Heterogeneity and Nonlinearity in the Relationship between Rediscount Credits and Firm Exports

Okan Akarsu
Altan Aldan
Huzeyfe Torun

TÜRKİYE CUMHURİYET
MERKEZ BANKASI

Heterogeneity and Nonlinearity in the Relationship between Rediscount Credits and Firm Exports

Huzeyfe Torun
Altan Aldan
Okan Akarsu

TÜRKİYE CUMHURİYET
MERKEZ BANKASI

Heterogeneity and Nonlinearity in the Relationship between Rediscount Credits and Firm Exports

Okan Akarsu*   Altan Aldan**   Huzeyfe Torun***

Abstract

Financial constraints may hamper firm exports since firms may have to bear export-related costs before they obtain export revenues. Hence, export credits are widely used around the world to mitigate the negative effects of financial constraints. This paper focuses on a specific type of subsidized export credit, namely the export rediscount credit scheme implemented by the Central Bank of the Republic of Türkiye (CBRT), and investigates whether credit-using firms' exports increase more than they do for firms that do not use this credit in the short run without implying a causal relationship. To achieve this, we combine four datasets: the firm-level monthly data on rediscount credit, firm-level monthly data on exports, firms' annual balance sheet and income statements, and firm-level annual data on employment. We find that receiving rediscount credit is positively correlated with export growth in the short run. This correlation is robust to using alternative measures of credit use, such as a discrete measure of receiving the rediscount credit and the amount of credit. Second, we discover that the correlation between the use of rediscount credits and export growth is stronger among small and medium-sized enterprises (SMEs). Third, we investigate whether the association between rediscount credits and firm exports is non-linear and find that exports increase less proportionately for a higher level of rediscount credits. Finally, we find that both FX- and TL-denominated credits are positively correlated with exports.

Keywords: Rediscount credit, Exports, Türkiye

JEL Classifications: D22, F14, O16

*Central Bank of the Republic of Türkiye. E-mail: okan.akarsu@tcmb.gov.tr

**Central Bank of the Republic of Türkiye. E-mail: altan.aldan@tcmb.gov.tr

***Central Bank of the Republic of Türkiye. E-mail: huzeyfe.torun@tcmb.gov.tr

NON-TECHNICAL SUMMARY

Policymakers and scholars generally agree that exports support economic growth and job creation, especially in developing countries. As a result, various support schemes are implemented to boost export growth in many countries, and Türkiye is no exception. One set of export support programs aims at easing financial constraints of exporters since the effect of liquidity constraints on exporting may be more severe compared to domestic sales. In this study, we focus on a specific export support program, namely export rediscount credits, implemented by the CBRT, aiming at easing financial constraints. Through this scheme, CBRT provides exporters with rediscount credits, mostly before they collect export revenues. Firms then repay the rediscount credit after they earn export revenues. Low interest rates and commissions make this scheme an effective export subsidy.

We analyze the association between rediscount credit use and export growth for the period of 2012-2021. For this purpose, we create a detailed firm level dataset by using four data sources. We first merge firm level data on rediscount credit use provided by the CBRT at monthly frequency with firm level monthly export data provided by the Ministry of Trade. Then we expand the data set with annual balance sheet and income statement data provided by the Revenue Administration and annual employment data provided by the Social Security Institution.

Our results reveal that the amount of rediscount credit use and exports are highly correlated in the short run. We also find heterogeneities with respect to firm and loan characteristics. The correlation is stronger among SMEs compared to large firms, which is consistent with the fact that financial constraints are more binding for SMEs. Furthermore, credits with the shortest maturity have the strongest correlation with the concurrent export performance and the correlation between TL-denominated credits and exports is slightly stronger compared to the correlation between FX-denominated credits and exports. Finally, we find that the correlation between rediscount credit and exports weakens as the amount of the credit increases.

1. INTRODUCTION

Most academics and policymakers agree that exports help economies grow and create jobs, particularly in developing countries.[1] Aside from the long-studied comparative advantage framework, the recent literature highlights a variety of channels through which international trade contributes to countries' economic output. The literature mentions the following gains: import of new varieties, increasing market share of more productive firms, adoption of new technologies, and resource reallocation (Melitz and Trefler, 2012; Feenstra, 2018). However, entry and survival in foreign markets are more difficult than in domestic markets because firms face various barriers in foreign markets such as low productivity, a lack of market knowledge, and financial constraints. Therefore, governments design different sets of policies to boost exports, such as public grants for exporters, public export guarantee schemes, foreign market access programs and subsidized export loans (Srhoj et al., 2020). Consequently, the effectiveness and efficiency of export promotion efforts attract academic interest in addition to other determinants of export growth. Hence, the relation between export support programs and firm performance has been analyzed extensively in the literature for different programs and countries (Alvarez, 2004; Volpe and Carballo, 2010; Broocks and Van Biesebroeck, 2017; Munch and Schaur, 2018).

Firms may incur export-related costs before generating export revenues, so the majority of global trade is supported by some form of trade finance (Auboin, 2009). Firms with limited liquidity may struggle to cover these upfront costs if their access to financial markets is restricted. As a result, credit constraints may reduce firms' ability to export, as evidenced by several theoretical studies (for example, Manova; 2013, Chaney; 2016). In fact, the effect of liquidity constraints on exporter firms is much more severe compared to firms that operate only in the domestic market since international transactions require more working capital than domestic ones due to longer shipment periods (Amiti and Weinstein, 2011). Moreover, there is less recourse in international transactions in case of a default of international commercial loans. Accordingly, the detrimental effects of financial constraints on exports were severely observed in the global financial turmoil of 2008 with exports from countries with tight financial conditions falling sharply (Chor and Manova, 2013). Hence, there is a growing empirical literature on the relation between firms' credit constraints and their exports starting from Greenaway et al. (2007), who mainly focus on the effects of financial constraints on export decision of firms. Wagner (2014) provides a comprehensive summary of the earlier findings. In a similar fashion, several studies empirically investigate the effects of credit support schemes on exports. For example, Felbermayr and Yalcin (2013) find that export credit guarantees issued by the German government had a positive impact on exports. Zia (2008) finds that subsidized export credit scheme implemented in Pakistan had a positive impact on exports of small and privately owned firms as the termination of subsidized credit caused a significant decline. On the other hand, exports of publicly listed firms did not change after the removal of subsidized export credits.

In this study, we focus on a particular form of subsidized export loan, namely the export rediscount credit scheme, implemented by the Central Bank of the Republic of Türkiye (CBRT). Rediscount

---

[1] Since at least the 1970s, academic literature emphasized the role of exports on growth and employment creation. See for example Tyler (1976) and Kavoussi (1984).

credits are funded by the CBRT and operated via Türk Eximbank and private banks. They are appealing to businesses because of their low interest rates and commissions. Until recently, credits were FX denominated and firms used TL credits and repaid them in FX terms. Credits to be paid in TL started to be available in 2020. In this case, firms must sell the amount of their export revenues equal to the value of their rediscount credits to the CBRT when the loan matures. In 2021, rediscount credits contributed approximately 21 billion USD to FX reserves.[2]

Several studies investigate the relation between exports and financial constraints in general and rediscount credits in particular in Türkiye. Akarım (2013) finds no significant correlation between probability to export and financial constraints in a sample of firms that are quoted on the Istanbul Stock Exchange. Demirhan (2016) examines the differences between non-exporters and export starters before exporting and finds that financially constrained firms are less likely to enter the export market. Gezici et al. (2019) find no statistical correlation between financial constraints and probability to enter the export market but argue that financing constraints faced by exporting firms are eased once they start exporting.

Akgündüz et al. (2018) investigate the impact of rediscount credit use on firms' export growth. Unlike the preceding papers, they concentrate on firms that are already active in the export market. Using the CBRT's expansion of the supply of rediscount credits in 2012, which can be considered exogenous to the firms, they estimate the causal effect of using the rediscount credit for the first time on export growth in the long run using the propensity score matching method. They discover that exports of firms that used rediscount credit for the first time in 2012 increased more than firms in the matched sample that did not use rediscount credit between 2012 and 2014.

This study contributes to the empirical literature on export assistance programs as well as the empirical literature on the relationship between credit constraints and export growth. We examine the relationship between rediscount credits and exports using a very rich dataset that includes information on the use and amount of rediscount credits between 2012 and 2022, as well as customs data that includes information on the firms' monthly export performance. Our paper provides a comprehensive correlation analysis of this program as the volume of the total rediscount credits and the number of beneficiaries increased considerably in the past decade (Figure 1). Moreover, there has been a shift in the composition of beneficiaries over the last decade, with a greater emphasis on small and medium-sized enterprises (SMEs) (Figure 2). As a result, firms in our sample are expected to be comparable to the average exporting firm. Furthermore, the richness of the data allows us to examine the association of rediscount credits in FX and TL denominations with exports separately. Finally, unlike previous studies, the long period of the analysis reduces the risk of estimates being influenced by a specific economic environment.[3]

---

[2] See
https://www.tcmb.gov.tr/wps/wcm/connect/EN/TCMB+EN/Main+Menu/Statistics/Banking+Data/Rediscount+Credits+Contribution+to+FX+Reserves
[3] For example, Akgündüz et al. (2018) argue that rediscount credit may have been particularly effective in their analysis period if firms had difficulties in access to finance and firms that receive rediscount credit may be quite different from the average exporting firm.

The novelty and the contribution of the paper is partly due to the rich set of data that combines four datasets provided by different organizations. We merge the firm-level monthly data on rediscount credits, the firm-level monthly data exports, annual balance sheet and income statements of all Turkish firms, and firm-level annual data on employment. Exploiting the unique data that is established by merging these four data sources, we analyze the co-movement between rediscount credits and firm performance, exports in particular.

We find that using rediscount credit is positively correlated with export growth in the short run. This correlation is robust to using alternative measures of credit, such as a binary indicator of rediscount credit use and the amount of credit. Second, we discover that the correlation between the use of rediscount credits and export growth is stronger for SMEs. Among other explanations, we prefer the explanation that SMEs are more liquidity constrained and may face more difficulties in access to other types of finance. Third, we investigate the existence of nonlinearity in the correlation between the rediscount credits and firm exports. The results in the full sample as well as those for SMEs and large firms imply that there is decreasing marginal correlation between rediscount credits and exports. As the amount of credits increase, their additional support to exports declines. Fourth, we compare the correlations of the amount of TL- and FX-denominated credits with exports separately. Our findings indicate that both credit types are positively correlated with exports, with TL-denominated credits having a slightly stronger correlation.

The plan of the paper is as follows: The next section contains a detailed exposition of the institutional background and data. We introduce our empirical model and discuss the details of our econometric strategy in Section 3. We present estimation results in Section 4. Section 5 includes discussion of the main findings and presents some policy recommendations.

2. INSTITUTIONAL BACKGROUND AND DATA
2.1 Institutional Background

The CBRT has long been using rediscount credits for different targets. Until 1990, rediscount credits acted as a means of development financing. Afterwards, a short-term rediscount window was introduced as a monetary tool, and the banking sector's short-term liquidity needs were met by providing short-term loans in exchange for discounting commercial promissory notes. During the global crisis of 2008, rediscount credits were introduced as a tool to mitigate financial constraints on exporters. Over time, the credit scope, limits and terms were gradually extended.

Currently, the rediscount credits program is a collaboration between the CBRT and Turkish banks with the aim of providing financial support to exporting firms. The program offers advantageous conditions for companies engaged in the export of goods and foreign exchange earning services. Export rediscount credits are relatively more accessible for exporting firms in terms of collateral and other conditions. Moreover, the cost of export rediscount credits is significantly lower compared to similar credits available in the market. Export rediscount credit is a financing option available for both goods and services exports, encompassing pre- and post-shipment periods, with

a maximum maturity of 360 days.[4] This credit facility is available to exporters who have made the commitment to export their products. The process of obtaining export rediscount credits can be initiated by either commercial banks or by Türk Eximbank. If payments are made after the due date, a 3 percent late payment penalty is applied. Similarly, for unfulfilled export commitments, a 3 percent late payment penalty applies from the date of credit initiation. In such cases, various taxes are imposed as well.

The CBRT changed the eligibility condition for the rediscount credits in 2021. Only firms whose export amount in the last three years or the last year is at least 10 percent higher than the import amount are granted rediscount credits. Moreover, credits can only be used in specified TL-denominated expenditures, and the repayments of these loans will be made solely with export proceeds. As a result, the number of firms receiving the credit and the amount of credit used decreased in 2021 (Figure 1). Furthermore, the CBRT started providing TL rediscount credits continuously after September 2021.[5]

Figure 1: Amount of rediscount credits and number of beneficiary firms over time
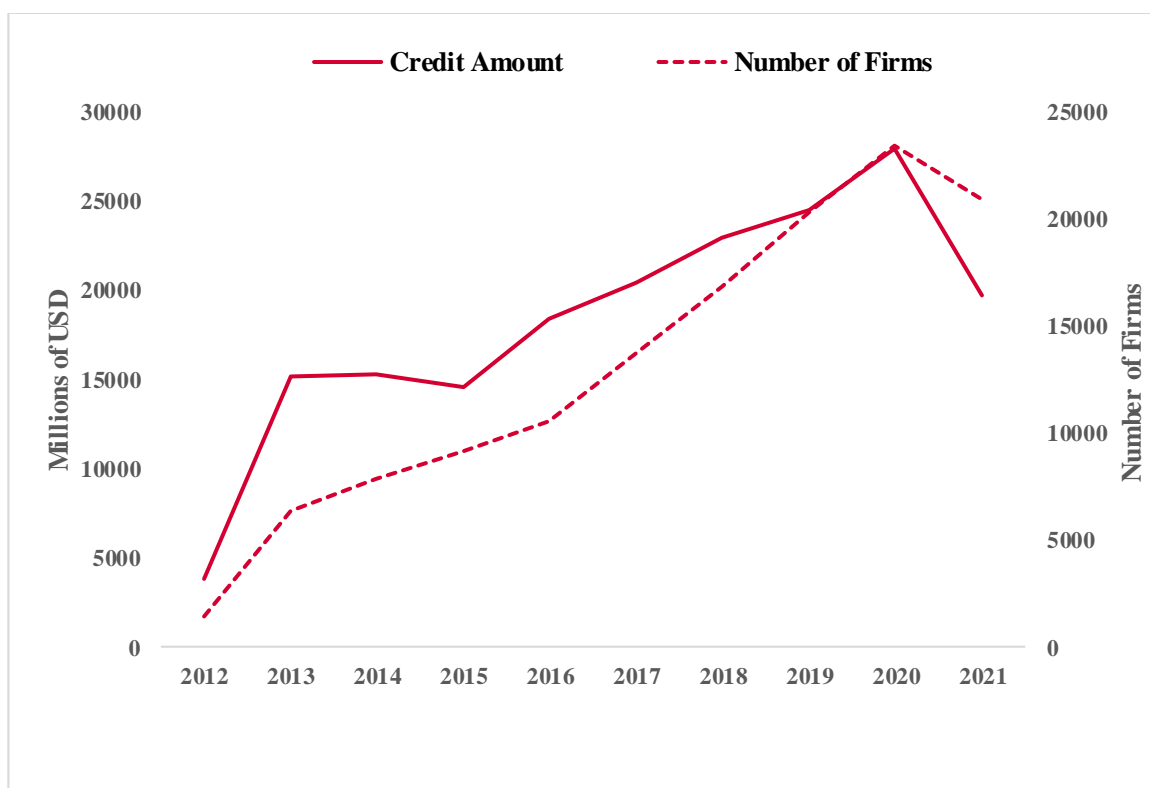
Source: Authors' calculations using CBRT data

---

[4] Initially, the maturity of rediscount credits was limited to 120 days, but the limit has been eased steadily. In 2013, the maximum maturity was extended to 240 days. In 2016, the maximum maturity of rediscount credits was extended for selected high technology industries or selected new markets. In 2020, in order to alleviate the devastating effects of the Covid-19 pandemic, the limit was extended to 720 days temporarily.

[5] In March 2020, TL-denominated FX credits were introduced against the negative effects of the Covid-19 pandemic. However, this was a temporary precaution.

Exports of SMEs can be more sensitive to credit market conditions as their internal resources are limited. To alleviate the negative effects of credit constraints on SME exports, the CBRT imposes lower bounds to the share of SMEs in rediscount credits use. As a result, the share of SMEs in the number of firms using rediscount credit is steadily increasing (Figure 2). Similarly, the portion of credits directed to SMEs is increasing but remains low.

Figure 2: Share of amount of rediscount credits and number of firms for SMEs
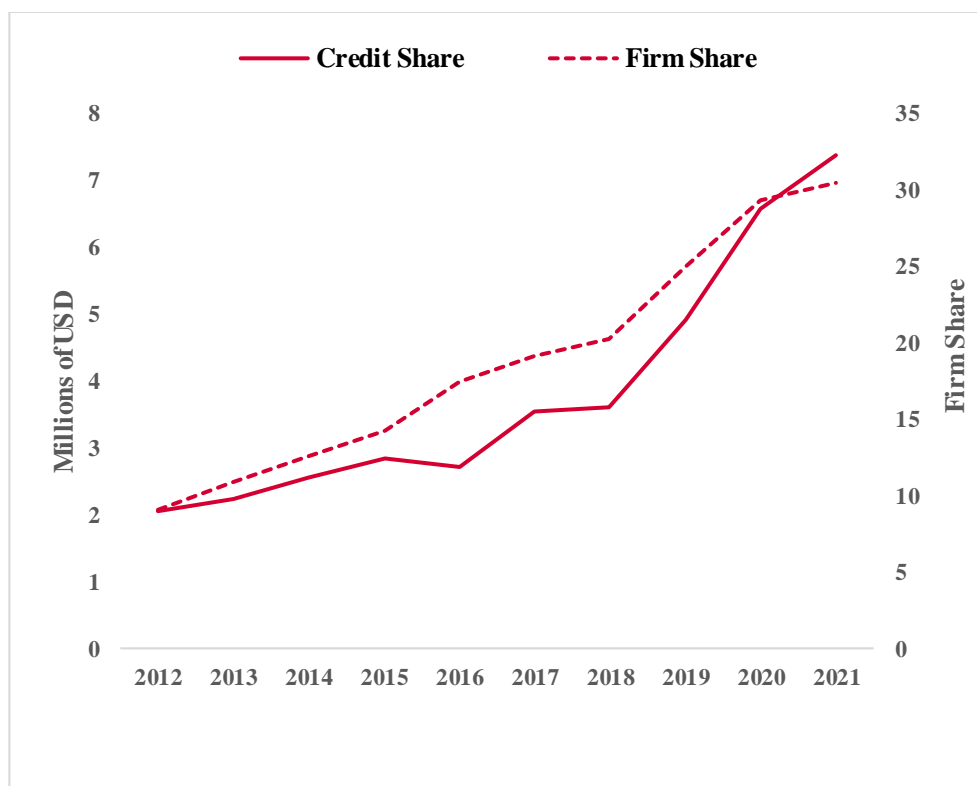
Source: Authors' calculations using CBRT data

2.2 Data

We use a rich set of data that enables us to analyze the correlation of rediscount credits with exports in detail. We merge four datasets provided by different organizations using generated firm IDs that are unique across firms and common across the datasets.[6] The firm-level monthly data on the use of rediscount credits and the amounts received are provided by the CBRT. The data contains information on the firm-bank level links, maturity and currency denomination of the rediscount credits drawn by firms. Our second dataset contains firm-level monthly exports and is provided by the Ministry of Trade. These two data sources are unbalanced panel data in the sense that we observe the firms only in the months they receive credits or in the months they export. In order to see the effect of getting rediscount credit on the level of future exports, we expand two data sources

---

[6] The data provided by the origin institutions are provided at the CBRT with generated firm ID numbers, and are available for use on site. Trade, balance sheet income statement and employment data are also available at the Ministry of Industry and Technology, at the Entrepreneur Information System laboratory.

for the years 2012-2021 for all months and match the datasets using the unique firm identifiers. Thirdly, we use the dataset provided by the Revenue Administration which contains the annual balance sheet and income statements of all Turkish firms that keep book records on a balance sheet basis for the period 2012-2021. Incorporated firms have to report balance sheets and income statements according to Tax Procedure Law No. 213 of Türkiye. On the other hand, unlimited firms (e.g. sole proprietorship) which are operating under the personal income tax regime only have to report balance sheets and income statements if they cross a certain size threshold. The dataset excludes firms in the financial and public sectors. Finally, we merge the annual balance sheet data with the firm-level annual employment data collected by the Social Security Institution, which allows us to obtain information about the firm size.[7] The merger of these four data sources constitutes a unique resource for the analysis of the relationship between credits and firm performance, exports in particular. The monthly frequency of the merged data further strengthens the analysis as we can capture the ups and downs in the credit usage throughout the 10-year period.

As a basic data cleaning procedure, we exclude firm-year observations with inconsistent values such as negative employment, negative total assets or negative net sales. In the merged and cleaned data, for each firm-year observation that exists in the balance sheet data and has non-negative net sales, we observe the months that the firm receives rediscount credit and those with no rediscount credit, the months that the firm exports and the months with no export activity.[8] In this sample, the firm characteristics extracted from the balance sheet data and employment vary at an annual basis, and the rest varies at a monthly basis. In this set up, our sample contains a firm observation only if the firm exists in the balance sheet data, and we keep the firms that exist in the balance sheet data even if they did not receive rediscount credit or export in the corresponding months. In other words, a firm's existence is measured and observed by its being in the balance sheet data.

Table 1 presents summary statistics for the 2012-2021 period. In the econometric analysis, we use exports and rediscount credits in USD terms. The mean of monthly exports of firms that have an export entry is around 1 million USD, whereas it declines to 65 thousand USD if we include firms with no export entry in the corresponding month. Rediscount credit users have higher export values irrespective of the firm size. Average monthly export value of credit users is around 65.4 million USD for all firms, 4.9 million USD for SMEs and 93.2 million USD for large firms, respectively.

Table 1: Summary Statistics

Variable	Total		SMEs		Large Firms	
	Mean	**Std. Dev.**	**Mean**	**Std. Dev.**	**Mean**	**Std. Dev.**
Share of Credit User Firms (%)	0.4		0.3		6	
Net Sales (1000 TRY)	20388	34719	10454	116872	60036	245339
Employment	44.82	210.32	14.54	232.17	801.1	1402.4
Exports (1000 USD)						
All Firms	65.44	1813.7	38	851.2	1474.1	1225
Only Exporters	1011.72	2256	259	1062	1900	13042
Rediscount Credit Users	65396.5	27315.7	4944.2	9956.6	93160.6	32617.9
Rediscount credit (1000 USD)						
All Firms	296.19	2990.7	257.2	1261.1	859.92	974.51
Credit Users	1374.17	3844.04	731.36	329.44	1725.36	4342.79
Ratio of Firms using Rediscount Credits w.r.t Maturity (%)*						
Maturity ≤ 90 Days	0.03		0.03		0.4	
90 < Maturity ≤ 120 Days	0.05		0.03		0.8	
120 < Maturity ≤ 180 Days	0.04		0.04		0.7	
180 < Maturity ≤ 240 Days	0.15		0.08		3	
240 < Maturity ≤ 360 Days	0.06		0.04		0.9	
Maturity > 360 Days	0.06		0.03		0.1	

Source: CBRT.

Notes: Average value of 2012-2021 period. A firm is classified as an SME if its number of employees is less than 250, and large otherwise. *Share in all firms within the group of firms in the same column.

3. METHODOLOGY

The empirical framework aims at capturing the correlation between a firm's use of rediscount credits and its export performance in the following months. First, we estimate whether exports increase within the six months after receiving the rediscount credit using the following fixed effects regression;

$$\text{EX}_{i,t} = \alpha_0 + \sum_{k=1}^{K} \alpha_k \, EX_{i,t-k} + \sum_{m=0}^{6} \delta_m \, RC_{i,t-m} + \beta' X_{i,t} + \mu_i + \delta_t + \theta_{s,t} + \varepsilon_{i,t} \qquad (1)$$

where subscripts i and t denote firm and year-month, respectively. $\text{EX}_{i,t}$ denotes the logarithm of exports of firm i at time t and $EX_{i,t-k}$ denotes k^{th} lagged value of exports. $RC_{i,t}$ is the logarithm of

total rediscount credits used by firm i at time t.[9] $X_{i,t}$ includes logarithm of net sales ($NS_{i,t}$) and logarithm of employment ($EMP_{i,t}$) to control for the firm size, and α, δ and β denote the parameters to be estimated. Any variation in exports across firms can be driven by unobserved differences. Therefore, we include firm fixed effects (μ_i) to control for unobservable firm-specific and time-invariant characteristics and δ_t, which is year-month fixed effects. Moreover, the model controls for sector-year fixed effects ($\theta_{s,t}$) to take out sector-specific year effects in exports and to control for any possible omitted and time-variant sector factors such as demand shocks or productivity.

In the baseline specification, we take $RC_{i,t}$ as a continuous variable. Alternatively, we use a binary indicator of using rediscount credits in a given month, which is denoted by $RCD_{i,t}$. This variable takes the value 1 if the firm receives rediscount credit, and 0 otherwise. Therefore, the specification with the binary explanatory variable is similar to the equation (1):

$$\text{EX}_{i,t} = \alpha_0 + \sum_{k=1}^{6} \alpha_k EX_{i,t-k} + \sum_{m=0}^{6} \delta_m RCD_{i,t-m} + \beta' X_{i,t} + \mu_i + \delta_t + \theta_{s,t} + \varepsilon_{i,t} \qquad (2)$$

A firm can use rediscount credit with maturities of 90, 120, 180, 240, 360 and 720 days. In order to examine the differential correlations of short-term and long-term rediscount credits on exports, we define dummy variables for each maturity period by taking benchmark variable as firms that do not use rediscount credits. We create six different groups based on the maturity of concurrent rediscount credits with up to 90 days, 91 to 120 days, 121 to 180 days, 181 days to 240 days, 241 to 360 days, and 361 to 720 days, and each dummy variable takes the value of 1 if they are in one of the maturity groups, and 0 otherwise. Therefore, the specification becomes

$$\text{EX}_{i,t} = \alpha_0 + \sum_{k=1}^{6} \alpha_k EX_{i,t-k} + \sum_{j \in g} \delta_j Maturity_{i,j,t} + \beta' X_{i,t} + \mu_i + \delta_t \theta_{s,t} + \varepsilon_{i,t} \qquad (3)$$

where g = (0,90], (90,120], (120,180], (180,240], (240,360], (360,720].

Furthermore, we investigate nonlinearity in the relation between rediscount credits and exports. To this end, we introduce nonlinearity into the specification by adding the squared logarithm of rediscount credits ($RC_{i,t}^2$) to Equation (1) and drop the lags of rediscount credits for simplicity. The potential nonlinearity has not been discussed in the Turkish case but has important implications for policy makers.

4. RESULTS

Table 2 presents the estimation results of Equation (1), which shows the relation between the amount of rediscount credits and exports. [10] All specifications include firm fixed effects to control for unobservable time-invariant firm-specific characteristics and sector-year fixed effects to take

---

[9] In fact, we use logarithm of exports plus 1 so that we include firms that did not export in the corresponding month.
[10] Since our aim is not to estimate and discuss the determinants of firm exports, we do not provide and interpret the coefficients of lagged values of exports in the main text. We provide the full coefficients in Table 2 in Appendix 2. The coefficients of lagged values of exports are positive in all specifications.

out sector specific year effects that affect export performance of firms.[11] According to the simplest model (model 1) with no control variables, exports increase contemporaneously by 6 percent if the amount of rediscount credit doubles. In model 2, we add the lagged values of exports, net sales, employment and three lagged values of rediscount as control variables. The contemporaneous correlation declines to 1 percent, but lagged values of the rediscount credit have also significant coefficients. We repeat the same exercise by adding more lagged values of rediscount credits as the effect of obtaining additional finance on export performance may last for a number of months. Information criteria (AIC and BIC) suggest that optimum number of lags for both exports and rediscount credits is 6 months (Model 5).[12] This specification implies that a hundred percent increase in the amount of rediscount credit used within 6 months is correlated with a 3-percent increase in exports.[13][14]

---

[11] Alternatively, we also estimated the Arellano-Bond GMM model. The results are qualitatively similar to our benchmark model (See appendix 5).

[12] We compared AIC and BIC up to 12 lags for both exports and rediscount credits. The results for lag selection criteria are provided in Appendix 2.

[13] We also ran regressions with 12 lags of rediscount credits and observed that the correlation mostly comes within 6 months, and the cumulative effect coming from all months resemble the results in Table 2.

[14] In order to eliminate the possibility that the results are driven by price changes, we also ran regressions with deflated export and rediscount credit. Results provided in Appendix 3 are similar to our benchmark results in Table 2.

Table 2: Amount of Rediscount Credits and Exports

Variables	Model 1	Model 2	Model 3	Model 4	Model 5
$RC_{i,t}$	0.0595***	0.0112***	0.0111***	0.0109***	0.0108***
	(0.0026)	(0.0010)	(0.0010)	(0.0010)	(0.0010)
$RC_{i,t-1}$		0.0076***	0.0075***	0.0072***	0.0071***
		(0.0010)	(0.0010)	(0.0010)	(0.0010)
$RC_{i,t-2}$		0.0064***	0.0062***	0.0059***	0.0058***
		(0.0010)	(0.0010)	(0.0010)	(0.0010)
$RC_{i,t-3}$		0.0036***	0.0033***	0.0029***	0.0028***
		(0.0010)	(0.0009)	(0.0009)	(0.0009)
$RC_{i,t-4}$			0.0015	0.0008	0.0007
			(0.0010)	(0.0009)	(0.0009)
$RC_{i,t-5}$				0.0037***	0.0034***
				(0.0010)	(0.0009)
$RC_{i,t-6}$					0.0014
					(0.0009)
$NS_{i,t}$		0.0326***	0.0569***	0.0568***	0.0567***
		(0.0047)	(0.0015)	(0.0016)	(0.0016)
$EMP_{i,t}$		0.246***	0.156***	0.158***	0.154***
		(0.0115)	(0.0042)	(0.0042)	(0.0041)
Lag of Exports	No	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes
Year-Month FE	Yes	Yes	Yes	Yes	Yes
Sector x Year FE	Yes	Yes	Yes	Yes	Yes
Observations	12,040,596	9,590,641	9,590,641	9,590,641	9,590,641
Number of Firms	247,005	133,917	133,917	133,917	133,917

Notes: Entries are coefficients and standard errors from estimating Equation (1). Standard errors, clustered by year-month level and by sector group, in parentheses. The dependent variable is the natural logarithm of exports. The unit of observation is a firm-year-month. See Table 1 for the precise definition of each variable. *** $p<0.01$, ** $p<0.05$, * $p<0.1$.

Table 3 presents the results of regressions which use a binary indicator for using rediscount credits in a given month which takes the value 1 if the firm receives rediscount credit, and 0 otherwise. In line with the estimates in models with the amount of rediscount credits in Table 2, rediscount credit use is positively correlated with exports. When we investigate the correlation from a dynamic approach in models 2-5, we find that the positive correlation between the use of rediscount credits and export performance may last for up to 5 months.

Table 3: Rediscount Credit Use and Exports

Variables	Model 1	Model 2	Model 3	Model 4	Model 5
$RCD_{i,t}$	0.822***	0.155***	0.154***	0.151***	0.150***
	(0.0347)	(0.0146)	(0.0145)	(0.0144)	(0.0144)
$RCD_{i,t-1}$		0.104***	0.102***	0.0989***	0.0982***
		(0.0136)	(0.0136)	(0.0135)	(0.0135)
$RCD_{i,t-2}$		0.0898***	0.0877***	0.0840***	0.0827***
		(0.0142)	(0.0140)	(0.0140)	(0.0139)
$RCD_{i,t-3}$		0.0517***	0.0482***	0.0433***	0.0420***
		(0.0138)	(0.0135)	(0.0134)	(0.0133)
$RCD_{i,t-4}$			0.0191	0.0109	0.00909
			(0.0138)	(0.0135)	(0.0134)
$RCD_{i,t-5}$				0.0465***	0.0435***
				(0.0138)	(0.0136)
$RCD_{i,t-6}$					0.0175
					(0.0134)
$NS_{i,t}$		0.0326***	0.0569***	0.0568***	0.0567***
		(0.0047)	(0.0015)	(0.0016)	(0.0016)
$EMP_{i,t}$		0.246***	0.156***	0.158***	0.154***
		(0.0115)	(0.0042)	(0.0042)	(0.0041)
Lag of Exports	No	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes
Year-Month FE	Yes	Yes	Yes	Yes	Yes
Sector x Year Month FE	Yes	Yes	Yes	Yes	Yes
Observations	12,040,596	9,590,641	9,590,641	9,590,641	9,590,641
Number of Firms	247,005	133,917	133,917	133,917	133,917

Notes: Entries are coefficients and standard errors from estimating Equation (2). Standard errors, clustered by year-month level and by sector group, in parentheses. The dependent variable is the natural logarithm of exports. The unit of observation is a firm-year-month. See Table 1 for the precise definition of each variable. *** p<0.01, ** p<0.05, * p<0.1.

Table 4 examines the maturity dimension of the rediscount credits and its relation with the export performance. Rediscount credits fall into one of the 6 maturity categories: up to 90 days, 91 to 120 days, 121 to 180 days, 181 days to 240 days, 241 to 360 days, 361 to 720 days. The default category includes the firms that did not receive rediscount credits in the corresponding month at all. Thus, each one of the six indicators shows the relationship between the use of rediscount credit with the corresponding maturity and the export performance compared to those that did not use rediscount credits at all. Column 6 includes the widest set of control variables and implies that the rediscount credits with the shortest maturity have the strongest correlation with the concurrent export

performance. This result is in line with expectations, since the conditions of the rediscount loan require companies to export at least the amount of the loan during the financing period. The maturity dimension is important for both policymakers and firms. A company that uses a rediscount credit of a certain amount with a one-year maturity is incentivized to export the same amount the following year. However, if the same fund is used twice for two firms with six-month maturities, both firms will be incentivized to export in the same year.

Table 4: Rediscount Credit Maturity and Exports

Variables	Model 1	Model 2	Model 3	Model 4	Model 5
Maturity ≤ 90	1.439***	0.441***	0.407***	0.386***	0.371***
	(0.130)	(0.0592)	(0.0555)	(0.0533)	(0.0522)
90 < Maturity ≤ 120	0.856***	0.296***	0.274***	0.263***	0.251***
	(0.0735)	(0.0394)	(0.0381)	(0.0377)	(0.0373)
120 < Maturity ≤ 180	1.030***	0.231***	0.215***	0.203***	0.195***
	(0.0605)	(0.0476)	(0.0460)	(0.0452)	(0.0441)
180 < Maturity ≤ 240	0.699***	0.217***	0.200***	0.190***	0.182***
	(0.0374)	(0.0203)	(0.0194)	(0.0188)	(0.0185)
240 < Maturity ≤ 360	0.717***	0.210***	0.190***	0.177***	0.169***
	(0.0579)	(0.0321)	(0.0307)	(0.0298)	(0.0291)
Maturity > 360	0.562***	0.124*	0.104	0.0908	0.0845
	(0.111)	(0.0751)	(0.0743)	(0.0744)	(0.0744)
$NS_{i,t}$		0.112***	0.0888***	0.0711***	0.0569***
		(0.0020)	(0.0018)	(0.0017)	(0.0016)
$EMP_{i,t}$		0.200***	0.181***	0.168***	0.159***
		(0.0051)	(0.0046)	(0.0044)	(0.0042)
Lag of Exports	No	3	4	5	6
Firm FE	Yes	Yes	Yes	Yes	Yes
Year-Month FE	Yes	Yes	Yes	Yes	Yes
Sector x Year Month FE	Yes	Yes	Yes	Yes	Yes
Observations	12,040,596	9,794,804	9,726,758	9,658,699	9,590,641
Number of Firms	247,005	133,917	133,917	133,917	133,917

Notes: Entries are coefficients and standard errors from estimating Equation (3). Standard errors, clustered by year-month level and by sector group, in parentheses. The dependent variable is the natural logarithm of exports. The unit of observation is a firm-year-month. See the Table (1) for the precise definition of each variable. *** p<0.01, ** p<0.05, * p<0.1.

Table 5 expands the analysis by examining whether the correlation of the rediscount credits varies across firm size, i.e. SMEs vs. large firms. In the first three columns, we provide results of the regressions with the amount of the rediscount credit as the variable of interest, and in the latter three columns, we present the results with the indicator of obtaining rediscount credit. In both

parts, the results show that the correlation between the use of rediscount credits and the export performance is stronger among SMEs compared to large firms, and the differences are statistically significant. This is consistent with the fact that access to finance is a more serious issue and financial constraints are more binding for SMEs. The results imply that a large firm is more likely to fulfil its export projections and commitments even in the absence of relatively advantageous and less costly rediscount credits.

Table 5: Heterogeneity Across Firm Size Groups

	SMEs	Large Firms	Difference		SMEs	Large Firms	Difference
$RC_{i,t}$	0.0155***	0.0056***	0.010***	$RCD_{i,t}$	0.196***	0.0807***	0.115***
	(0.0018)	(0.0012)	(0.0016)		(0.0229)	(0.0180)	(0.0221)
$RC_{i,t-1}$	0.0109***	0.0032***	0.008***	$RCD_{i,t-1}$	0.136***	0.0429**	0.093***
	(0.0017)	(0.0012)	(0.0015)		(0.0215)	(0.0170)	(0.0182)
$RC_{i,t-2}$	0.0099***	0.0027**	0.007***	$RCD_{i,t-2}$	0.124***	0.0413**	0.083***
	(0.0018)	(0.0012)	(0.0016)		(0.0228)	(0.0174)	(0.0216)
$RC_{i,t-3}$	0.0055***	0.0001	0.005***	$RCD_{i,t-3}$	0.0701***	0.00270	0.067***
	(0.0017)	(0.0011)	(0.0015)		(0.0220)	(0.0167)	(0.0321)
$RC_{i,t-4}$	0.0014	-0.0004	0.002***	$RCD_{i,t-4}$	0.0148	-0.00588	0.021**
	(0.0017)	(0.0011)	(0.0012)		(0.0227)	(0.0163)	(0.0011)
$RC_{i,t-5}$	0.0032*	0.0027**	0.0005***	$RCD_{i,t-5}$	0.0353	0.0377**	-0.0024***
	(0.0017)	(0.0011)	(0.00002)		(0.0225)	(0.0167)	(0.0011)
$RC_{i,t-6}$	0.0041**	-0.0011	0.005***	$RCD_{i,t-6}$	0.0456**	-0.0186	0.064***
	(0.0017)	(0.0011)	(0.0012)		(0.0225)	(0.0163)	(0.0183)
$NS_{i,t}$	0.0578***	0.0408***	0.017***	$NS_{i,t}$	0.0578***	0.0409***	0.017***
	(0.0016)	(0.0130)	(0.0014)		(0.00167)	(0.0130)	(0.0065)
$EMP_{i,t}$	0.150***	0.142***	0.008***	$EMP_{i,t}$	0.150***	0.142***	0.008***
	(0.0043)	(0.0214)	(0.0032)		(0.00434)	(0.0214)	(0.0029)
Lag of Exports	Yes	Yes	Yes		Yes	Yes	Yes
Firm FE	Yes	Yes	Yes		Yes	Yes	Yes
Year-Month FE	Yes	Yes	Yes		Yes	Yes	Yes
Sector x Year Month FE	Yes	Yes	Yes		Yes	Yes	Yes
Observations	8,947,060	562,059	9,508,115		8,947,060	562,059	9,508,115
Number of			130,627				130,627
firms	120,500	10,333			120,500	10,333	

Notes: Entries are coefficients and standard errors from estimating Equation (1) for columns (1), (2) and (3) and Equation (2) for columns (4), (5) and (6). The dependent variable is the natural logarithm of exports. The unit of observation is a firm-year-month. Columns (3) and (6) show the results of regressions where whole sample is used with all coefficients interacted with firm size dummy. A firm is classified as an SME if its number of employees is less than 250, and large otherwise. See the Table (1) for the precise definition of each variable. *** p<0.01, ** p<0.05, * p<0.1.

As discussed earlier, there have been regulation changes in terms and conditions of rediscount credits and eligibility criteria. In 2020, TL-denominated rediscount credits were introduced and were widely used in the following years. Moreover, rediscount credits were granted to only net exporter firms starting from October 2021. In Table 6, we investigate the effects of these regulatory changes. In the first two columns, we compare the correlations of the amount of TL- and FX-denominated credits with exports after the introduction of TL-denominated credits. The results suggest that both credit types are positively correlated with exports, but the correlation is slightly stronger for TL-denominated credits. In column 3, we present the results for the sample starting from October 2021, when being a net exporter was added as a new criterion. The positive correlation between amount of rediscount credits and exports holds in this period as well, albeit slightly smaller compared to whole sample. In columns 4-6, we repeat the same exercise but use the binary indicator of credit usage and obtain similar results.

Table 6: Rediscount Credits and Exports: Regulation Changes

Variables	Model 1 TL	Model 2 FX	Model 3 Net Exporters	Variables	Model 4 TL	Model 5 FX	Model 6 Net Exporters
$RC_{i,t}$	0.0155***	0.0056***	0.00701***	$RCD_{i,t}$	0.180*	0.119***	0.0637***
	(0.0018)	(0.0012)	(0.002)		(0.106)	(0.0411)	(0019)
$RC_{i,t-1}$	0.0109***	0.0032***	0.0051***	$RCD_{i,t-1}$	0.229*	0.0803**	0.0619***
	(0.0017)	(0.0012)	0.0028)		(0.119)	(0.0402)	(0.0017)
$RC_{i,t-2}$	0.0099***	0.0027**	0.0053***	$RCD_{i,t-2}$	0.0902	0.0834**	0.0364***
	(0.0018)	(0.0012)	(0.0031)		(0.123)	(0.0412)	(0.0018)
$RC_{i,t-3}$	0.0055***	0.0001	0.0028***	$RCD_{i,t-3}$	0.172	-0.0436	0.0621***
	(0.0017)	(0.0011)	(0.0033)		(0.125)	(0.0403)	(0.0016)
$RC_{i,t-4}$	0.0014	-0.0004	0.0028	$RCD_{i,t-4}$	-0.0141	0.00705	0.0432
	(0.0017)	(0.0011)	(0.0033)		(0.124)	(0.0400)	(0.0453)
$RC_{i,t-5}$	0.0032*	0.0027**	0.0005	$RCD_{i,t-5}$	0.0698	0.0735*	0.0111
	(0.0017)	(0.0011)	(0.0032)		(0.116)	(0.0412)	(0.0439)
$RC_{i,t-6}$	0.0041**	-0.0011	0.0007***	$RCD_{i,t-6}$	-0.149	-0.0300	0.0879***
	(0.0017)	(0.0011)	(0.0032)		(0.129)	(0.0395)	(0.0442)
$NS_{i,t}$	0.0578***	0.0408***	0.1118***	$NS_{i,t}$	0.0563***	0.0565***	0.1425***
	(0.0016)	(0.0130)	(0.0074)		(0.00167)	(0.00166)	(0.0074)
$EMP_{i,t}$	0.150***	0.142***	0.153***	$EMP_{i,t}$	0.156***	0.159***	0.153***
	(0.0043)	(0.0214)	(0.0222)		(0.00433)	(0.00430)	(0.0222)
Lag of Exports	Yes	Yes	Yes		Yes	Yes	Yes
Firm FE	Yes	Yes	Yes		Yes	Yes	Yes
Year-Month FE	Yes	Yes	Yes		Yes	Yes	Yes
Sector x Year Month FE	Yes	Yes	Yes		Yes	Yes	Yes
Observations	1,561,830	1,612,884	1,048,179	Observations	1,561,830	1,612,884	1,048,179
Number of firms	94,917	97,867	74,867	Number of firms	94,917	97,867	74,867

Notes: Entries are coefficients and standard errors from estimating Equation (1) for columns (1) and (2) and Equation (2) for columns (3) and (4). Standard errors, clustered by year-month level and by sector group, in parentheses. The dependent variable is the natural logarithm of exports. The unit of observation is a firm-year-month. FX and TL refers to foreign currency and TL-denominated rediscount credits, respectively. See Table (1) for the precise definition of each variable. *** p<0.01, ** p<0.05, * p<0.1.

The results above point to a positive relationship between the use of rediscount credits and export performance of firms. Still, this does not necessarily imply that the marginal contribution of the access to credits is linear in the amount of the credits. To check for any non-linearity, we estimate a model which also includes the square of the logarithm of the amount of rediscount credit. The

coefficient of the square of the amount of rediscount credit ($RC_{i,t}^2$) is negative in all models in Table 7. In other words, the results in the full sample as well as those for SMEs and large firms imply that there is decreasing marginal contribution from the rediscount credits to export performance. As the amount of the credits increase, the additional support for the exports declines. Together with the previous findings, this nonlinearity is particularly important for the policy design.

Table 7: Nonlinearity in the Correlation between Rediscount Credits and Export Performance

Variables	Model 1 Full Sample	Model 2 SMEs	Model 3 Large Firms
$RC_{i,t}$	0.079***	0.1245***	0.0347***
	(0.0008)	(0.0314)	(0.0178)
$RC_{i,t}^2$	-0.0041***	-0.0075***	-0.0017***
	(0.0010)	(0.0024)	(0.0012)
$NS_{i,t}$	0.1529***	0.1482***	0.2266***
	(0.0030)	(0.0031)	(0.0238)
$EMP_{i,t}$	0.1464***	0.1217***	0.01464***
	(0.0400)	(0.0072)	(0.0400)
Lag of Exports	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes
Year-Month FE	Yes	Yes	Yes
Sector x Year Month FE	Yes	Yes	Yes
Observations	8,575,516	8,005,261	570,255
Number of firms	127,071	116,792	10,279
Turning Point	9.63	8.30	10.21

Notes: Entries are coefficients and standard errors from estimating Equation (1) by adding the squared logarithm of rediscount credits, $RC_{i,t}^2$, and excluding the lags of rediscount credits. Standard errors, clustered by year-month level and by sector group, in parentheses. The dependent variable is the natural logarithm of exports. The unit of observation is a firm-year-month. A firm is classified as SME if its number of employees is less than 250, and large otherwise. See Table (1) for the precise definition of each variable. *** p<0.01, ** p<0.05, * p<0.1.

5. CONCLUSION

The CBRT provides rediscount credits to exporter firms via Türk Eximbank and other banks. These credits serve as an export subsidy since the interest rate of rediscount credits is below the market average. In this study, we use a rich set of data that combines four datasets provided by different organizations using generated firm ids that are unique across firms and common across the datasets. We merge the firm-level monthly data on the use of rediscount credit, the data on firm

level monthly exports, the data that contains the annual balance sheet and income statements of all Turkish firms, and the data on the firm-level annual employment. Exploiting the unique data that is established by the merger of these four data sources, we analyze the correlation between rediscount credits and firm performance, exports in particular.

Our results suggest that receiving rediscount credit is positively correlated with export growth in the short run. This correlation is robust to using alternative measures of credit that are used. Second, we discover that the correlation between the use of rediscount credits and export growth is stronger among SMEs. This finding is consistent with the assumption that SMEs have less liquidity and may have more difficulty accessing other types of finance. Third, we investigate the existence of nonlinearity in the correlation between the rediscount credits and exports. The estimated coefficients of the correlates imply a decreasing marginal contribution from the rediscount credits on export performance. The correlation between the rediscount credits and exports declines as the amount of the credits increases. Fourth, our findings suggest that both TL- and FX-denominated rediscount credit types are positively correlated with exports but the correlation is slightly stronger for TL-denominated credits.

The findings of the study contribute to the credit-firm performance literature and add to the information set available to policy makers. Analyses that aim to understand the impact of regulations enrich the information inputs of all policy designs and enable scheme refinement. The evidence that shows the positive correlation between the rediscount credits and exports supports the arguments in favor of such schemes. On the other hand, the nonlinearity found in the correlation of rediscount credits with exports indicates that ever-increasing volumes of credits may eventually lead to lower contributions from this policy in terms of additional exports. Finally, while the export values of SMEs are lower than those of large firms, evidence that the relation between rediscount use and exports is higher among SMEs than large firms matters for policy design.

REFERENCES

Akarım, Y. D. (2013). The impact of financial factors on export decisions: The evidence from Turkey. Economic Modelling, 35, 305-308.

Akgündüz, Y. E., Kal, S. H., & Torun, H. (2018). Do subsidised export loans increase exports? The World Economy, 41(8), 2200-2215.

Alvarez, R. (2004). Sources of export success in small-and medium-sized enterprises: The impact of public programs. International Business Review, 13(3), 383-400.

Amiti, M., & Weinstein, D. E. (2011). Exports and financial shocks. The Quarterly Journal of Economics, 126(4), 1841-1877.

Arellano, M., & Bond, S. R. (1991). Some tests of specification for panel data: Monte Carlo evidence and an application to employment equations. Review of Economic Studies, 58, 227-297.

Auboin, M. (2009). Boosting the Availability of Trade Finance in the Current Crisis: Background Analysis for a Substantial G20 Package. CEPR Policy Insight No. 35.

Broocks, A., & Van Biesebroeck, J. (2017). The impact of export promotion on export market entry. Journal of International Economics, 107, 19-33.

Chaney, T. (2016). Liquidity constrained exporters. Journal of Economic Dynamics and Control, 72, 141-154.

Chor, D., & Manova, K. (2012). Off the cliff and back? Credit conditions and international trade during the global financial crisis. Journal of International Economics, 87(1), 117-133.

Demirhan, A. A. (2016). Export behavior of the Turkish manufacturing firms. Emerging Markets Finance and Trade, 52(11), 2646-2668.

Feenstra, R. C. (2018). Alternative sources of the gains from international trade: Variety, creative destruction, and markups. Journal of Economic Perspectives, 32(2), 25-46.

Felbermayr, G. J., & Yalcin, E. (2013). Export credit guarantees and export performance: An empirical analysis for Germany. The World Economy, 36(8), 967-999.

Gezici, A., Orhangazi, Ö., & Yalçın, C. (2018). Exports and financing constraints evidence from Turkey. Review of Middle East Economics and Finance, 14(1), 20170024.

Greenaway, D., Guariglia, A., & Kneller, R. (2007). Financial factors and exporting decisions. Journal of International Economics, 73(2), 377-395.

Kavoussi, R. M. (1984). Export expansion and economic growth: Further empirical evidence. Journal of Development Economics, 14(1), 241-250.

Melitz, M. J., & Trefler, D. (2012). Gains from trade when firms matter. Journal of Economic Perspectives, 26(2), 91-118.

Manova, K. (2013). Credit constraints, heterogeneous firms, and international trade. Review of Economic Studies, 80(2), 711-744.

Munch, J., & Schaur, G. (2018). The effect of export promotion on firm-level performance. American Economic Journal: Economic Policy, 10(1), 357-387.

Srhoj, S., & Wagner, J. (2020). Export boosting policies and firm behaviour: Review of empirical evidence around the world. Working Paper Series in Economics, No. 395, Leuphana Universität Lüneburg, Institut für Volkswirtschaftslehre, Lüneburg.

Tyler, W. G. (1976). Manufactured exports and employment creation in developing countries: Some empirical evidence. Economic Development and Cultural Change, 24(2), 355-373.

Volpe Martincus, C., & Carballo, J. (2010). Export promotion: Bundled services work better. The World Economy, 33(12), 1718-1756.

Wagner, J. (2014). Credit constraints and exports: A survey of empirical studies using firm-level data. Industrial and Corporate Change, 23(6), 1477-1492.

Zia, B. H. (2008). Export incentives, financial constraints, and the (mis) allocation of credit: Micro-level evidence from subsidized export loans. Journal of Financial Economics, 87(2), 498-527.

APPENDICES:

APPENDIX 1: DATA CLEANING PROCEDURE

The Revenue Administration provides the CBRT with balance sheets and income statements of all Turkish firms keeping books according to balance sheet principles for the period 2012-2021. Negative values in essential economic indicators of a firm such as net sales, total assets and employment could indicate data recording errors or anomalies. Therefore, inclusion of negative values can significantly impact the reliability and validity of regression results. Thus, we exclude firms that reported incomplete or incoherent data from the analysis, such as observations with negative net sales and total assets. The first column of table A1 shows the total number of firms in this dataset. The second column shows the number of firms with net sales and assets greater than 0 and the third column shows the number of firms when we also exclude firms with no employment. The last column shows the number of exporter firms by year.

Table A1: Data Cleaning Process and the Number of Observations

Year	Total Number of Firms in Balance Sheet	Net Sales > 0 Assets > 0	Net Sales>0 Assets > 0 Employment > 1	Exporter Firms
2012	603,394	481,023	450,265	132,718
2013	612,717	488,358	468,639	137,459
2014	628,486	502,297	472,526	143,401
2015	655,244	524,563	517,575	149,862
2016	682,173	549,336	542,634	156,028
2017	721,785	579,424	572,617	161,566
2018	766,314	614,933	609,289	167,656
2019	806,199	643,114	637,546	181,025
2020	869,189	676,825	671,196	185,114
2021	940,344	732,448	725,845	187,944

Notes: Entries display the Number of firms on a yearly basis. The first column represents all the firms recorded in the balance sheet and income statement data. The second column shows the number of firms with positive net sales and total asset, while the third column shows the count of firms with positive net sales, total assets and more than one employee. The last column shows the number of firms that have conducted exports at least once, with positive net sales, total assets, and more than one employee.

APPENDIX 2: FULL SET OF COEFFICIENTS IN TABLE 2

Table A2: Rediscount Credits and Exports

Variables	Model 1	Model 2	Model 3	Model 4	Model 5
$RC_{i,t}$	0.0595***	0.0112***	0.0111***	0.0109***	0.0108***
	(0.0026)	(0.0010)	(0.0010)	(0.0010)	(0.0010)
$RC_{i,t-1}$		0.0076***	0.0075***	0.0072***	0.0071***
		(0.0010)	(0.0010)	(0.0010)	(0.0010)
$RC_{i,t-2}$		0.0064***	0.0062***	0.0059***	0.0058***
		(0.0010)	(0.0010)	(0.0010)	(0.0010)
$RC_{i,t-3}$		0.0036***	0.0033***	0.0029***	0.0028***
		(0.0010)	(0.0009)	(0.0009)	(0.0009)
$RC_{i,t-4}$			0.0015	0.0008	0.0007
			(0.0010)	(0.0009)	(0.0009)
$RC_{i,t-5}$				0.0037***	0.0034***
				(0.0010)	(0.0009)
$RC_{i,t-6}$					0.0014
					(0.0009)
$EX_{i,t-1}$		0.211***	0.206***	0.202***	0.200***
		(0.0008)	(0.0007)	(0.0008)	(0.0008)
$EX_{i,t-2}$		0.152***	0.152***	0.150***	0.150***
		(0.0005)	(0.0005)	(0.0005)	(0.0005)
$EX_{i,t-3}$		0.111***	0.108***	0.105***	0.103***
		(0.0005)	(0.0005)	(0.0004)	(0.0005)
$EX_{i,t-4}$		0.086***	0.082***	0.080***	0.078***
		(0.0004)	(0.0003)	(0.0005)	(0.0005)
$EX_{i,t-5}$		0.069***	0.067***	0.065***	0.065***
		(0.0005)	(0.0004)	(0.0005)	(0.0005)
$EX_{i,t-6}$		0.063***	0.061***	0.062***	0.062***
		(0.0004)	(0.0005)	(0.0005)	(0.0005)
$NS_{i,t}$		0.0326***	0.0569***	0.0568***	0.0567***
		(0.0047)	(0.0015)	(0.0016)	(0.0016)
$EMP_{i,t}$		0.246***	0.156***	0.158***	0.154***
		(0.0115)	(0.0042)	(0.0042)	(0.0041)
Firm FE	Yes	Yes	Yes	Yes	Yes
Year-Month FE	Yes	Yes	Yes	Yes	Yes
Sector x Year FE	Yes	Yes	Yes	Yes	Yes
Observations	12,040,596	9,590,641	9,590,641	9,590,641	9,590,641
Number of Firms	247,005	133,917	133,917	133,917	133,917

Notes: Entries are coefficients and standard errors from estimating Equation (1). Standard errors, clustered by year-month level and by sector group, in parentheses. The dependent variable is the natural logarithm of exports. The unit of observation is a firm-year-month. See Table 1 for the precise definition of each variable. *** p<0.01, ** p<0.05, * p<0.1.

APPENDIX 3: INFORMATION CRITERIA FOR OPTIMAL LAG SELECTION

Table A3: BIC Values for Alternative Lag Structures

| | **Export Lags** | | | | | | | | | | | |
	Lags	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
Rediscount Lags	**0**	65512.6	64857.5	64208.9	62282.6	60414.2	61018.3	59187.7	57412.1	55689.7	55427.9	53512.4	51663.0
	1	62892.1	62074.5	61267.5	61255.3	61243.0	62467.9	62455.4	62442.9	62430.4	62430.4	62417.9	62405.4
	2	59747.5	58844.7	57955.6	57955.0	57954.4	57374.9	57374.3	57373.7	57373.1	57373.1	57372.6	57372.0
	3	56760.1	56734.3	58844.7	58843.9	58843.2	58137.1	58136.3	58135.5	58134.8	58134.8	58134.0	58133.3
	4	56760.1	56757.5	56754.9	54484.7	52305.3	52253.0	50162.9	50163.4	50163.9	50163.4	50163.4	50163.4
	5	55624.9	55624.9	55624.9	55006.2	54394.4	54276.1	53672.4	53075.4	52485.1	52485.1	51901.3	51324.1
	6	519853.5	51411.0	50871.4	51380.1	51894.0	50025.5	50525.8	51031.0	51031.0	51031.0	51031.0	51031.0
	7	53956.2	53956.1	53956.1	53956.0	53955.9	53955.9	53955.8	53955.8	53955.7	53955.7	53955.7	53955.6
	8	52337.5	51750.7	56734.3	56734.2	56734.2	54847.4	54847.4	54847.3	54847.3	54847.3	54847.2	54847.1
	9	51290.7	51164.8	51039.1	51039.1	51039.1	50664.0	50664.0	50664.0	50664.0	50664.0	50663.9	50663.9
	10	51290.7	53411.0	50152.9	50152.9	50152.9	51823.0	53548.7	55331.9	57174.4	55331.9	55331.9	55331.9
	11	50977.8	50797.8	50677.8	50738.3	51793.9	52829.8	53886.4	54964.1	56063.4	54964.1	54964.1	54964.1
	12	51285.6	50235.2	51779.6	51203.3	52297.4	51204.2	51428.0	51175.4	50633.9	51725.4	50071.4	50071.4
	Notes: Entries are BIC from estimating equation (1), divided by 1000. The regression started by incorporating the firm fixed effects, sector x year fixed effects and firm control variables as the initial equation. Each column and row represent the number of lags of exports and rediscount credits added into the initial equation. The specification with lowest BIC is the one with 6 lags of both rediscount credits and exports.												

Table A4: AIC Values for Alternative Lag Structures

		Export Lags											
	Lags	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
Rediscount Lags	**0**	64973.3	64438.6	63819.6	61935.8	60065.8	60678.5	58846.4	57001.7	55204.0	54922.7	53056.1	51247.9
	1	62386.8	61630.8	60847.7	60823.4	60883.8	62144.7	62138.5	62052.0	61971.8	61990.3	61910.3	61885.6
	2	59261.5	58412.5	57547.0	57523.6	57614.5	57083.7	57077.5	57037.2	56980.0	56968.7	56900.3	56894.1
	3	56298.5	56311.9	58424.1	58440.7	58498.0	57847.8	57841.3	57800.3	57776.6	57736.4	57655.5	57654.7
	4	56315.2	56346.2	56354.8	54111.3	51988.2	52003.4	49903.4	50028.3	50008.9	50033.3	49968.5	49908.8
	5	55216.3	55243.7	55254.7	54661.9	54134.6	54076.0	53447.9	52816.6	52198.0	52198.0	51581.5	50957.2
	6	516342.4	51129.8	50623.4	51160.2	51707.8	49900.7	50394.7	50863.2	50842.9	50812.5	50782.2	50731.7
	7	53613.0	53639.6	53682.3	53714.3	53746.3	53783.8	53767.7	53735.5	53708.7	53692.6	53665.9	53644.5
	8	52020.2	51472.8	56463.3	56502.6	56513.8	54672.5	54645.2	54607.0	54579.8	54569.0	54541.8	54530.9
	9	50964.6	50869.7	50780.1	50805.4	50830.7	50477.2	50472.2	50467.1	50452.1	50426.9	50396.8	50386.8
	10	50969.6	53103.0	49908.3	49918.3	49938.2	51637.1	53340.7	55105.9	56918.3	55045.6	55034.7	55018.2
	11	50678.8	50514.9	50430.7	50496.0	51556.7	52608.8	53661.0	54717.9	55801.1	54696.1	54679.8	54663.4
	12	50954.3	49930.6	51501.5	50933.4	52042.4	50985.0	51187.5	50941.0	50392.1	51462.9	49911.7	49936.6

Notes: Entries are AIC from estimating equation (1), divided by 1000. The regression started by incorporating the firm fixed effects, sector x year fixed effects and firm control variables as the initial equation. Each column and row represent the number of lags of exports and rediscount credits added into the initial equation. The specification with lowest AIC is the one with 6 lags of both rediscount credits and exports.

APPENDIX 4: CORRELATION BETWEEN EXPORTS AND REDISCOUNT CREDITS IN
REAL TERMS

In order to eliminate any possible price effect in our results, we replicate models in Table 2 with
real values of exports and rediscount credit. We approximate real values of exports by deflating
the nominal export values with industry level export unit value index (according to CPA2008
classification) and approximate rediscount credits by deflating the nominal figures by CPI in the
US.

Table A5: Amount of Rediscount Credits and Exports (in real terms)

	Model 1	**Model 2**	**Model 3**	**Model 4**	**Model 5**
$RC_{i,t}$	0.0494***	0.0092***	0.0091***	0.0091***	0.0090***
	(0.0035)	(0.0013)	(0.0012)	(0.0013)	(0.0012)
$RC_{i,t-1}$		0.0061***	0.0060***	0.0058***	0.0057***
		(0.0012)	(0.0011)	(0.0012)	(0.0011)
$RC_{i,t-2}$		0.0054**	0.0052**	0.0049**	0.0047***
		(0.0011)	(0.0012)	(0.0012)	(0.0011)
$RC_{i,t-3}$		0.0029**	0.0028**	0.0026**	0.0025**
		(0.0012)	(0.0012)	(0.0012)	(0.0011)
$RC_{i,t-4}$			0.0007	0.0001	0.0001
			(0.0012)	(0.0011)	(0.0012)
$RC_{i,t-5}$				0.0031**	0.0029***
				(0.0012)	(0.0011)
$RC_{i,t-6}$					0.0013
					(0.0012)
$NS_{i,t}$		0.116***	0.116***	0.116***	0.116***
		(0.0017)	(0.0017)	(0.0017)	(0.0017)
$EMP_{i,t}$		0.090***	0.0897***	0.0897***	0.0897***
		(0.0037)	(0.0037)	(0.0037)	(0.0037)
Lag of Exports	No	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes
Year-Month FE	Yes	Yes	Yes	Yes	Yes
Sector x Year FE	Yes	Yes	Yes	Yes	Yes
Observations	5,478,125	5,035,217	5,035,217	5,035,217	5,035,217
Number of firms	82,831	67,524	67,524	67,524	67,524

Notes: Entries are coefficients and standard errors from estimating Equation (1). Standard
errors, clustered by year-month level and by sector group, in parentheses. We restrict our
sample to NACE 1-38 for the years 2013-2022, since the export unit index is available only
for those sectors and years. Export unit index is obtained from Turkish Statistical Institute
(TURKSTAT). Rediscount credit is divided by US monthly CPI. The unit of observation is a
firm-year-month. The optimal lags of export and rediscount credit variables are obtained by
using the AIC, and model 2-5 includes first 6 lags of exports. See Table 1 for the precise
definition of each variable. *** p<0.01, ** p<0.05, * p<0.1.

APPENDIX 5: DYNAMIC PANEL DATA MODEL(GMM) RESULTS

Table A6: Rediscount Credits and Exports (GMM Results)

Variables	Model 1	Model 2	Model 3	Model 4	Model 5
$RC_{i,t}$	0.0118***	0.0046***	0.0051***	0.0052***	0.0045***
	(0.0019)	(0.0018)	(0.0018)	(0.0016)	(0.0015)
$RC_{i,t-1}$		0.0045***	0.0044***	0.0032***	0.0021***
		(0.0014)	(0.0013)	(0.0013)	(0.0010)
$RC_{i,t-2}$		0.0038***	0.0026***	0.0021***	0.0019***
		(0.0013)	(0.0012)	(0.0011)	(0.0008)
$RC_{i,t-3}$		0.0031***	0.0019*	0.0020	0.0016**
		(0.0015)	(0.0014)	(0.0015)	(0.0009)
$RC_{i,t-4}$			0.0014	0.0014	0.0012
			(0.0012)	(0.0011)	(0.0012)
$RC_{i,t-5}$				0.0014*	0.0011*
				(0.0009)	(0.0007)
$RC_{i,t-6}$					0.0005**
					(0.0003)
$NS_{i,t}$		0.052***	0.046***	0.046***	0.048***
		(0.0001)	(0.0003)	(0.0003)	(0.0004)
$EMP_{i,t}$		0.042***	0.031***	0.031***	0.032***
		(0.0015)	(0.0016)	(0.0016)	(0.0014)
Lag of Exports	No	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes
Year-Month FE	Yes	Yes	Yes	Yes	Yes
Sector x Year FE	Yes	Yes	Yes	Yes	Yes
Observations	11,880,221	8,786,223	8,786,223	8,786,223	8,786,223
Number of firm	232,112	126,823	126,823	126,823	126,823

Notes: Entries are coefficients and standard errors from estimating Equation (1) by the Arellano and Bond (1991) two-step generalized method of moments (GMM) procedure using two-step robust errors. The dependent variable is the natural logarithm of exports. The unit of observation is a firm-year-month. Model 2-5 includes first 6 lags of exports. See Table 1 for the precise definition of each variable. Robust standard errors are in parenthesis. *** p<0.01, ** p<0.05, * p<0.1.

Central Bank of the Republic of Türkiye

Recent Working Papers

The complete list of Working Paper series can be found at Bank's website

(**http://www.tcmb.gov.tr**)

Taming Corporate Sector Currency Mismatches: Reflections from a Quasi-Natural (Macroprudential) Experiment
(Tanju Çapacıoğlu, Hakan Kara; Working Paper No:24/06, May 2024)

Bank Loan Maturity and Corporate Investment
(Burak Deniz, İbrahim Yarba; Working Paper No:24/05, May 2024)

Profit Margins and Cost Pass-Through in Türkiye
(H. Burcu Gürcihan Yüncüler, Çağrı Sarıkaya; Working Paper No:24/04, March 2024)

Funding Quality and The Pricing of Retail Rates: Evidence from the Turkish Banking Sector
(Koray Alper, Tanju Çapacıoğlu Working Paper No:24/03, March 2024)

Anticipating Credit Developments with Regularization and Shrinkage Methods: Evidence for Turkish Banking Industry
(Salih Zeki Atılgan, Tarık Aydoğdu, Mehmet Selman Çolak, Muhammed Hasan Yılmaz Working Paper No:24/02, February 2024)

Urban Sprawl and Fuel Consumption in Post-Earthquake Period: A Quasi-Experimental Evidence
(Ahmet Duhan Yassa Working Paper No:24/01, February 2024)

The Impact of Negative Income Shocks on the Relative Prices of Private Label Products: The Covid-19 Episode
(Serdar Yürek; Working Paper No: 23/09, December 2023)

Effects of Emerging Markets' Asset Purchase Programs on Financial Markets
(İrfan Çerçil, Cem Ali Gökçen; Working Paper No: 23/08, December 2023)

Do Subsidized Export Credits Affect Firms' Behavior in the FX Market? Micro Evidence from Türkiye
(Ünal Seven, Ertan Tok; Working Paper No: 23/07, December 2023)

Building a Financial Constraint Index for Türkiye
(Hatice Gökçe Karasoy Can, Evren Erdoğan Coşar, Working Paper No: 23/06, December 2023)

Üretimin İthal Girdi İçeriği ve İhracatın Reel Kur Esnekliği: Türkiye Örneği
(Demirhan Demir, Selçuk Gül, Abdullah Kazdal Çalışma Tebliği No: 23/05, December 2023)

State-Dependency in Price Adjustments: Evidence from Large Shocks
(Elif Feyza Özcan Kodaz, Serdar Yürek, Working Paper No: 23/04, October 2023)

Impact of Easing Restrictions on Restaurant Inflation: Normalization Processes in Türkiye during COVID-19
(Ceren Eldemir, Serdar Yürek, Working Paper No: 23/03, October 2023)

İlave 6 Puanlık Bölgesel Sigorta Prim Teşvikinin İstihdama ve Kayıtlılığa Etkisi
(Muhammet Enes Çıraklı Çalışma Tebliği No: 23/02, Ekim 2023)

Entrepreneur Education and Firm Credit Outcomes
(Yusuf Emre Akgündüz, Abdurrahman B. Aydemir, Halil İbrahim Aydın, Working Paper No: 23/01, October 2023)

Is Corporate Indebtedness a Drag on Investment After Financial Shocks?
(İbrahim Yarba, Working Paper No: 22/03, June 2022)

Financial Literacy and Cash Holdings in Türkiye
(Mustafa Recep Bilici, Saygın Çevik Working Paper No: 22/02, April 2022)

Central Bank of the Republic of Türkiye

Recent Working Papers

The complete list of Working Paper series can be found at Bank's website

(**http://www.tcmb.gov.tr**)

Taming Corporate Sector Currency Mismatches: Reflections from a Quasi-Natural (Macroprudential) Experiment
(Tanju Çapacıoğlu, Hakan Kara; Working Paper No:24/06, May 2024)

Bank Loan Maturity and Corporate Investment
(Burak Deniz, İbrahim Yarba; Working Paper No:24/05, May 2024)

Profit Margins and Cost Pass-Through in Türkiye
(H. Burcu Gürcihan Yüncüler, Çağrı Sarıkaya; Working Paper No:24/04, March 2024)

Funding Quality and The Pricing of Retail Rates: Evidence from the Turkish Banking Sector
(Koray Alper, Tanju Çapacıoğlu Working Paper No:24/03, March 2024)

Anticipating Credit Developments with Regularization and Shrinkage Methods: Evidence for Turkish Banking Industry
(Salih Zeki Atılgan, Tarık Aydoğdu, Mehmet Selman Çolak, Muhammed Hasan Yılmaz Working Paper No:24/02, February 2024)

Urban Sprawl and Fuel Consumption in Post-Earthquake Period: A Quasi-Experimental Evidence
(Ahmet Duhan Yassa Working Paper No:24/01, February 2024)

The Impact of Negative Income Shocks on the Relative Prices of Private Label Products: The Covid-19 Episode
(Serdar Yürek; Working Paper No: 23/09, December 2023)

Effects of Emerging Markets' Asset Purchase Programs on Financial Markets
(İrfan Çerçil, Cem Ali Gökçen; Working Paper No: 23/08, December 2023)

Do Subsidized Export Credits Affect Firms' Behavior in the FX Market? Micro Evidence from Türkiye
(Ünal Seven, Ertan Tok; Working Paper No: 23/07, December 2023)

Building a Financial Constraint Index for Türkiye
(Hatice Gökçe Karasoy Can, Evren Erdoğan Coşar, Working Paper No: 23/06, December 2023)

Üretimin İthal Girdi İçeriği ve İhracatın Reel Kur Esnekliği: Türkiye Örneği
(Demirhan Demir, Selçuk Gül, Abdullah Kazdal Çalışma Tebliği No: 23/05, December 2023)

State-Dependency in Price Adjustments: Evidence from Large Shocks
(Elif Feyza Özcan Kodaz, Serdar Yürek, Working Paper No: 23/04, October 2023)

Impact of Easing Restrictions on Restaurant Inflation: Normalization Processes in Türkiye during COVID-19
(Ceren Eldemir, Serdar Yürek, Working Paper No: 23/03, October 2023)

İlave 6 Puanlık Bölgesel Sigorta Prim Teşvikinin İstihdama ve Kayıtlılığa Etkisi
(Muhammet Enes Çıraklı Çalışma Tebliği No: 23/02, Ekim 2023)

Entrepreneur Education and Firm Credit Outcomes
(Yusuf Emre Akgündüz, Abdurrahman B. Aydemir, Halil İbrahim Aydın, Working Paper No: 23/01, October 2023)

Is Corporate Indebtedness a Drag on Investment After Financial Shocks?
(İbrahim Yarba, Working Paper No: 22/03, June 2022)

Financial Literacy and Cash Holdings in Türkiye
(Mustafa Recep Bilici, Saygın Çevik Working Paper No: 22/02, April 2022)