TÜRKİYE CUMHURİYET MERKEZ BANKASI

WORKING PAPER NO: 17/20

Do Subsidized Export Loans Increase Exports?

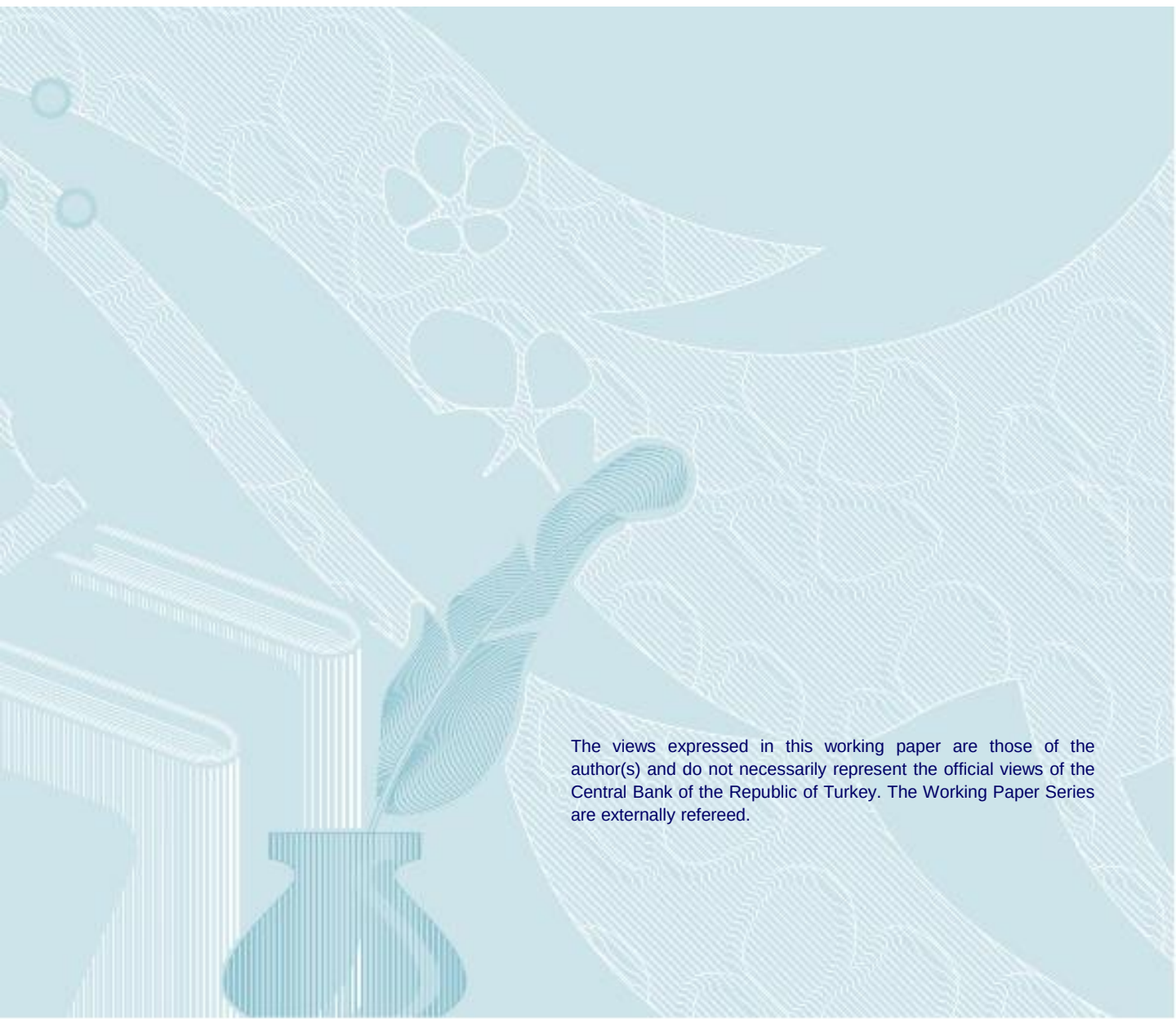
December 2017

Yusuf Emre AKGÜNDÜZ
Süleyman Hilmi KAL
Huzeyfe TORUN

Address:
Central Bank of the Republic of Turkey
Head Office
Structural Economic Research Department
İstiklal Caddesi No: 10
Ulus, 06050 Ankara, Turkey

Phone:
+90 312 507 80 04

Facsimile:
+90 312 507 78 96



Do subsidized export loans increase exports?*

Yusuf Emre Akgündüz †
Central Bank of the Republic of Turkey

Süleyman Hilmi Kal ‡
Central Bank of the Republic of Turkey

Huzeyfe Torun §
Central Bank of the Republic of Turkey

Abstract

Turkey's export rediscount credit programme provides credit to exporting firms that is both easy to acquire and is offered at a low interest rate. We follow the performance of firms that first received the credit in 2012 when the amount of credit provided went up dramatically in 2012. We use propensity score mathing to construct a control group of firms with which we compare the credit-receiving firms before and after 2012 in a difference-in-differences framework. These firms have increased their exports substantially in the following years compared to the matched firms with similar propensities to receive the rediscount credit. We find that firms that received the rediscount credit increased their exports by 65% and total sales by 19% compared to matched firms. We find no statistically significant effects on domestic sales and profits. We also find suggestive evidence that the effects fade away after a certain amount of credits.

JEL codes: F13; F14; L25; O24; E58

Keywords: Central banking, rediscount credit, firm export, propensity score matching

*The views expressed here are of our own and do not necessarily reflect those of the Central Bank of the Republic of Turkey. All errors are ours. We would like to thank Tuna Han Özdemir, Onur Sarıkaya and Mehmet Oğuzhan Üstün for their assistance in data access and preparation.

†yusufemre.akgunduz@tcmb.gov.tr. Structural Economic Research Department, Central Bank of the Republic of Turkey, Istiklal Cad. No:10, 06100 Ulus, Ankara, Turkey.

‡suleyman.kal@tcmb.gov.tr. Research and Monetary Policy Department, Central Bank of the Republic of Turkey, Istiklal Cad. No:10, 06100 Ulus, Ankara, Turkey.

§huzeyfe.torun@tcmb.gov.tr. Structural Economic Research Department, Central Bank of the Republic of Turkey, Istiklal Cad. No:10, 06100 Ulus, Ankara, Turkey.

Non-technical Summary

Exporting may require up-front investment that liquidity constrained firms are unable to make without access to credit markets. Access to credit markets is a significant issue particularly in developing economies where the financial markets are less developed, uncertainty is greater and borrowing is more costly. At the same time, it is well established in the literature that exporting firms are larger and more productive. Therefore policies that subsidize exporting have been introduced with varying degrees of success and appear to have been an effective tool in cushioning the negative impact of financial constraints.

In this paper, we study the performance of the firms that benefit from the rediscount credit policy of the Central Bank of the Republic of Turkey (CBRT), a form of subsidized export loan. The rediscount credit is provided in Turkish Liras and is paid back in foreign currency. It essentially allows exporting firms to receive credit with low interest rates and minimal collateral. CBRT provides rediscount credits with two goals in mind: increasing foreign currency reserves and promoting exports. CBRT's own reports show that the former goal has largely been achieved. Analysing the export performance of receiving firms is the main goal of this paper. The primary concern in the empirical analysis is that firms that are more likely to increase their exports will also be the firms that apply for rediscount credits. To deal with potential endogeneity problem, we use propensity score matching methodology in a difference-in-differences set up.

Our findings indicate that firms that received the rediscount credit in 2012 increased their exports substantially in the period between 2012 and 2014 compared to the matched firms. This increase is also reflected in total sales. As might be expected from an export targeting credit programme, there are no similar effects on domestic sales.

1 Introduction

There is an extensive theoretical literature that links credit constraints and firms' ability to export (Manova, 2008; Bellone et al., 2010; Manova, 2013; Chaney, 2016). Exporting may require up-front investment that liquidity constrained firms are unable to make without access to credit markets. This issue is particularly accentuated in developing economies where the financial markets are less developed, uncertainty is greater and borrowing is more costly (Feenstra et al., 2014). At the same time, exports have long been recognized as a way for developing countries to promote growth partly through its potential to improve productivity and innovation (Tyler, 1981; Melitz, 2003; Lo Turco and Maggioni, 2015). Policies that subsidize exporting have been introduced with varying degrees of success and appear to have been an effective tool in cushioning the negative impact of the global recession of 2009 on firms (Zia, 2008; Martincus and Carballo, 2010; Cadot et al., 2015; Van Biesebroeck et al., 2016).

We study the performance of the firms that benefit from the rediscount credit policy of the Central Bank of the Republic of Turkey (CBRT), a form of subsidized export loan. The rediscount credit is provided in Turkish Liras and is paid back in foreign currency. It essentially allows exporting firms to receive credit with low interest rates and minimal collateral. CBRT provides rediscount credits with two goals in mind: increasing foreign currency reserves and promoting exports. CBRT's own reports show that the former goal has largely been achieved. The latter was not previously studied and analysing the export performance of receiving firms is the main goal of this paper. We study how the firms that benefited from a sharp increase in the credit limit and availability in 2012 performed after receiving the rediscount credit. The benefiting firms were already exporters prior to the expansion in rediscount credit supply, so we are looking particularly at the effects on the intensive margin. The average rediscount credit amount is substantial at more than 6 million US Dollars in our treatment sample and more than half the

firms receive the credit multiple times. We should therefore be able to observe the effects on firm performance if the policy is indeed effective.

The rediscount credit is provided to firms in three steps. First, the exporting firms apply to the banks. The primary bank handling rediscount credits is the Turkish Eximbank. After evaluation and acceptance by the banks, the firms transfer promissory notes at the amount of credit demanded as collateral and related documents to the banks. Second the banks deliver the credit demands to the CBRT one day before provision of the credit. Credit evaluation and approval is completed in one day by the CBRT and approval is communicated to the banks same day. The banks deliver the firm's promissory notes stamped with the banks' guarantees and other related documents to the CBRT. The CBRT discounts the promissory notes and transfers the discounted amount of funds to the banks in Turkish Liras. The banks transfer the funds to firms after deducting their commissions to the exporting firms on the same day. On or before the due date of the credit, the firms present customs declaration as proof of export along with the credit amount in foreign currency to close the credit.

We merge the rediscount credit data from the CBRT with the extensive administrative records on finances and trade of each firm collected by the Ministry of Science, Industry and Technology. The primary concern in the empirical analysis is that firms that are more likely to increase their exports will also be the firms that apply for rediscount credits. We deal with potential endogeneity and self-selection in two ways. First, we construct a control group using propensity score matching (PSM). Second, we exploit the exogenous increase in rediscount credit supply in 2012. Since we have data both before and after firms receive rediscount credits in 2012, we can use a difference-in-differences (DD) set-up to compare the performance of the treated firms with the matched control group (Caliendo and Kopeinig, 2008).

Our findings indicate that firms that received the rediscount credit in 2012 increased their exports substantially. In the period between 2012 and 2014, exports

of receiving firms increased by around 65% compared to the matched firms. This increase is reflected in total sales (19%) and the number of employees (8%). As might be expected from an export targeting credit programme, there are no similar effects on domestic sales.

There is a recent and growing literature linking credit constraints and firms' exports, which is reviewed by Wagner (2014). The empirical strategy on most of these studies involves linking liquidity ratios and credit scores of firms with their export outcomes. Our identification strategy is more policy oriented and direct since we study the impact of providing low cost credit to exporters. The previous literature has studied credit guarantee policies which ease credit constraints but do not directly provide credit to exporters. The results suggest that credit guarantee schemes increase exports in both Austria and Germany (Egger and Url, 2006; Felbermayr and Yalcin, 2013). However, these studies analyze exclusively the effect on the export amounts at the sector level. Our data includes balance sheet variables such as total and domestic sales, which allows us to see if there is a substitution between domestic sales and exports at the firm level. Finally, the large and postive effects we find may point to a strong potential effect from export promotion policies targeting already-exporting firms. This is in line with Paravisini et al. (2015) who analyse the impact of credit shocks on exporting firms in Peru and find that positive effects on exports are concentrated on the intensive margin.

The remainder of the paper is organized as follows. Section 2 provides the institutional background information on the rediscount credit and its expansion in 2012. Section 3 explains the methodology that we use to estimate the relationship between receiving credits and firm outcomes. Section 4 introduces the data. Section 5 presents the results, and section 6 concludes.

2 Institutional background

CBRT utilized rediscount credit for the purpose of development financing until year 1990. Afterwards, short term rediscount window was opened to be used as a monetary policy instrument. Short term liquidity demand of the banking sector has been met through short-term credits in return of discounting of commercial promissory notes. In addition to this, as a measure to relieve the burden of cost financing during global crises of 2008, requirements and processes of rediscount credit for the real (export) sector were simplified, improved and streamlined; credit scope, credit limits and credit terms were extended gradually. Export rediscount credits are comparatively easier to access in terms of collateral and other conditions for the exporting firms. Also, cost of export rediscount credits are much lower compared to similar credits in the market[1].

Export rediscount credit is a pre and post shipment export financing facility for both goods/services exports with maturities up to 360 days. It is given to the exporters with requirement of export commitment. Process of export rediscount credit can be initiated either by commercial banks or the Turkish Eximbank. In case of late payments, 3% late payment penalty is imposed and for the non-realized export commitments 3% late payment penalty beginning from the credit initiation date and other taxes are imposed.

Between 2012 and 2013 some important improvements such as extension of export commitment period from 4 months to 6 months and extension of payback period to 240 days increased demand of this credit facility. Simultaneously the CBRT raised the limit on the amount of credit given from 5 billion US dollars in 2011 to 12 billion US dollars in 2013. Thus the number of firms receiving the credit and the amount of credit used rose rapidly starting in 2012 as seen in Figure 1. Since 2011, the number of firms using this credit facility increased from 281 to 1207 in 2015. The total amount of credit used increased from 3 billion US Dollars

[1] LIBOR+.5% up to 120 day maturity; LIBOR+.75% up to 240 day maturity; LIBOR+1.5% 360 day maturity

to 15 billion US Dollars in 2015.

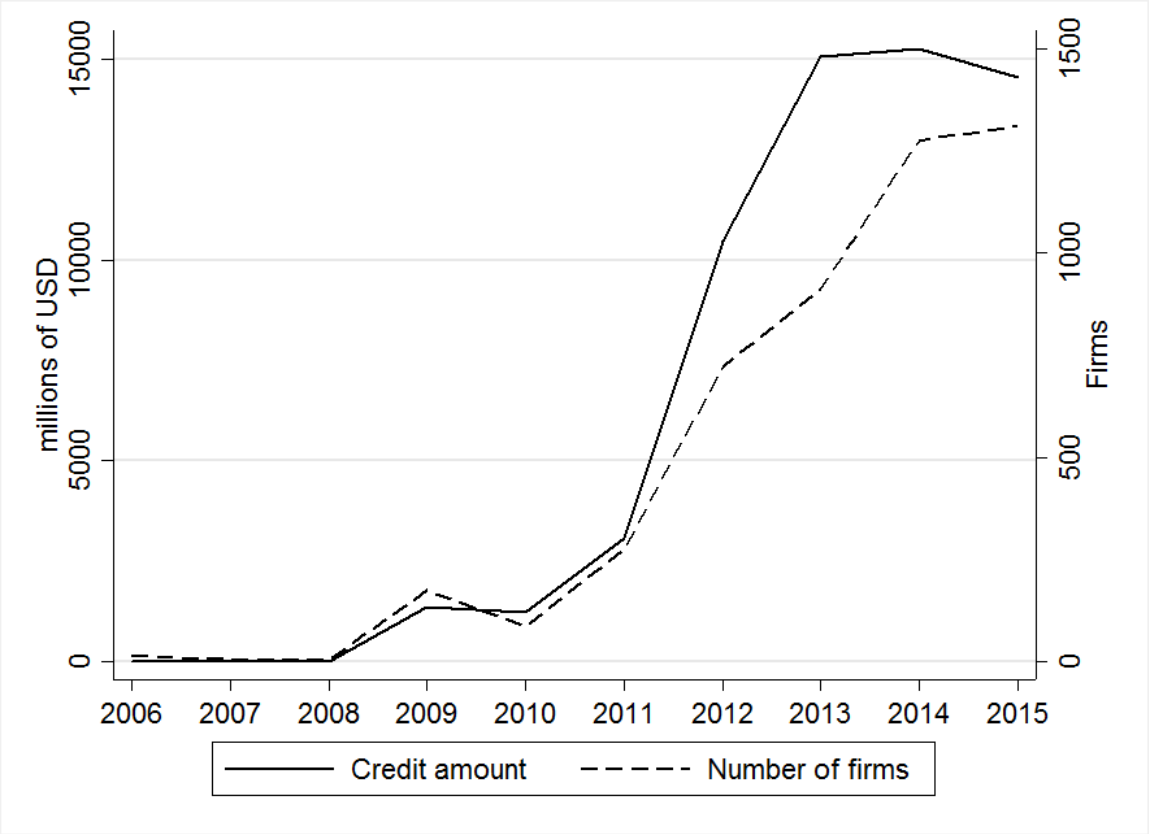


Figure 1: Amount of rediscount credits and number of receiving firms over time

3 Methodology

Since our data source includes all firms in Turkey and the rediscount credit is largely taken up by larger firms that have previously exported, simply comparing the outcomes of the treated firms that receive rediscount credits to all other firms is unlikely to be informative. Therefore, we use propensity score matching to first identify a control group of firms that have similar propensity scores to the firms that receive rediscount credits that we define as the treatment group (Heckman et al., 1998).[2]

To estimate the propensity scores we regress treatment status (R_{2012}) - receiving

[2]We use the publicly available Stata command *psmatch2* for matching and calculating the propensity scores (Leuven and Sianesi, 2003).

rediscount credit in 2012 for the first time - on the 2011 and 2010 outcomes of all firms in terms of exports (E), sales (S), domestic sales (D), number of employees (W) and operating profits (P) in the probit specification. In addition, we include 81 fixed effects for provinces and 172 fixed effects for all sectors at the 3-digit level in NACE classification. Here, the propensity score is the conditional probability of receiving rediscount credit given the pre-treatment characteristics of the firms. In effect, firms that have the closest propensity score to a treated firm are included in the control group. For each firm in the treatment group, we find a firm that did not receive the rediscount credit, but has a similar likelihood to receive it conditional on the pre-treatment characteristics. We aim to reduce the selection bias by equating the groups based on the resulting propensity scores. The propensity scores are estimated using the probit specification in equation 1 where X includes log of exports in 2011 and 2010, whether the firm exported in 2011 and 2010, log of sales in 2011 and 2010, log of domestic sales in 2011 and 2010, number of workers in 2011 and 2010, profits in 2011 and 2010 and age as well as its square, sector fixed effects and province fixed effects.

$$Pr(R_{2012} = 1|X) = \Phi(X'\beta) \tag{1}$$

Our matching technique is that of nearest neighbour matching. There are several cases of one control group firm being matched to multiple (with a maximum of 4) treated firms. These firms are weighted accordingly in the Difference-in-Differences regressions. In line with the previous literature that uses propensity score matching methodology, we limit our sample to firms for which a common support is found. Since nearly all firms in the treatment group are matched to a separate control firm, the final sample size is almost twice as large as the treatment group.

Once the control and treatment groups are defined according to nearest neighbour matching, we estimate the relationship between receiving rediscount credit

in 2012 and firm outcomes in 2012-2014 using the econometric specification presented by Equation 2. The outcome of interest is given by y_{it} for the firm i in year t. T_i is a binary variable that takes the value one for the firms that receive the rediscount credits in 2012, and zero otherwise. $Post2012_t$ takes the value one for all observations from 2012 and after. γ is our parameter of interest and shows the effect of receiving rediscount credit first in 2012 on the firm performance in years 2012 to 2014. The specification further controls for firm fixed-effects, (f_i), which controls for any time invariant unobserved heterogeneity. Since a small number of firms move between sectors and provinces, we further include sector (s_{it}) and province (p_{it}) fixed effects despite the inclusion of firm fixed-effects in all regressions.

$$y_{it} = \alpha + \beta T_i + \theta Post2012_t + \gamma(T_i \times Post2012_t) + f_i + b_t + s_{it} + p_{it} + \varepsilon_{it} \quad (2)$$

Our propensity score matching - difference in diifferences (PSM-DD) methodology ensures that the treatment firms are compared to firms with similar propensity scores and that time-invariant unobserved heterogeneity is accounted for. However, it does not deal with unobserved shocks which may influence the treatment and control group firms differently. In order to limit this concern, we focus on firms that first receive the credit during the exogenous expansion in rediscount credits in 2012.

While the propensity score matching methodology is designed for binary treatments and our primary interest is on the impact of receiving the rediscount credit, the credit amount itself varies among the receiving firms. We use the generalized propensity score (GPS) approach introduced by Hirano and Imbens (2004) to determine whether receiving a higher amount of credit is linked to more exports.[3] The GPS approach has recently been used in the literature to estimate similar continuous treatments (Dai and Cheng, 2015; Fryges et al., 2015; Kluve et al., 2012).

[3]We use the publicly available Stata command *doseresponse* when employing the GPS methodology (Bia et al., 2008).

Following Hirano and Imbens (2004) and Kluve et al. (2012), we can define the GPS methodology as follows. Among firms that received the rediscount credit in 2012, indexed by $i = 1, ..., N$, there is a continous set of treatment values given by $t \in T$. Each observation has potential performance outcomes $Y_i(t)$ which is defined as the unit level dose-response function. The aim of the GPS methodology is to estimate the average dose-response function $\mu(t) = E(Y_i(t))$. The key assumption is that of weak confoundedness. It is referred to as weak since it does not require joint independence of all outcomes and instead requires conditional independence to hold for each value of the treatment. We omit the subscript i to simplify the notation in the following description.

$$Y(t) \perp T|X \text{for all } t \in T \tag{3}$$

Equation 3 implies that conditional on observables X, the potential outcome $Y(T)$ is independent of the treatment level T. If the assumption holds, the subsidy assignment can be treated as random. In our application, X includes all variables in the binary propensity score matching with the exception of 3-digit sector and province fixed effects.

The average dose response function can be obtained by first calculating a generalized propensity score (GPS), which is needed to solve the dimensionality problem caused by having multiple covariates. If $r(t, x)$ is the conditional density of the treatment, GPS is given as $R = r(T, X)$. Within a strata with the same value of $r(t, X)$, the probability that $t = T$ is independent of X. As long as treatment level is weakly unconfounded given X, it will also be weakly unconfounded given GPS.

To estimate the GPS, we first need to assume a functional form of the relationship between the rediscount credit amount, the outcome of interest and the GPS. We assume a normal distribution model and estimate the GPS using ordinary least squares:

$$\hat{R}_i = \frac{1}{\sqrt{2\pi\sigma^2}} exp\left(-\frac{1}{2\pi\sigma}(T_i - \hat{\beta}_0 - \hat{\beta}_1 X_i)^2\right) \tag{4}$$

Second, we estimate the conditional expectation function of the outcome, Y_i, given the estimated GPS and the treatment levels, T_i and R_i. We use the cubic approximation shown in equation 5 for the estimation.

$$E[Y_i|T_i, R_i] = \alpha_0 + \alpha_1 T_i + \alpha_2 T_i^2 + \alpha_3 T_i^3 + \alpha_4 R_i + \alpha_5 R_i^2 + \alpha_6 R_i^3 + \alpha_7 R_i T_i \tag{5}$$

Given the parameters estimated in equaiton 5, we can calculate the average potential outcome at each treatment level t using equation 6. Once we estimate the potential outcome for each level of treatment, the dose-response function is estimated in full. The confidence interval is calculated for the dose-response function through bootstrapping. We repeat the process for all four of our outcomes: exports, sales, employment, profit and domestic sales. The resulting dose-response functions and their confidence intervals can then be presented graphically.

$$E[Y(t)] = \frac{1}{N}\sum_{i=1}^{N}(\hat{\alpha}_0 + \hat{\alpha}_1 t + \hat{\alpha}_2 t^2 + \hat{\alpha}_3 t^3 + \hat{\alpha}_4 r + \hat{\alpha}_5 r^2 + \hat{\alpha}_6 r^3 + \hat{\alpha}_7 rt) \tag{6}$$

4 Data

We construct a unique panel data set using two main sources of data to analyze the effect of the rediscount credits on firm performance. Annual data on firms that receive the rediscount credit and the amounts received are provided by the CBRT. Annual data on firms' exports, sales and other financial information is made available by the Ministry of Science, Industry and Technology.[4] We matched the two data sources using the tax identifiers of the firms. We use data from the years 2009 to 2014 for the analysis.

[4]Neither dataset is publicly available. The Ministry of Science, Industry and Technology data requires researchers to obtain permission and physically be at the ministry to work with the data. Rediscount credit data would need to be acquired from the CBRT directly upon permission.

The full dataset includes all firms in Turkey and there is a balanced sample of 317,905 firms for which we have complete information for the years 2009 to 2014. We observe that nearly all firms that receive the rediscount credit in 2012 had exported in a year prior to 2012. We therefore limit the sample to firms that had exported at least once between the years 2009 and 2011. Second, the total amount of rediscount credits before 2012 was very limited, and we aim to investigate the performance of the firms which received rediscount credit when it is expanded in 2012. Therefore, we excluded any firm that first received the credit before or after 2012. The resulting sample has 40,320 firms. We use this limited group of firms as our main sample, but further test the robustness of the results by estimating the propensity scores for the full sample.

There are in total 375 firms remaining in our sample that receive the rediscount credit first in 2012. The average amount of the credit in 2012 per receiving firm was around 6.5 million US Dollars, and the average amount a firm received per year between 2012 and 2014 is more than 7.3 million US Dollars. The programme has a very high reattainment rate. Around 60% of the treatment group firms receive the rediscount credit again in 2013 while a further 50% receive it in 2014. In total, the treatment group firms received more than 8.2 billion US Dollars in rediscount credits. Table 1 shows the summary statistics before and after 2012 for the treatment group firms and the rest of the sample. The firms in the programme are older and larger than the rest of the sample. The average value of annual exports is 13.6 million dollars among treatment firms, and 1.4 million dollars among the rest of the firms between 2009-2011. We also observe that the treatment firms are larger than the rest of the firms in terms of sales, domestic sales, operational profits and the number of workers.

Once we further limit the sample using propensity score matching, the treatment and control group firms have considerably more similar pre-treatment characteristics. The results of the probit regression used to estimate the propensity scores is presented in Table 2. Total exports and sales appear to have the strongest

effects on the propensity to receive the rediscount credit in 2012. Due to lack of a common support 6 treatment firms are excluded from the PSM analysis, resulting in 369 treatment group firms. The control group is comprised of 316 firms since there are some control group firms that are the nearest match for multiple treatment firms. The summary statistics for the matched sample before and after 2012 is given by Table 3. The gap between the treatment firms and the matched control firms in terms of pre-treatment characteristics is significantly smaller than the gap between treatment firms and the rest of the firms. We report the balancing tests of the matched treatment and control samples in Table 4. After matching, none of the variables appear to be unbalanced.

Before continuing with the regression results, we can get an idea about the relationship between rediscount credits and the average value of annual exports and sales from Figure 2. The three lines in the figure represent the average value of exports for the firms in the treatment group, the matched control group and all non-treated firms. Average exports increased until 2012 across all non-treated firms but declined afterwards. A similar pattern is seen for matched control group firms and the decline in that case begins already in 2012. Treatment group firms differ in that their exports rise between 2012 and 2014, suggesting that firms that received rediscount credits in 2012 outperformed both the rest of the exporting firms and firms in the matched control group.

5 Results

Table 5 shows the propensity score matching & difference-in-differences estimates where matched firms constitute the control group. Therefore, in Table 5, we have almost a balanced sample where we have similar number of treatment and control firms before and after 2012. The treatment variable is a binary variable that equals to one for firms that have received rediscount credits for the first time in 2012, many of which received it multiple times during the treatment period. The PSM-

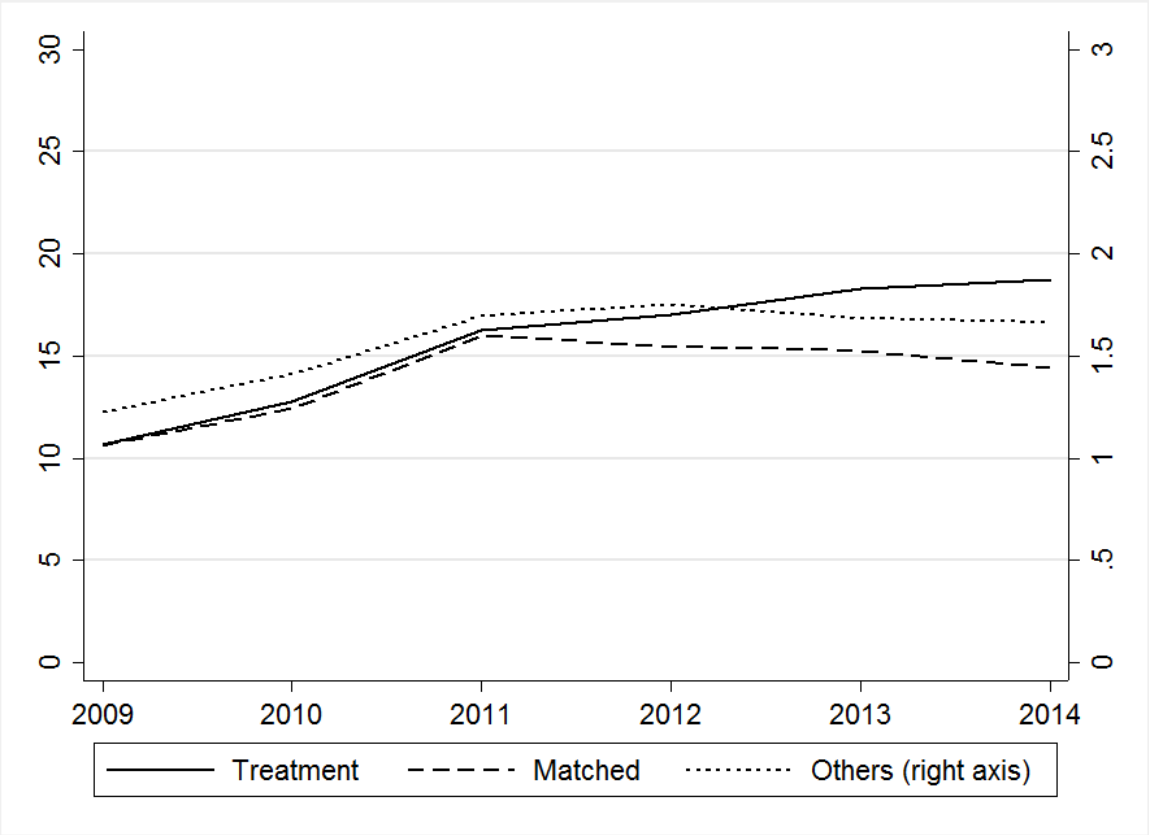


Figure 2: Average exports over time in millions of US dollars

DD estimate indicates a 65% increase in the value of exports in panel 1 for treated firms. A corresponding, though smaller effect of 19% is found on total sales. The estimated effects are similar for exports but smaller for sales when we limit the sample to the 2010-2013 period. Treatment group firms appear to become larger after receiving rediscount credits compared to the matched control firms as their number of employees rises. Considering the focus of the rediscount credits on export promotion, we unsurprisingly find no significant effects on domestic sales and profits.[5]

For comparison we present the OLS estimates using the full sample of firms that exported between 2009 and 2011 in Table A1 in the Appendix. The estimated effect on exports is larger by around 50 percentage points compared to the PSM-DD estimate. The larger estimated effect may be due to self selection of the large

[5]We performed the same matching procedure and analysis for the full sample of firms in the data without limiting the sample to ever-exported firms. The results are almost identical and can been seen in Table A2 in the appendix.

and growing firms into the rediscount credits. In other words, comparing the firms that receive rediscount credits to any ever-exported firm may lead to upward biased estimates.

While Table 5 gives the estimated effect of the binary treatment of first receiving rediscount credits in 2012 for receiving firms, it says little about the quantitative relationships between the credit amount and firm performance. Using the same matched sample Table 6 regresses firm outcomes on the log of the rediscount credit received in a given year and its lag. The results are qualitatively similar to the binary treatment case with significant positive effects on exports, sales and workers and no effects on domestic sales and profits. The estimates show that not only current year's credits affect the firm performance but also the credit received in the previous year. This is in line with the design of the rediscount credits. A firm that receives the redisount credit has to document a total value of exports not smaller than the credit amount in period of two years. A 1 percent increase in rediscount credits appears to raise exports by around 0.028% in the same year and 0.029% in the following year. For sales, the effect is 0.005% in the same year and 0.012% in the following year.

Since there is heterogeneity in the size of the rediscount credits received by the treatment group firms, we estimate the effect of the amount of rediscount credits received in 2012 for exports and sales in 2012 to 2014 using GPS. The resulting dose response and treatment functions are shown in Figures 3 and 4. The estimated dose response function suggests an inverse U-shaped relationship between the amount of rediscount credits received and exports. The treatment effect function shows that the effects are diminishing but positive up to a saturation point but statistically insignificant at the 5% level afterwards. Figure 4 shows that the effects are similar for sales.[6]

[6]Following Hirano and Imbens (2004), we performed balancing test by dividing the sample into three equal strata. Although we do not report the full results here for brevity, we find some evidence against the balancing property particularly in the third strata.

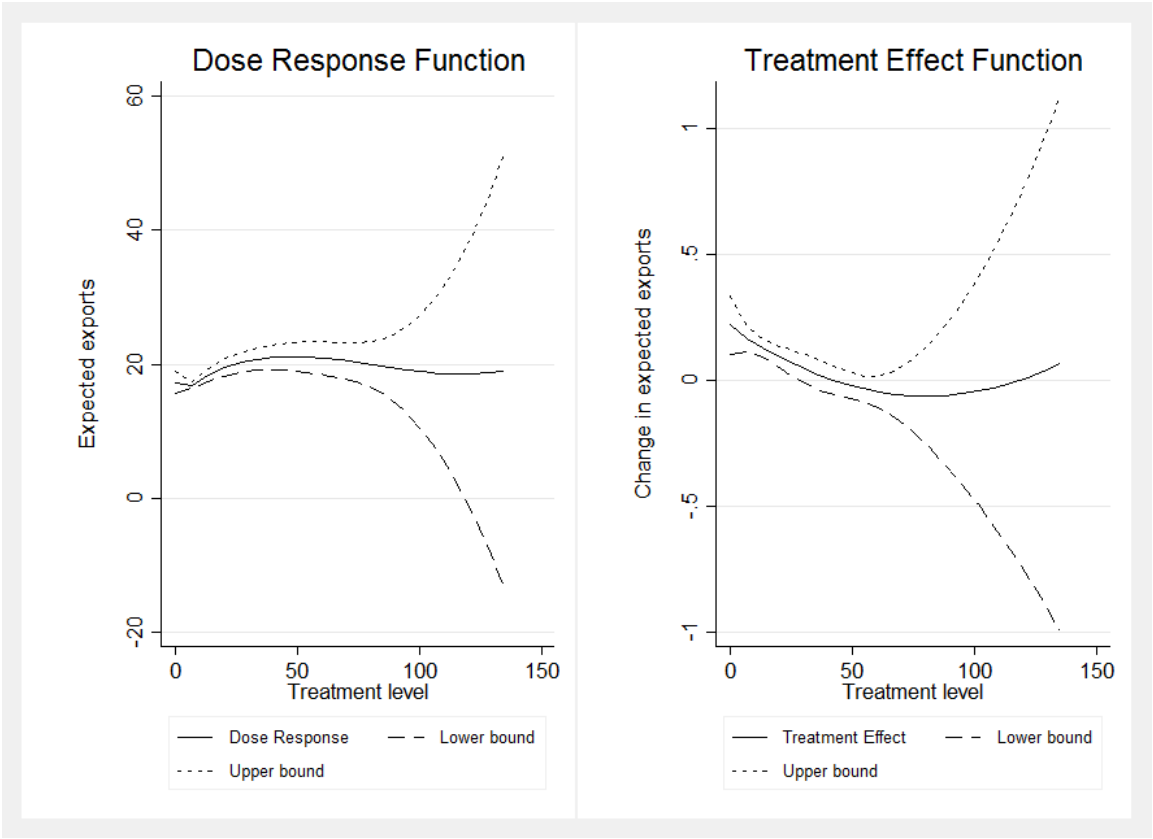


Figure 3: Dose response function - Exports

6 Conclusion

Export promotion is a commonly implemented policy across the world. The trade literature has already established the fact that trading firms are larger, more productive and survive longer than others (Girma et al., 2004; Wagner, 2007; Van Biesebroeck et al., 2016). From a policy maker's perspective, increasing exports means more sustainable current account deficits, higher foreign currency reserves, and more stable exchange rates. The rediscount credit focuses particularly on alleviating the credit constraints that exporting firms may face. Its study can therefore contribute to both the evaluation of such policies across the world and provide micro level evidence on the relationship between credit constraints and firms' ability to export.

In this paper, we investigate the effect of receiving rediscount credits on firm performance in the consecutive years. The programme was expanded substan-

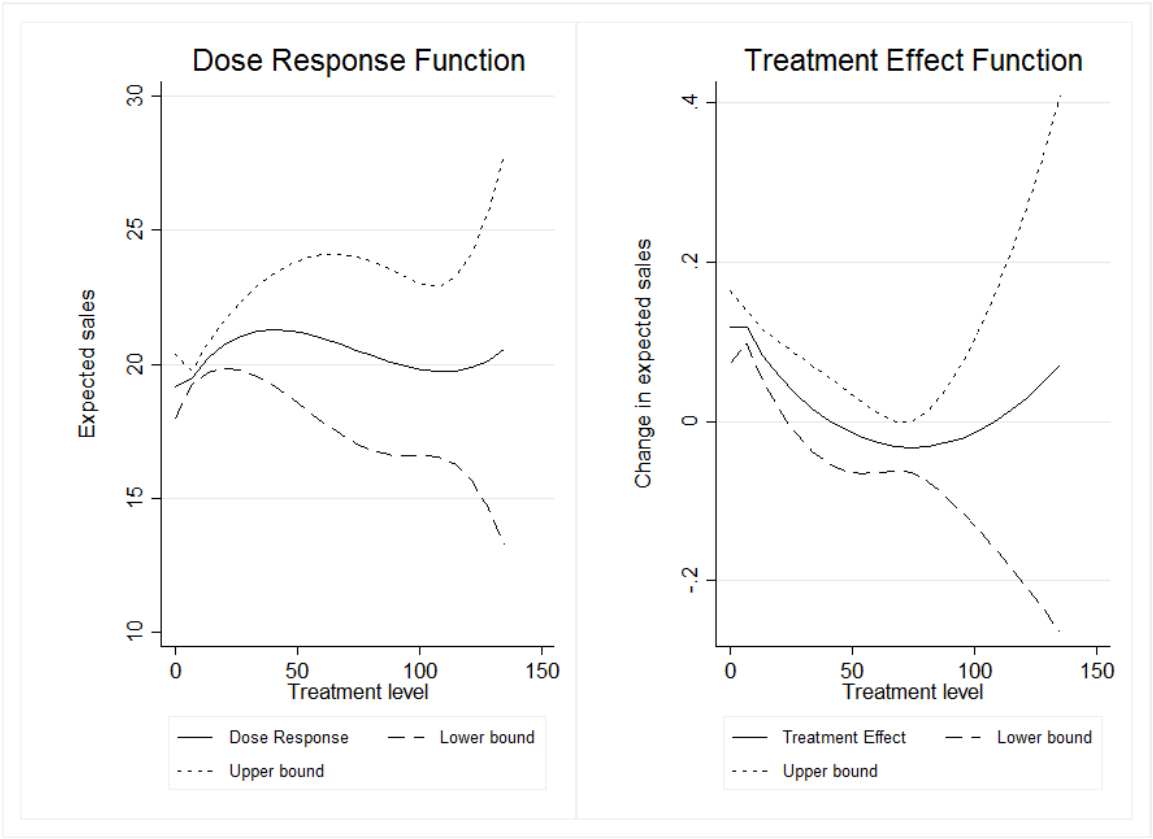


Figure 4: Dose response function - Sales

tially in 2012 and we follow the firms that first receive the rediscount credit during the expansion. Compared to the matched firms with similar propensity scores, the receiving firms exhibit higher exports and sales while there is no similar increase in their profits and domestic sales. Since the goal of the policy was to increase exports, we may conclude that it was a success. We further find an increase in the number of workers employed by the receiving firms, indicating that increasing exports resulted in larger firms. The lack of an increase in profits is rather puzzling given the increase in exports and employment. Several explanations are possible. Firms may be enduring larger operational costs to increase their exports especially in the first years which might prevent their profits from increasing in the observed years. Alternatively, they could be entering more competitive markets where the mark-up is lower. Since they are choosing to export and increase their employment, the former explanation of short-term costs for long-term bene-

fits seems more likely.

Nevertheless, there are reasons to be cautious about the further expansion of the programme. The firms that enter the programme in 2012 are quite different from the average exporting firm. Already exporting firms may be more likely to benefit from the programme and its large scale extension to other firms may not give the same results. Also, the credit may have been particularly effective during the post-crisis period if firms had difficulties in financing.

References

Bellone, F., Musso, P., Nesta, L., Schiavo, S., 2010. Financial constraints and firm export behaviour. The World Economy 33, 347–373.

Bia, M., Mattei, A., et al., 2008. A Stata package for the estimation of the dose–response function through adjustment for the generalized propensity score. The Stata Journal 8, 354–373.

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

Caliendo, M., Kopeinig, S., 2008. Some practical guidance for the implementation of propensity score matching. Journal of economic surveys 22, 31–72.

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

Dai, X., Cheng, L., 2015. The effect of public subsidies on corporate R&D investment: An application of the generalized propensity score. Technological Forecasting and Social Change 90, 410–419.

Egger, P., Url, T., 2006. Public export credit guarantees and foreign trade structure: Evidence from Austria. The World Economy 29, 399–418.

Feenstra, R.C., Li, Z., Yu, M., 2014. Exports and credit constraints under incomplete information: Theory and evidence from China. Review of Economics and Statistics 96, 729–744.

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

Fryges, H., Vogel, A., Wagner, J., 2015. The impact of R&D activities on exports of German business services enterprises: first evidence from a continuous treatment approach. The World Economy 38, 716–729.

Girma, S., Greenaway, D., Kneller, R., 2004. Does exporting increase productivity? A microeconometric analysis of matched firms. Review of International Economics 12, 855–866.

Heckman, J.J., Ichimura, H., Todd, P., 1998. Matching as an econometric evaluation estimator. The Review of Economic Studies 65, 261–294.

Hirano, K., Imbens, G.W., 2004. The propensity score with continuous treatments. Applied Bayesian modeling and causal inference from incomplete-data perspectives 226164, 73–84.

Kluve, J., Schneider, H., Uhlendorff, A., Zhao, Z., 2012. Evaluating continuous training programmes by using the generalized propensity score. Journal of the Royal Statistical Society: Series A (Statistics in Society) 175, 587–617.

Leuven, E., Sianesi, B., 2003. PSMATCH2: Stata module to perform full Mahalanobis and propensity score matching, common support graphing, and covariate imbalance testing. Statistical Software Components, Boston College Department of Economics.

Lo Turco, A., Maggioni, D., 2015. Imports, exports and the firm product scope: evidence from Turkey. The World Economy 38, 984–1005.

Manova, K., 2008. Credit constraints, equity market liberalizations and international trade. Journal of International Economics 76, 33–47.

Manova, K., 2013. Credit constraints, heterogeneous firms, and international trade. The Review of Economic Studies 80, 711–744.

Martincus, C.V., Carballo, J., 2010. Beyond the average effects: The distributional impacts of export promotion programs in developing countries. Journal of Development Economics 92, 201–214.

Melitz, M.J., 2003. The impact of trade on intra-industry reallocations and aggregate industry productivity. Econometrica 71, 1695–1725.

Paravisini, D., Rappoport, V., Schnabl, P., Wolfenzon, D., 2015. Dissecting the effect of credit supply on trade: Evidence from matched credit-export data. The Review of Economic Studies 82, 333–359.

Tyler, W.G., 1981. Growth and export expansion in developing countries: Some empirical evidence. Journal of development Economics 9, 121–130.

Van Biesebroeck, J., Konings, J., Martincus, C.V., 2016. Did export promotion help firms weather the crisis? Economic Policy 31, 653–702.

Wagner, J., 2007. Exports and productivity: A survey of the evidence from firm-level data. The World Economy 30, 60–82.

Wagner, J., 2014. Credit constraints and exports: a survey of empirical studies using firm-level data. Industrial and Corporate Change , 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, 498–527.

Summary Statistics (Treatment Firms & Rest)

	2009-2011		2012-2014	
	Treatment	Rest	Treatment	Rest
Age	7.62	6.10	9.76	8.44
Export (in USD x1000)	13584.17	1444.98	18888.76	1699.97
Sales (in TL x1000)	90501.49	20415.72	143611.30	31100.10
Domestic sales (in TL x1000)	56220.39	20415.72	88050.79	25641.56
Operational profits (in TL x1000)	2514.94	669.70	4903.42	995.90
Workers	224.424	47.31	277.84	54.14
N	1,125	119,835	1,125	119,835

Table 1: **Treatment & Rest** There are 375 treatment firms in each year. The rest of the firms consist of firms that have exported at least between 2009-2011.

Probit Estimations for Propensity Score Matching

Exports 2011	0.0855***	Domestic sales 2010	0.0105
	(0.0246)		(0.0189)
Exports 2010	0.0371	Workers 2011	0.0001
	(0.0237)		(0.0004)
Exported in 2011	-1.0193***	Workers 2010	-0.0003
	(0.3003)		(0.0004)
Exported in 2010	-0.2017	Profit 2011	0.0000
	(0.2872)		(0.0000)
Sales 2011	0.3149***	Profit 2010	-0.0000
	(0.0796)		(0.0000)
Sales 2010	0.1046	Age	0.0111
	(0.0785)		(0.0102)
Domestic sales 2011	-0.0101	Age squared	-0.0004
	(0.0189)		(0.0004)
N	21792		

Table 2: **Probit Estimation** *** p<0.01, ** p<0.05, * p<0.1. The estimation includes year, province and sector fixed effects. Observations from provinces and sectors that are perfect predictors of failure are excluded from the sample.

Summary Statistics (Treatment Firms & Matched Control Firms)

	2009-2011		2012-2014	
	Treatment	Matched Control	Treatment	Matched Control
Age	7.64	7.51	9.78	9.74
Export (in USD x1000)	13228.91	13018.20	18007.30	15050.99
Sales (in TL x1000)	86435.91	93950.10	135393.60	139815.70
Domestic sales (in TL x1000)	53547.21	66012.41	82709.76	100396.60
Operational profits (in TL x1000)	2619.87	3026.60	4882.62	5011.44
Workers	220.95	205.41	274.01	238.57
N	1,107	948	1,107	948

Table 3: **Treatment & Matched Control** There are 369 treatment firms in each year. The matched control firms consist of firms that have similar propensity scores to the treatment firms. Since some control firms are the closest match for more than one treatment firm, there are 316 control matched firms each year. The values in the table are annual averages.

Balancing Tests for Treatment Firms & Matched Control Firms

		Mean		Percentage	T-test	
Covariates		Treated	Control	bias reduction	t	p>value
Age	Unmatched	8.6902	7.2706		10.95	0
	Matched	8.645	8.3902	82.1	0.49	0.624
Age squared	Unmatched	126.3	90.221		11.11	0
	Matched	123.59	120.92	92.6	0.17	0.863
Exports 2011	Unmatched	14.268	8.3737		47.82	0
	Matched	14.344	14.554	96.4	0.7	0.86
Exports 2010	Unmatched	14.238	8.5039		43.08	0
	Matched	14.187	14.493	94.7	1.14	0.256
Sales 2011	Unmatched	17.607	14.794		34.4	0
	Matched	17648	17.764	95.9	0.17	0.863
Sales 2010	Unmatched	17.521	14.776		53.7	0
	Matched	17.338	17.444	96.1	1.03	0.301
Domestic sales 2011	Unmatched	16.442	13.848		34.4	0
	Matched	16.521	16.558	98.6	0.17	0.863
Domestic sales 2010	Unmatched	16.36	13.822		31.35	0
	Matched	16.225	16.307	96.8	0.39	0.7
Profit 2011	Unmatched	3708.9	832.8		5.12	0
	Matched	2831.9	2136.1	75.8	0.45	0.65
Profit 2010	Unmatched	3036.7	786.8		3.61	0
	Matched	2868.7	3123.9	88.7	0.27	0.7
Workers 2011	Unmatched	251.13	50.726		35.4	0
	Matched	240.98	230.54	94.8	0.39	0.695
Workers 2010	Unmatched	242.45	49.859		31.55	0
	Matched	223.55	218.06	97.1	0.23	0.82

Table 4: **Matching quality** There are 369 treatment firms in each year. Since some control firms are the closest match for more than one treatment firm, there are 316 control matched firms each year.

The Effect of the Reform on Firm Performance – PSM-DD Estimates

	Exports	Sales	Domestic Sales	Profits	Workers
			Sample of 2009-2014		
Policy effect ($T_i \times Post2012_t$)	0.6541***	0.1899***	0.1057	-1030.05	17.5527*
	(0.2088)	(0.0629)	(0.1183)	(1643.51)	(10.5731)
# of Obs.	4,110	4,110	4,110	4,110	4,110
			Sample of 2010-2013		
Policy effect ($T_i \times Post2012_t$)	0.6718***	0.1009*	0.0537	-2875.26	11.0895
	(0.2142)	(0.0557)	(0.1270)	-2118.2	(8.5461)
# of Obs.	2,740	2,740	2,740	2,740	2,740

Table 5: **PSM-DD Estimates** ***, **, and * refer to 1%, 5%, and 10% significance levels, respectively. Standard errors clustered at the the firm level are reported in parentheses. Dependent variable is given at the top of each column. Exports, sales and domestic sales are in natural logarithms. Each cell shows the effect of receiving rediscount credit first in 2012 on firm performance in the years 2012-2014. All regression include firm, year, province and sector fixed effects, as well as firm age and its square.

Credit Amount and Firm Performance in the Matched Sample – PSM-DD Estimates

	Exports	Sales	Domestic Sales	Profits	Workers
			Sample of 2009-2014		
RediscountCredit	0.0279**	0.0052*	-0.0006	-63.1290	1.2472***
	(0.0115)	(0.0030)	(0.0060)	(96.1954)	(0.4803)
$RediscountCredit_{t-1}$	0.0290**	0.0118***	0.0017	-183.2978	1.2265*
	(0.0120)	(0.0041)	(0.0073)	(114.0282)	(0.6686)
# of Obs.	4,110	4,110	4,110	4,110	4,110
			Sample of 2010-2013		
RediscountCredit	0.0286**	0.0003	-0.0047	-183.2978	0.7305
	(0.0121)	(0.0023)	(0.0068)	(114.0282)	(0.4733)
$RediscountCredit_{t-1}$	0.0280*	0.0132**	0.0071	-183.2978	0.7195
	(0.0154)	(0.0053)	(0.0101)	(114.0282)	(0.5521)
# of Obs.	2,740	2,740	2,740	2,740	2,740

Table 6: **PSM-DD Estimates** ***, **, and * refer to 1%, 5%, and 10% significance levels, respectively. Standard errors clustered at the the firm level are reported in parentheses. Dependent variable is given at the top of each column. Exports, sales and domestic sales are in natural logarithms. Independent variables "Rediscount Credit" and "Lag of Rediscount Credit" are in natural logarithms as well. All regression include firm, year, province and sector fixed effects, as well as firm age and its square.

Appendix A

The Effect of the Reform on Firm Performance – Ordinary Least Squares Estimates

	Exports	Sales	Domestic Sales	Profits	Workers
			Sample of 2009-2014		
Policy effect $(T_i \times Post2012_t)$	1.1480***	0.3268***	0.2100***	2052.7501***	46.3955***
	(0.1698)	(0.0591)	(0.0811)	(668.6506)	(2.7133)
# of Obs.	241,920	241,920	241,920	241,920	241,920
			Sample of 2010-2013		
Policy effect $(T_i \times Post2012_t)$	1.0200***	0.1705***	0.0512	647.5315	29.4132***
	(0.1937)	(0.0606)	(0.0881)	(724.0962)	(2.5379)
# of Obs.	161,280	161,280	161,280	161,280	161,280

Table A1: **OLS Estimates** ***, **, and * refer to 1%, 5%, and 10% significance levels, respectively. Standard errors clustered at the the firm level are reported in parentheses. Dependent variable is given at the top of each column. Exports, sales and domestic sales are in natural logarithms. Each cell shows the effect of receiving rediscount credit first in 2012 on firm performance in the years 2012-2014. All regression include firm, year, province and sector fixed effects, as well as firm age and its square.

The Effect of the Reform on Firm Performance – PSM-DD Estimates with Full Sample

	Exports	Sales	Domestic Sales	Profits	Workers
			Sample of 2009-2014		
Policy effect ($T_i \times Post2012_t$)	0.6676***	0.1671**	0.0924	-1030.0459	15.4513
	(0.1933)	(0.0659)	(0.1169)	(1643.5134)	(10.5655)
# of Obs.	4,326	4,326	4,326	4,326	4,326
			Sample of 2010-2013		
Policy effect ($T_i \times Post2012_t$)	0.7874***	0.1015**	0.0521	-1548.6078	8.7974
	(0.2064)	(0.0478)	(0.1216)	(1957.5693)	(8.6791)
# of Obs.	2,884	2,884	2,884	2,884	2,884

Table A2: **PSM-DD Estimates with Full Sample** ***, **, and * refer to 1%, 5%, and 10% significance levels, respectively. Standard errors clustered at the the firm level are reported in parentheses. Dependent variable is given at the top of each column. Exports, sales and domestic sales are in natural logarithms. Each cell shows the effect of receiving rediscount credit first in 2012 on firm performance in the years 2012-2014. All regression include firm, year, province and sector fixed effects, as well as firm age and its square.

Central Bank of the Republic of Turkey

Recent Working Papers

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

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

A Financial Connectedness Analysis for Turkey
(Ferhat Çamlıca, Didem Güneş, Etkin Özen Working Paper No. 17/19, December 2017)

Production Fragmentation and Factor Price Convergence
(Hülya Saygılı Working Paper No. 17/18, August 2017)

Evidence for the Explosive Behavior of Food and Energy Prices: Implications in Terms of Inflation Expectations
(Aytül Ganioğlu Working Paper No. 17/17, July 2017)

Regional Economic Growth in Turkey: The Effects of Physical, Social and Financial Infrastructure Investments
(Hülya Saygılı, K. Azim Özdemir Working Paper No. 17/16, July 2017)

Forecasting the Growth Cycles of the Turkish Economy
(H. Murat Özbilgin Working Paper No. 17/15, June 2017)

Home-ownership, Housing Demand and Household Wealth Distribution in Turkey
(Evren Ceritoğlu Working Paper No. 17/14, June 2017)

Credit Cycles and Capital Flows: Effectiveness of the Macroprudential Policy Framework in Emerging Market Economies
(Salih Fendoğlu Working Paper No. 17/13, May 2017)

Are Macroprudential Policies Effective Tools to Reduce Credit Growth in Emerging Markets?
(F. Pınar Erdem, Etkin Özen, İbrahim Ünalmış Working Paper No. 17/12, May 2017)

Volatility: As a Driving Factor of Stock Market Co-movement
(Ali Gencay Özbekler Working Paper No. 17/11, May 2017)

The Effect of House Price Changes on Cohort Consumption in Turkey
(Evren Ceritoğlu Working Paper No. 17/10, April 2017)

Beef Price Volatility in Turkey: Can Import Policy Affect the Price and Its Uncertainty?
(Meltem Gülenay Chadwick, Emine Meltem Baştan Working Paper No. 17/09, April 2017)

Disaggregated Evidence for Exchange Rate and Import Price Pass-through in the Light of Identification Issues, Aggregation Bias and Heterogeneity
(M. Utku Özmen, Meltem Topaloğlu Working Paper No. 17/08, April 2017)

Interdependencies across Sovereign Bond Credit Default Swap Markets
(Derya Ezgi Kayalar, İrem Talaslı, İbrahim Ünalmış Working Paper No. 17/07, April 2017)

Disentangling Age and Cohorts Effects on Home-Ownership and Housing Wealth in Turkey
(Evren Ceritoğlu Working Paper No. 17/06, March 2017)

The Impact of Syrian Refugees on Natives' Labor Market Outcomes in Turkey: Evidence from a Quasi-Experimental Design
(Evren Ceritoğlu, Hatice Burcu Gürcihan-Yüncüler, Huzeyfe Torun, Semih Tümen Working Paper No. 17/05, February 2017)

Rebalancing Turkey's Growth by Improving Resource Allocation and Productivity in Manufacturing
(Aslıhan Atabek, Dan Andrews, Rauf Gönenç Working Paper No. 17/04, February 2017)

Mean-Reversion in Unprocessed Food Prices
(Kurmaş Akdoğan Working Paper No. 17/03, February 2017)

Rise of Services and Female Employment: Strength of the Relationship
(Şerife Genç İleri, Gönül Şengül Working Paper No. 17/02, February 2017)

Self-Insurance and Consumption Risk-Sharing between Birth-Year Cohorts in Turkey
(Evren Ceritoğlu Working Paper No. 17/01, January 2017)