both 2015 and 2017; 769 of them utilized EFS during the same period. Standard errors in parenthesis ***, significant at the 1% level; **, significant at the 5% level; *, significant at the 10% level.

LTFF had a similar impact to EFS in terms of export performance. The estimates reported in column (1) of Table 8 show that using LTFF increased the growth rate of export sales for recipient firms by 8 to 11 percentage points relative to what it would have been had these firms not participated in the scheme. Once again, assuming that the impact of LTFF across all recipient firms was equal to the average treatment effect we estimate, the results suggest that without LTFF, Pakistan's exports in 2017 would have been 300 million US dollars lower than if the scheme had not been in operation. The smaller impact of LTFF compared to EFS stems from the fact that fewer exporters used the financing facility between 2015 and 2017. Similar to EFS, LTFF had no significant impact on the growth rate of the number of products exported or on the number of destinations reached by recipient firms.

Our results are consistent with the findings of Akgündüz et al. (2018), who find that the subsidized loan program they evaluate in Turkey increases the average growth rate of exports

of treated firms by approximately 10 percentage points over the course of 5 years—a very similar magnitude to the one we estimate. Our results contrast with the majority of paper evaluating different instruments of export promotion in developing countries (Volpe Martincus and Carballo, 2008; Cadot et al., 2015; Defever et al., 2020, e.g.), in that the positive effect of export finance support operates mainly through the intensive rather the extensive margin. This result is also consistent with Paravisini et al. (2015), who find that reductions in the supply of credit to exporters affect the value of their exports rather than the number of products they export or the number of markets they reach.

Table 8: Average Treatment Effect of Long-Term Financing Facility for Machinery & Equipment (LTFF) on the Average Growth Rate of Export Outcomes

	Export value (1)	# products (2)	# destinations (3)
OLS	0.669***	0.099***	0.124***
	(0.063)	(0.018)	(0.025)
Inverse probability	0.106***	0.042**	0.021
(IPW)	(0.030)	(0.019)	(0.032)
Propensity score	0.112***	0.025	0.032
(PSM)	(0.040)	(0.029)	(0.043)
Mahalanobis matching	0.087**	0.012	-0.015
(NNM)	(0.035)	(0.030)	(0.050)
Average growth rate of treated firms	0.003	0.045	0.044

The table reports the average treatment effect on the treated firms that participated in EFS—the estimated coefficient associated with the EFS dummy in regression 1. All the covariates used for matching 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 which exported in both 2015 and 2017; 769 of them utilized EFS during the same period. Standard errors in parenthesis ***, significant at the 1% level; **, significant at the 5% level; *, significant at the 10% level.

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

Our results suggest both EFS and LTFF have had a positive impact on boosting exports, but at what cost? To assess the costs and benefits of the schemes, we carry out a back-of-the-envelop cost-benefit analysis of the two export finance support schemes, similar to the one conducted by Cadot et al. (2015) to evaluate the impact of an export promotion program in Tunisia. We consider two scenarios. In the first we assume that the State Bank of Pakistan (SBP) aims at improving the consolidated fiscal position of the Government. In this sense, it is important to compare the financial opportunity cost that SBP incurs by providing subsidized credit to exporters (instead of, for example, lending to the central Government) against the estimated tax revenues that additional exports bring into Government coffers. In the second scenario we assume instead that the SBP's objective is to secure additional foreign exchange, so we contrast each extra dollar of additional exports with the financial opportunity cost of the schemes to the SBP.

Before presenting our results, we first discuss the parameters we use in our evaluation. We use the US 6-month Treasury bill rate, which is 13 percent per annum during our period of analysis, to pin down SBP's opportunity cost of raising external funds to finance the schemes because this is the key reference interest rate that the bank uses to determine both the refinance and end-user interest rates to firms that participate in EFS and LTFF. We assume a 20 percent profit margin for exporters; this figure is very close to the markup estimates for exporters found by Loecker and Warzynski (2012). The statutory corporate income tax rate in Pakistan is 30 percent. Based on the estimates presented in the previous section, and assuming that the exports of each participating firm increase by the estimated average treatment effect, we assume that EFS and LTFF generate 500 and 270 million US dollars worth of additional exports. We assume the refinancing rates offered by SBP are 2 and 4 percent per annum for EFS and LTFF respectively. It is important to remark that we impose strong assumptions such as constant profit and tax rates across exporters and we are not considering any indirect tax effects that could be brought about by the additional

exports—thus, our the results of our analysis are to be interpreted with caution.

Table 9: Cost-Benefit Analysis

Scenario 1: increase tax revenues	**EFS**	**LTFF**
Loans outstanding	USD 3,800 m	USD 275
Additional exports	USD 500 m	USD 270 m
SBP refinancing interest rate	2% p.a.	4.5% p.a.
SBP opportunity cost	13% p.a.	13% p.a.
Financial cost for SBP	USD 418 m	USD 23 m
Profit margin exporters	20%	20%
Corporate income tax rate	30%	30%
Additional tax revenues collected	USD 30 m	USD 16 m
Scenario 2: increase foreign exchange		
Every extra dollar secured costs SBP	83 cents	8.6 cents

Loans outstanding are the total loans outstanding averaged over the period 2015-2017. Additional exports are obtained by assuming that the average treatment effect for each scheme (7 percent for EFS and 8.7 percent for LTFF) applies to all treated firms. The opportunity cost for SBP to raise external funds is given by the US 6-month Treasury bill rate, which is 13 percent during our period of analysis. The financial cost for SBP is calculated by multiplying loans outstanding by the difference between the opportunity cost and the refinancing rate it offers to commercial banks participating in the export finance support schemes. Additional tax revenues are calculated by assuming that 20 percent of additional exports constitute profits that are all taxed at the statutory tax rate of 30 percent. The last row in the table is calculated by subtracting the financial cost for SBP from the additional exports generated by each scheme relative to additional exports.

Our parametrization and calculations are summarized in Table 9. We calculate the additional tax collected by assuming that the 100 million US dollars and the 54 million US dollars worth of export profits (20 percent of the additional exports produced by the two schemes) for firms using EFS and LTFF are taxed at the statutory rate of 30%. This results in 30 and 23 million US dollars worth of additional tax revenues from EFS and LTFF respectively. This compares with the financial cost of 418 million US dollars incurred by SBP to raise funds for EFS $(3,800 \times (13\% - 2\%) = 418)$ and 23 million US dollars $(275 \times (13\% - 4.5\%) = 23.37)$ for LTFF. From a fiscal balance perspective, therefore, neither EFS nor LTFF appears to be cost effective in increasing exports despite the positive impact we have estimated for both programs in terms of raising individual export values. It is also

important to remark that both the EFS and LTFF offer loans to exporters at negative real interest rates given that during the period of analysis the inflation rate never exceeded 5 percent.

From the point of view of bringing in additional foreign exchange, the schemes appear to be more cost effective, however. The cost of bringing in each additional dollar of exports is calculated at 83 and 8.6 cents for EFS and LTFF.[6]

6 Conclusion and Policy Implications

The availability of export finance is crucial for the export sector to thrive and grow. Due to a longer production process and lag between production and delivery of goods and services, firms involved in international trade are particularly dependent on export finance for their working capital needs. In addition, with export markets being relatively more sophisticated and competitive than domestic ones, keeping up with global demand requires constant investments in technology upgrading. In this paper we evaluate the impact of the Export Finance Scheme and the Long-Term Finance Facility for Plant & Machinery on firm-level export performance. EFS and LTFF are export finance support programs offered by the SBP, with the objective of providing access to finance liquidity needs in the short term and investment in machinery and equipment in the long run for exporters in Pakistan.

Using a matching estimator to control for the non-random selection of firms into the export finance support schemes, we find that both EFS and LTFF generate a positive and substantial impact on the value of exports of firms participating in the schemes. EFS led to a 7 percentage point increase in the growth rate of exports among treated firms, while LTFF generated an increase in the same performance indicator of between 8.7 and 11.2 percentage points. We do not find evidence that either EFS or LTFF affected the growth rate in the number of products exported or the number of foreign markets reached by firms participating in the schemes. Conducting a cost-benefit analysis shows that while both schemes deliver

[6]These figures are calculated as $1-(500-418)/500$ for EFS and $1-(270-23)/270$ for LTFF.

net benefits—either in terms of higher tax revenues or foreign exchange—the financial cost that SBP incurs in offering them is quite substantial.

In light of our results, some policy implications emerge. First, to make the schemes more cost effective, it is important that the SBP reassesses the refinancing rates it offers to commercial banks. Lending at negative real interest rates is costly and distorts the allocation of credit at the aggregate level as Zia (2008) has shown. Second, the schemes could be more impactful if opened to all firms in all sectors in the economy. In particular, it is likely that new firms, or firms that are diversifying into new markets or products, may benefit more from access to export finance. Prioritizing new export ventures when allocating the funds is likely more efficient than continuing to lend to established exporters.

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