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Export Behavior of the Turkish Manufacturing Firms

August 2015

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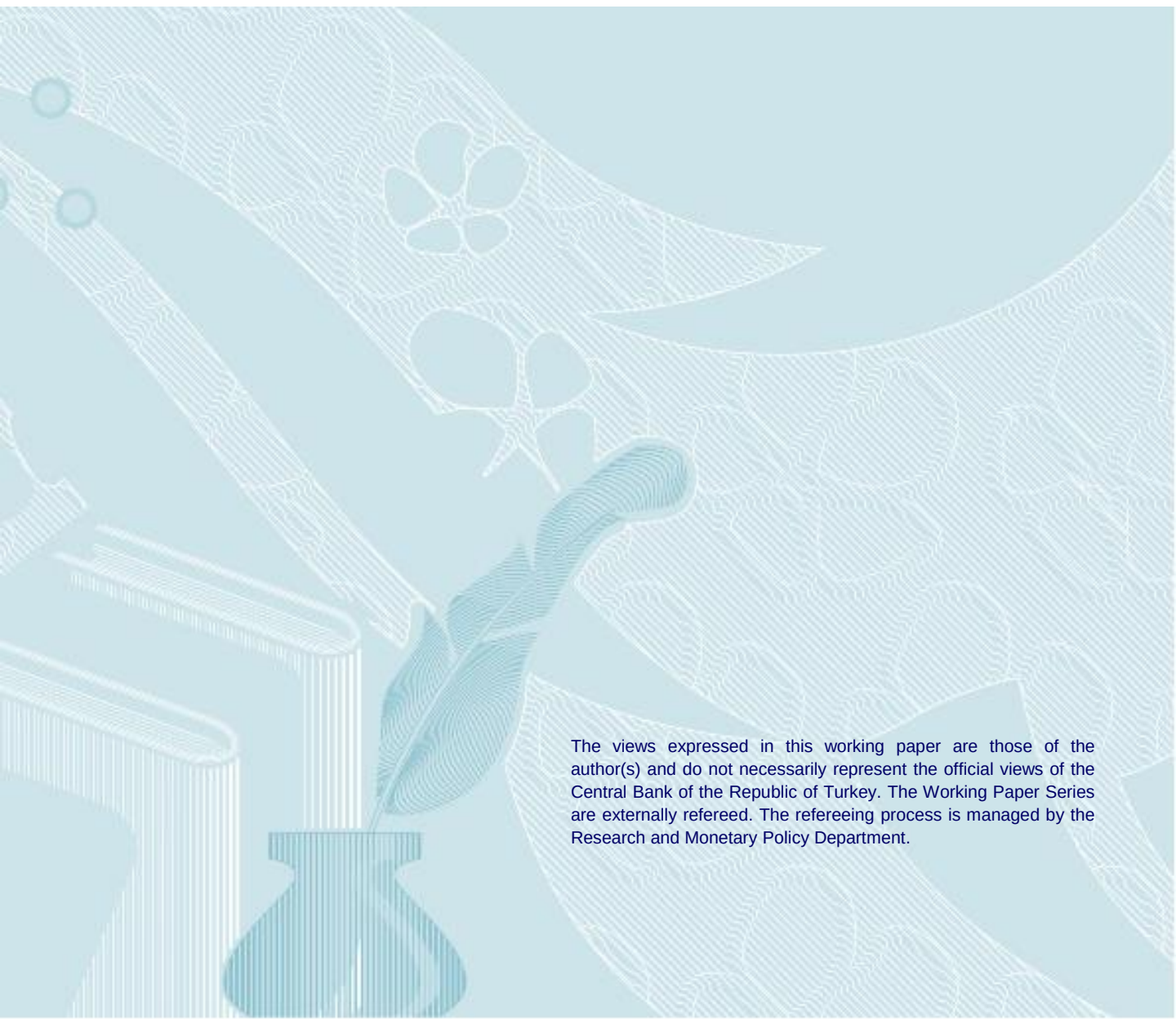

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Export Behavior of the Turkish Manufacturing Firms[*]

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Abstract

Up to date, Turkey's export performance has been analyzed from macro perspective extensively. However, far too little attention has been paid to firm-level analysis contrary to ongoing and growing empirical literature. Using firm-level data of manufacturing sector during the period 1989-2010, this paper explored the export behavior of Turkish firms. The preliminary analysis revealed the superiority of exporting firms over non-exporters. Both self-selection and learning-by-exporting are found to be valid explanation for the source of this observed export premium. Dynamic discrete choice model results show that Turkish manufacturing firms are facing with export market entry costs and those costs are important determinants of the firms' export propensity. Besides, it is observed that crises lead to changes in those entry costs and consequently changes in the export behavior of the firms.

Keywords: Export behavior; firm heterogeneity; firm-level analysis; micro econometrics; Turkey.

JEL Classifications: C25; C22; F14

[*] The views expressed are those of the author and should not be attributed to the Central Bank of Turkey. I would like to thank to an anonymous referee for comments and suggestions that substantially improved the paper. E-mails: aslihan.atabek@tcmb.gov.tr

1. Introduction

This paper investigates export behavior of the Turkish manufacturing firms for the 1989-2010 periods using comprehensive firm-level data. More precisely, analysis begins with comparing exporters and non-exporters in different selected performance measures via simple descriptive and regression analysis. Then, the two leading hypothesis, that is to say self-selection and learning by exporting hypotheses are tested for the case of Turkish manufacturing sector. The analysis is extended by testing existence of sunk-cost via dynamic discrete choice model. This approach also provides answer to the question what are the factors that derive the export propensity of Turkish manufacturing firms.

For the last couple of decades, both in empirical and theoretical trade literature, interest has shifted from macro to micro-level investigation of export performance. The main reason for this shift is the recent availability of micro-level data sets and advances in computation. Contrary to growing and enriching empirical literature on firm-level export behavior, the applications for Turkey were fairly limited. Predominantly, the learning-by-exporting hypothesis has been investigated using Turkish firm-level data (Yasar and Rejesus, 2005; Yasar et al., 2007, Aldan and Günay, 2008; Kılıçaslan and Erdoğan, 2012; Maggioni, 2012). Apart from these, Yasar, Nelson and Rejesus (2003) investigated the productivity effects of firms at different export status and Özler et al. (2009) examined export market participation decision of Turkish manufacturing plants for 1990-2001 periods within the sunk-cost framework.

Despite importance of exports for Turkish economy, limited number of existing firm-level analysis contrary to ongoing literature constitutes the main motivation for this paper. In line with the heterogeneous firm-level trade literature, export behavior has been investigated using data coming from the Central Bank of the Republic of Turkey (CBRT) Company Accounts dataset in details. In this paper a wide range of econometric tools is used to understand export behavior of the Turkish manufacturing firms in a comprehensive way. With each analysis a series of consistent and complementary conclusions are drawn and those conclusions provide comprehensive picture for the export behavior of the Turkish manufacturing firms. Our analysis begins with comparing exporters and non-exporters in different selected performance measures via simple descriptive and regression analysis. This preliminary analysis provides answer to the question what are the characteristics of exporting firms in Turkey. Then self-selection and learning by exporting hypotheses are tested. These analyses put forward the sources of differences between exporters and non-exporters. The analysis is extended by testing existence of sunk-cost via dynamic discrete choice model. This approach also delivers answer to the question what are the factors that derive the export performance of Turkish manufacturing firms.

The first analysis is based on the pioneering empirical study of Bernard and Jensen (1995) in which the aim is to investigate the performance differences of exporters and non-exporters. Using

simple regression export premium is calculated for each chosen firm performance (size, productivity, profitability, capital-intensity, R&D intensity, non-price competitiveness, credit constraint and liquidity). Main finding from this empirical exercise is that exporters are better than non-exporters. To be more specific Turkish manufacturing sector exporters are found to be larger, more productive, more capital-intensive, more quality oriented (higher R&D, marketing and advertisement expenditures), more profitable, more liquid and less credit constrained. Findings are consistent with the previously obtained and commonly accepted views about the superiority of exporters (For a detailed literature review, see Wagner, 2007).

Showing the superiority of the exporters leads us to investigate the validity of two leading hypothesis, self-selection and learning-by-exporting, about the sources of this observed export premium. According to self-selection hypothesis, superior firms self-select to be in the export market and thus causality runs from performance to exports. On the other hand, learning-by-exporting asserts that international markets are more competitive and challenging which forces exporting firms to improve faster, so that exporting makes firms better. Here, self-selection is tested using Wagner's (2007) recommendation by assessing the pre-export performance difference of export starters and non-exporters. Propensity Score Matching Difference-in-Difference (PSM-DID) approach is used for testing the validity of learning-by-exporting hypothesis. Estimation results revealed that for Turkish manufacturing exporters both self-selection and learning-by-exporting hypotheses are valid. While larger, more productive and more capital-intensive Turkish manufacturing firms self-select into export markets; by engaging export size, productivity, credit conditions and non-price competitiveness of the export starters improves further. Significant learning-effect for Turkish manufacturing sector provides supportive evidence for the view that learning-effect is important especially for the developing countries.

Self-selection of exporting firms is associated with the existence of export market entry costs in the recent trade literature. Following the Roberts and Tybout approach, importance of the sunk-costs on the export market participation decision of the Turkish manufacturing firms is investigated for the period 1990-2010 via dynamic discrete choice model. The estimation result reveals the importance of sunk-costs in export market participation decision of the firms. Moreover, it is concluded that the benefits of past export experience does not depreciate fully immediately after the exit, its effect diminishes in the following year of the exit and perishes after three years. The existence of sunk-costs for the case of Turkey was first studied by Özler et al. (2010) using different dataset coming from TURKSTAT for the period 1990-2001. Consistent with our findings they concluded that there are high sunk entry costs and past export market experience depreciates rapidly. Different from Özler et al. (2009), using the advantage of our dataset's lengthy coverage, we include interaction terms of the crisis dummies with lagged export status in order to investigate the variation of sunk-cost during the crisis. Estimation results show that crisis lead to variation in the sunk-costs. With

occurrence of the 1994 crisis, sunk-costs declined whereas with the 2008 crisis, sunk-costs increased; for 2001 crisis, no statistically significant change in the sunk-cost observed.

The organization of this paper is as follows: In the following section literature survey is given. In the third section data and constructed variables are presented in details. Fourth section is devoted to the presentation and discussion of the empirical results and in the final section, conclusion is given.

2. Literature Survey

The empirical literature on the exporting behavior of firms has been started with the pioneer paper by Bernard and Jensen (1995). In order to open different window to the debates concerning the issue of US manufacturing competitiveness they used large panel data of firms. In this way, unlike up until now international trade studies that concentrated on countries and/or sectors they were able to investigate the contribution of the exporting firms to the manufacturing sector. Using both simple descriptive analysis and export premium calculated from ordinary least squares (OLS) regression of firms characteristics on export status, authors concluded that the typical exporting plant is larger, pays higher wages and is more capital intensive and more productive than its non-exporting counterpart. This paper and its findings provided the basis for many other panel data studies that covers both developed and developing countries[1]. Common and robust finding from various studies points out superiority of the exporting firms.

In order to explain superiority of the exporters, the literature evolved by testing validity of two hypotheses, self-selection and learning-by-exporting. These two hypotheses indicate two direction of causality between exporting and performance. According to one view, exportation incurs additional costs (such as transportation and marketing) and investments which can only be covered by "good" firms. This view argues causality runs from performance to exporting and named self-selection hypothesis. On the other hand, according to another view, firms that enter into export markets exposed to more competition. Once a firm enters into the export markets, he learns how to cope with intense competition which leads to faster improvement in the performance measures. Hence, according to the learning-by-exporting hypothesis, engaging exporting activity improves the firm's performance and it points out the other direction of the causal relation, from exporting to performance. These two alternative hypotheses were first analysed empirically by Bernard and Jensen (1999b) and Clerides et al. (1998). Although their econometric approaches and data used were different, the conclusions were similar. They found no evidence for the existence of learning effect and they concluded that indeed better firms self-select into export markets. Hence, the source of

[1] Bernard and Jensen (1998, 1999) for the United States (U.S.), Bernard and Wagner (1998) and Wagner (2002) for the case of Germany; Aw et al. (2000) for the case of Taiwan and Korea; Clerides et al. (1998) for the case of Colombia, Mexico and Morocco; Girma et al. (2003, 2004) and Greenaway and Kneller (2004) for the case of the U.K, Head and Ries (2003) for the case of Japan, Delgado et al. (2002) for the case of Spain, Hallward-Driemeier et al. (2002) for the case of Thailand, Indonesia, the Philippines and Korea, Bigsten et al. (2004) for the case of sub-Saharan Africa and Yang and Mallick (2010) for China. Conclusion from numerous studies for different countries is comparatively clear; exporters are superior to non-exporters.

observed performance difference between exporters and non-exporters dedicated to self-selection of the exporters. Wagner (2007) gives detailed survey for the literature of export behaviors of firms and he surveyed 54 empirical studies covering 34 countries and the general finding is that exporter are better and those better firms self-select into the export markets. Hence, self-selection hypothesis is commonly accepted commentary for the superiority of the exporters.

Findings in favor of self-selection direct researches towards investigation the impact of sunk-cost on the export decision of the firms. Theoretical papers, Dixit (1989a, 1989b), Baldwin (1989), Baldwin and Krugman (1989) and Krugman (1989) showed that existence of sunk entry cost for the foreign market produces hysteresis in trade flows. Using this result, Roberts and Tybout (1997) developed an empirical dynamic discrete choice model for export status of the firms in order to test the existence of sunk cost. Sunk cost existence is tested with the significance of previous export status on current export decision. Using panel data for Colombia authors concluded that previous exporting history of the firms had an effect on the current exporting status. This is interpreted as the existence of sunk cost. Using same logic, existence of the sunk cost has been examined for different countries and these studies reveals strong evidences for the presence of sunk costs in the entry.

3. Data and Variables

In this paper, CBRT Company Account dataset for 1989-2010 period is used. This data set provides detailed firm-level information for comprehensive number of firms for fairly long time period. Since 1989, balance sheets, income statements and firm specific information such as employment, establishment date, company town and legal status have been collected from financial and non-financial firms on an annual basis. Unique identification numbers given to each firm allow matching across the years to form a panel data set.

The data has been compiling by economic sectors, classified according to four-digit level of NACE (Nomenclature Générale des Activités Economique dans les Communautes Européennes) Rev 1.1 but are aggregated to the two-digit level for most analysis herein[2]. Due to the fact that majority of the Turkey's export is provided by the manufacturing sector, in this study **only the manufacturing sector is considered**.

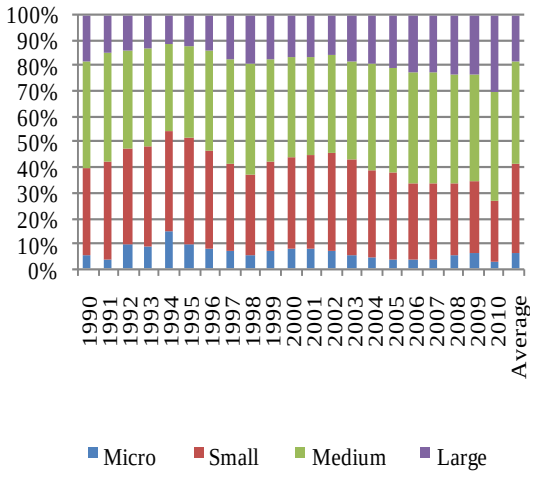
At the beginning in order to obtain robust, coherent and reliable analysis, data set is reviewed. Data is collected based on volunteer information and continuous participation or complete information for the given year cannot be expected. Hence some of the firms have to be excluded due to either missing information or inadequate number of observations. Those firms that do not partake in the sample at least two consecutive years or that do not have at least three observations are excluded. It can be argued that omitting those firms that did not survive at least 3 years can generate selection bias due to success. However, the number of observation that possesses these exclusion

[2] In 2010, economic sector classification is changed from NACE Rev 1.1 to NACE 2. The sector codes of the firms according to NACE Rev 1.1 for year 2010 are provided by CBRT.

criteria is fairly limited: 1664 observations (belonging to 271 firms) only constitute 1.9 percent of total. As a result our final dataset contains 86675 observations corresponding to 8738 manufacturing firms.

Before going into detail, here, main characteristics of the data set are explored. In order to portray size distribution, firms are classified as micro, small, medium and large according to their total number of employees[3]. The proportion of each size categories in total and by sectors are given in Figure 1 and 2, respectively.

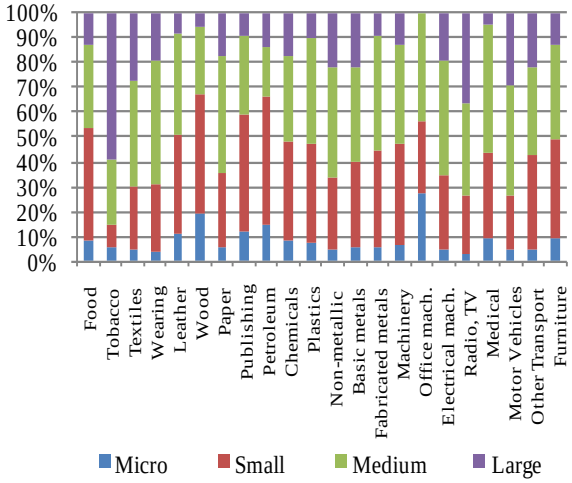
Figure 1. Size Distribution of Firms*



Source: CBRT, author's own calculations

* Each bar shows the share of each size category in the corresponding year t. Share of size category i for the corresponding year t is calculated as the ratio of number of firms that are in size category i at year t to the total number of firms at year t.

Figure 2. Size Distribution of Firms Across Sectors*



Source: CBRT, author's own calculations

* Each bar shows the share of each size category in the corresponding sector s. Share of size category i for the corresponding sector is calculated as the ratio of number of firms that are operating in sector s with size i to the total number of firms at that sector with size i.

The main drawback of firm-level studies in this field is that datasets typically include only firms above certain size which makes results biased. However, as it can be seen from Figure 1, this data set not only includes large firms but also small and medium sized even micro firms. On average, 40.7 percent of the sample is micro and small sized firms, 41.2 percent is medium-sized and 18.1 percent is large firms. Size distribution of the firms over time reveals that firm sizes have been increasing over time. While in 1990, 18.3 percent of the manufacturing firms are classified as large; in 2010 large firm proportion increased to 29.9 percent. Sectoral distribution indicates that different from the general pattern, share of large firms in the tobacco, radio-TV and motor vehicles sectors is fairly high (Figure 2).

In order to investigate regional dispersion of the manufacturing firms Table 1 is given. From the figures given in Table 1, it is observed that the Marmara region, with on average 56.9 percent

[3] Firms are classified as micro if their total number of employees are less than 10, as small if that number is between 10 and 49, as medium if the total number of employees is between 50 and 249 and lastly as large if the total number of employees exceeds 249.

share, is an important trade base for Turkey. Other than Marmara region, Aegean and Central Anatolia has 17.3 percent and 11.6 percent shares respectively. Table 1 also portrays existence of sectoral differences in the regional dispersion of the firms. Especially, food, wood and non-metallic minerals sectors seems to disperse all over the country whereas for the sectors such as tobacco and office machinery regional dispersion is low and firms in those sectors are mostly located at a specific region.

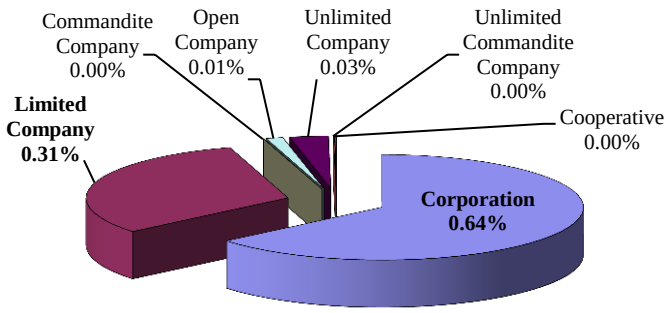
Table 1. Regional Dispersion of Manufacturing Firms

	Region 1	Region 2	Region 3	Region 4	Region 5	Region 6	Region 7
Food	9.6	2.5	19.5	4.5	15.9	13.9	34.2
Tobacco	1.7	0.0	93.6	0.0	0.0	0.0	4.7
Textiles	8.9	0.8	17.7	7.3	3.9	0.4	60.8
Wearing	1.7	0.0	17.7	0.1	2.5	1.0	77.0
Leather	0.8	0.0	22.6	0.2	4.9	2.2	69.3
Wood	12.4	0.0	17.9	0.1	9.4	23.0	37.2
Paper	5.2	0.4	17.7	3.5	9.5	1.5	62.3
Publishing	1.9	0.0	11.3	1.6	22.8	0.0	62.4
Petroleum	0.0	0.0	36.2	2.9	0.0	4.4	56.5
Chemicals	4.2	0.0	15.1	0.9	7.1	1.3	71.5
Plastics	4.5	1.3	15.4	3.2	9.5	2.6	63.5
Non-metallic	7.1	2.2	22.1	2.7	15.0	10.4	40.6
Basic metals	4.6	0.3	13.0	0.5	13.8	7.3	60.6
Fabr. Met.	3.7	0.3	12.9	1.0	17.3	1.2	63.6
Machinery	4.0	0.0	16.2	1.1	24.7	3.7	50.2
Office mach.	0.0	0.0	0.0	8.7	0.0	0.0	91.3
Electrical mach.	0.4	0.8	13.7	0.0	14.9	2.3	67.9
Radio, TV	0.0	0.0	20.6	0.0	17.6	0.0	61.8
Medical	0.4	0.0	25.5	0.0	15.7	5.2	53.3
Motor Vehicles	3.2	0.0	18.2	0.3	9.5	0.9	67.9
Other Transport	0.0	0.0	6.6	0.6	10.0	0.4	82.4
Furniture	4.8	0.8	9.6	0.8	21.1	4.8	58.2
TOTAL	5.7	0.8	17.3	2.6	11.6	5.1	56.9

Source: Author's own calculations.
Region 1 represents Mediterranean, Region 2 represents Eastern Anatolia, Region 3 represents Aegean, Region 4 represents South-eastern Anatolia, Region 5 represents Central Anatolia, Region 6 represents Black Sea and Region 7 represents Marmara. Each entry of the table given above corresponds to the share of sector i at the corresponding region j, Sij. The share Sij is calculated as the ratio of total number of firms that operates in sector i at the jth region to the total number of firms that operates in sector i.

When legal status of the manufacturing firms is investigated, the predominance of corporations becomes clear with the share of 64.0 percent (Figure 3).

Figure 3 Legal Status of Manufacturing Firms



Source: Author's own calculations.

As a summary, a typical Turkish manufacturing firm in this dataset is medium sized corporation located at Marmara region.

Turning attention to the variables used in the analysis; various numbers of different firm characteristics can be thought to be influential on firms' export performance. Previous empirical studies provide guidance for the variable selection. However, it is notably important to note that in the existing literature, it is possible to encounter different definitions for the same measure due to data restrictions. Here within the availability of the data, three set of variables are constructed in line with the empirical literature.

The first set of variables contains efficiency measures such as size, productivity and profitability of the firms. Efficiency measures are expected to have positive relation with export performance. Total number of employees is used to measure the size of the firms. Although there are different alternative productivity measures in the empirical literature, here we used net sales based measure of labor productivity as opposed to total factor productivity, since the data set does not contain neither capital stocks nor value-added. However, the use of net sales based measure for labor productivity does create some problems. The main problem is that this measure does not represent quantities; it is measured in Turkish lira. Thus it is impossible to distinguish actual productivity difference from price variation across firms, products and/or sectors. In order to overcome this problem in some extent 2-digit sector-level price indices are used for converting net sales into real terms.[4] Profitability is considered as another indicator for the efficiency. Firms' profitability is defined as the ratio of operating profit to net sales.

Second set of variables are related with the quality measures. Quality is considered as an important prerequisite in exportation since it is presumed that export markets require higher quality products. Technology usage and innovation is one of the main requirements for obtaining quality production. With this respect, the ratio of R&D expenditures to the operating expenses is used as a proxy for the technology usage. However, not all firm especially small and medium sized firms invest to R&D; instead they prefer to import technology by the machinery that they use. Therefore, capital can be considered as another input for quality production and it is used in explaining the exporting behavior of the firms. Capital intensity of the firms is defined as real tangible assets per worker[5]. On the other hand according to the advertising and vertical product differentiation literatures, firms can attract consumer's attention and increase their willingness to pay for their products by investing to marketing, advertising and R&D. Those types of investments provide non-price competition (known as quality competition) power to the firms and they can forestall the competitors by charging higher

[4] 2-digit sector-level whole sales price indices obtained from TURKSTAT are used.
[5] To convert tangible assets into real terms, 2-digit sectoral whole sale price indices are used.

prices[6]. Quality competition power or in other words endogenous sunk-costs of the firms is measured as the ratio of marketing, advertisement and distribution expenditures to the operating expenses.

Financial health measures constitute the third set of firm-specific variables. Financial health is important for the exporters since exportation incurs additional costs and investments. A firm is said to be liquidity constrained if it incurs difficulties to cover fixed costs for investments (including exports) due to either the scarce internal resources or difficulties in accessing to external financing means. In order to comprise the liquidity conditions of the firms, two different variables are used. The first variable is relevant with the internal resources of the firms. In empirical literature when speaking of the internal resources firm's cash flow is used in general, however since our data set does not contain information about cash-flow, alternative measure is preferred. Liquidity ratio that is defined as short-term trade receivables over total assets is used. This ratio is assumed to be showing how well a firm is positioned to meet any future short-term obligations and this measure can be regarded as a proxy for *accessibility of the internal resources.* The second variable is constructed to show firm's ability to access external resources. For most of the firm, credits from financial sector are the main source of finance. However not all firms are able to raise external financing at the same amount and with the same cost. The credit constraint variable is defined as the ratio of bank loans to total liabilities. Inability to find credit from financial sector to finance liabilities is considered as the severity of credit constraints for the firms. The constructed measure shows the borrowing power of the firms and the ratio varies between zero and one. As the ratio approaches to zero, it shows the severity of the credit constraint. Positive relation is expected between export performance and financial health of the firms.

Apart from these firm-specific factors, in order to account for sectoral and regional differences sector and region dummies are considered. Also time dummies are used in order to capture the influence of time varying macro-variables such as credit conditions, exchange rates and trade policies.

4. Empirical Results

In this section, main features of the exporting behaviors of the Turkish manufacturing firms are going to be identified by exploiting several approaches used in the empirical literature. Consistent with the order of the literature, first, performance differences are studied by comparing exporters and non-exporters in different selected performance measures via simple descriptive and regression analysis. Then self-selection and learning by exporting hypotheses are tested. The analysis is finalized by testing the existence of sunk-costs via dynamic discrete choice model.

4.1 Export Premium

The performance differences between exporters and non-exporters are investigated through simple descriptive analysis. For this purpose constructed efficiency indicators (including size, labor

[6] In the industrial organization literature, Sutton (1991) has named those expenditures made for increasing firm's quality competition as ***endogenous sunk-costs***.

productivity and profitability), quality indicators (R&D, marketing and advertisement expenditures and capital intensity) and financial condition indicators (credit constraint and liquidity) are used as the main performance measures.

Then more technical approach is followed and exporter premia are calculated for the selected performance measures following Bernard and Jensen (1995).

i. Descriptive Statistics:

Before going into detailed analysis, as a first step some preliminary graphical comparisons of exporters and non-exporters are carried out. Figure 4 through Figure 11 give the means of the selected performance measures by the export status of the firms over the period 1989-2010.

Figure 4. Size by Total Employment

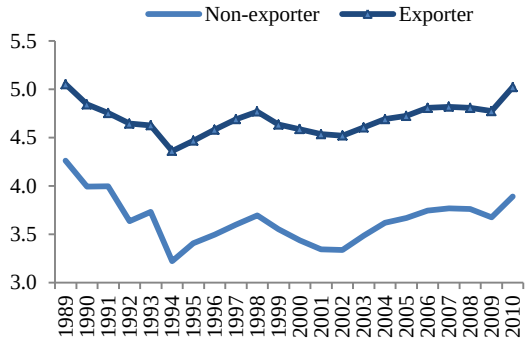


Figure 5. Productivity*

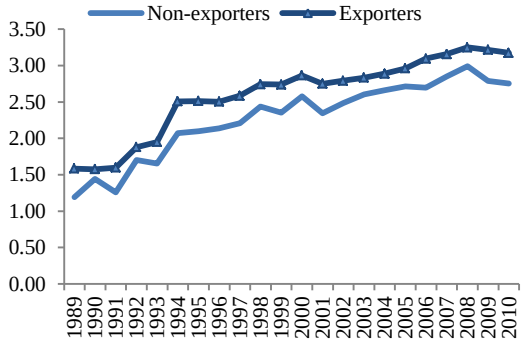


Figure 6. Profitability**

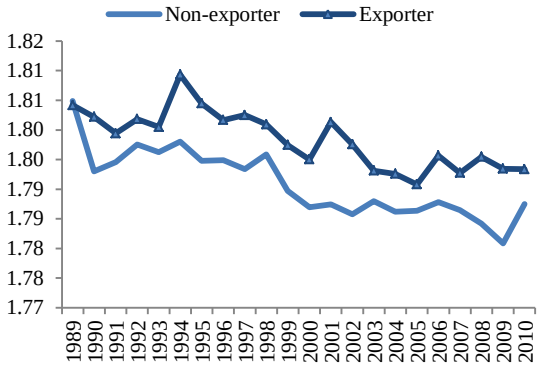


Figure 7. Technology Usage

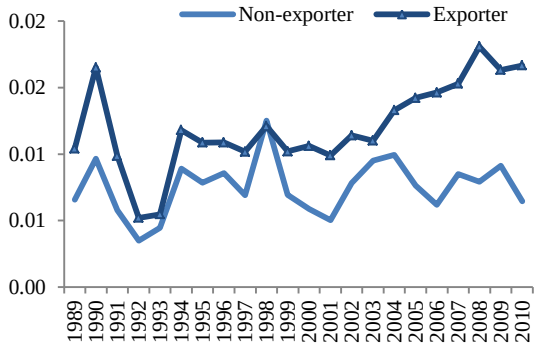


Figure 8. Marketing Expenses

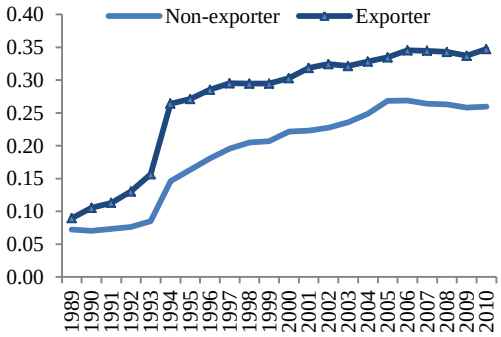


Figure 9. Capital Intensity*

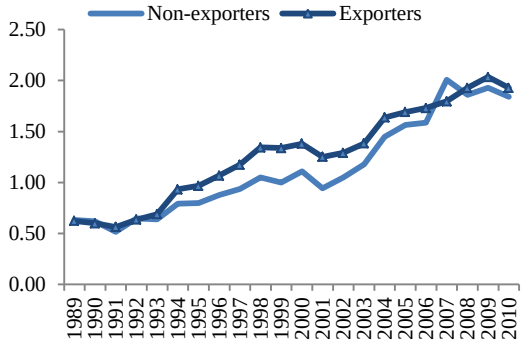


Figure 10. Credit Constraints

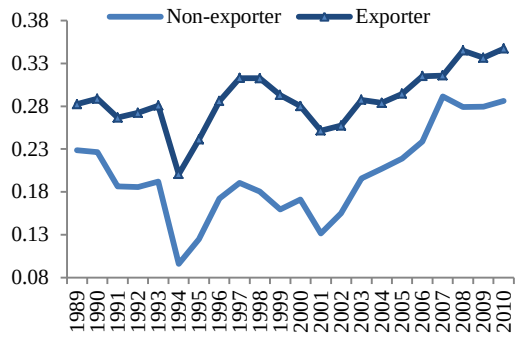
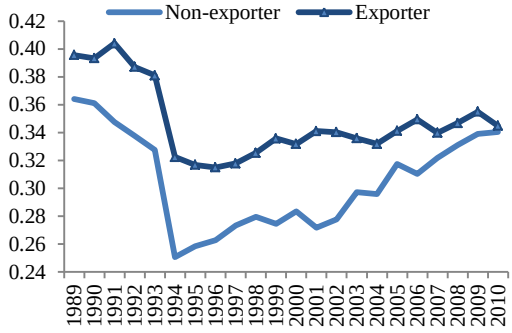


Figure 11. Liquidity



Source: Author's own calculations.
* To convert net sales and tangible assets into real terms, 2-digit sectoral wholesale price indices are used.
** Due to the ease of follow, profitability of the firms is rescaled by adding the minimum profit value to each observation. This rescaling enables to take the logarithm of the measure which provides convenient presentation.

Graphical investigation reveals that exporters are more efficient than non-exporters. More precisely, exporters are larger, more productive and more profitable compared to non-exporters. On average employment, productivity and profitability levels for the exporting firms remain above that of non-exporters. When quality measures are considered, that is to say R&D and marketing expenses and capital intensity of the firms, again superiority of the exporters is obvious. For R&D expenses, differentiation between exporters and non-exporters has become more evident since 2004. Intuitively, this pattern can be the result of the new regulations made in the legal incentive for R&D activity that was put in force in 2004[7]. Marketing expenses variable is regarded as endogenous sunk-costs of the firms. As mentioned before, firms with higher productivity are willing to spend more on such investment since their marginal benefits is higher. Moreover, exporters receive additional marginal benefits from those investments when compared with non-exporters; hence observing higher endogenous sunk costs for the exporters is evident. As expected, exporting firms seem to have stronger financial structure. For exporters both internal and external financing seems to be easier. Although for the last few years, liquidity difference between exporters and non-exporters vanishes, still exporters have better position.

Briefly, those findings, derived from simple descriptive statistics can be regarded as the source of evidence for the superiority of the exporters. Following the literature in order to provide more evidence on the performance differences between exporters and non-exporters, means of the selected performance measures for exporting and non-exporting firms are given in Table 2.

[7] Dated 01.02.2004 and 25334 (repeated) published in the Official Gazette with law number 5035; this new regulation provides tax payers that engage R&D activity significant tax advantages.

Table 2. Comparison Means of Performance Measures for Exporters and Non-Exporters

	Non Exporter	Exporter	t-stat	p-value	Mean Comparison Test Result*
Efficiency Measures					
Size	3.62	4.68	-119.1	0.00	Reject H_o
Productivity	2.33	2.65	-23.4	0.00	Reject H_o
Profitability	1.79	1.80	-14.6	0.00	Reject H_o
Quality Measures					
R&D Intensity	0.01	0.01	-13.1	0.00	Reject H_o
Capital Intensity	2.97	3.19	-36.0	0.00	Reject H_o
Marketing Expenses	0.20	0.28	-17.9	0.00	Reject H_o
Financial Measures					
Credit constraint	0.20	0.29	-70.2	0.00	Reject H_o
Liquidity	0.30	0.35	-32.8	0.00	Reject H_o

Source: Author's own calculations.
Ho: diff = mean(0) - mean(1)=0 and Ha: diff = mean(0) - mean(1)<0.
* t tests on the equality of means

According to mean comparison test results, for all measures the difference between exporters and non-exporters are found to be statistically significant. The next step in empirical investigation is the computation of exporter premia.

ii. Export Premia:

With the descriptive analysis given above, it is observed that the exporters display better performance than non-exporters according to the selected measures. In order to support this descriptive evidence, exporter premium is calculated. Exporter premium is defined as the percentage difference of performance measure between exporters and non-exporters. It is computed from the following regression equation:

$$\ln(y_{it}) = \alpha + \beta \text{Export}_{it} + \delta \text{Control}_{it} + \varepsilon_{it} \quad (1)$$

where y_{it} denotes selected performance measures (namely size, productivity, credit constraint, capital intensity, profitability, liquidity, technology usage and marketing expenses) of firm i at time t and $Export_{it}$ is a dummy variable showing the export status of firm i at time t. $Export_{it}$ gets the value of 1 if the firm i's foreign sale is greater than zero at time t and zero otherwise. The vector $Control$ contains a logarithm of the number of employees (except in the case of the size regression), sector, region and time dummies. For the regression that covers full sample crises dummies (for 1994, 2001 and 2008) are also included into $Control$ vector and ε is the error term.

Exporter premia is computed from the estimated β coefficient as $100 \times (\exp(\beta) - 1)$ and is interpreted as the percentage difference between exporters and non-exporters. If for the given measure, exporters have better performance then positive and statistically significant estimate for the β coefficient is expected.

In order to utilize panel structure of the data and account for unobserved, time-invariant heterogeneity problem, the model is estimated with random effect. Estimation results of the logarithm of the selected firm performances on the export status and other control variables together with the calculated exporter premiums are given in Table 3.

Table 3. Random Effect Panel Data Regression of Firm Performance Measures on Export Status

	Coef.	Std. Err.	Premium	No of Obs.	No of Firms	Adjusted R2
Dependent Variable: Size = log(Number of Employment)						
Full Sample (1989-2010)	0.31***	0.012	36.7%	84476	8737	0.16
1994 Crisis (1993-1995)	0.22***	0.014	24.6%	14237	5591	0.12
2001 Crisis (2000-2002)	0.29***	0.022	33.4%	12457	4970	0.15
2008 Crisis (2007-2010)	0.28***	0.024	32.4%	13757	4398	0.10
Dependent Variable: Productivity = log(Real Net Sales/Number of Employment)						
	Coef.	Std. Err.	Premium	No of Obs.	No of Firms	Adjusted R2
Full Sample (1989-2010)	0.40***	0.013	48.7%	84456	8735	0.21
1994 Crisis (1993-1995)	0.36***	0.020	43.1%	14237	5591	0.13
2001 Crisis (2000-2002)	0.34***	0.025	39.8%	12454	4968	0.08
2008 Crisis (2007-2010)	0.38***	0.036	46.2%	13750	4397	0.09
Dependent Variable: Profitability = log(Operating Profits/Net Sales+1)						
	Coef.	Std. Err.	Premium	No of Obs.	No of Firms	Adjusted R2
Full Sample (1989-2010)	0.01***	0.001	0.5%	84311	8736	0.03
1994 Crisis (1993-1995)	0.00***	0.001	0.4%	14215	5585	0.03
2001 Crisis (2000-2002)	0.01***	0.002	0.7%	12439	4966	0.02
2008 Crisis (2007-2010)	0.01**	0.002	0.5%	13707	4390	0.02
Dependent Variable: Credit Constraints= log(Total Financial Liabilities/Total Liabilities)						
	Coef.	Std. Err.	Premium	No of Obs.	No of Firms	Adjusted R2
Full Sample (1989-2010)	0.05***	0.002	4.7%	84457	8737	0.12
1994 Crisis (1993-1995)	0.05***	0.004	5.0%	14228	5587	0.13
2001 Crisis (2000-2002)	0.06***	0.004	5.7%	12457	4970	0.11
2008 Crisis (2007-2010)	0.02***	0.005	2.5%	13754	4398	0.04
Dependent Variable: Liquidity=log(Short-term Receivables/Total Assets)						
	Coef.	Std. Err.	Premium	No of Obs.	No of Firms	Adjusted R2
Full Sample (1989-2010)	0.02***	0.002	2.0%	84475	8737	0.07
1994 Crisis (1993-1995)	0.03***	0.003	3.1%	14237	5591	0.10
2001 Crisis (2000-2002)	0.03***	0.004	3.1%	12457	4970	0.07
2008 Crisis (2007-2010)	0.00	0.004	0.2%	13756	4398	0.03
Dependent Variable: Capital Intensity= log(Real Tangible Assets /Number of Employment)						
	Coef.	Std. Err.	Premium	No of Obs.	No of Firms	Adjusted R2
Full Sample (1989-2010)	0.20***	0.013	22.1%	84476	8737	0.08
1994 Crisis (1993-1995)	0.20***	0.018	21.6%	14237	5591	0.03
2001 Crisis (2000-2002)	0.18***	0.024	19.6%	12457	4970	0.01
2008 Crisis (2007-2010)	0.14***	0.036	14.8%	13757	4398	0.08
Dependent Variable: Technology Usage = log(R&D Expenses/Operating Expenses)						
	Coef.	Std. Err.	Premium	No of Obs.	No of Firms	Adjusted R2
Full Sample (1989-2010)	0.001**	0.001	0.1%	84476	8737	0.02
1994 Crisis (1993-1995)	0.001	0.001	0.1%	14237	5591	0.01
2001 Crisis (2000-2002)	0.00	0.001	0.0%	12457	4970	0.03
2008 Crisis (2007-2010)	0.002	0.001	0.2%	13757	4398	0.04
Dependent Variable: Marketing Expenses = log(Marketing Expenses/Operating Expenses)						
	Coef.	Std. Err.	Premium	No of Obs.	No of Firms	Adjusted R2
Full Sample (1989-2010)	0.05***	0.002	4.7%	84476	8737	0.27
1994 Crisis (1993-1995)	0.08***	0.004	7.9%	14237	5591	0.17
2001 Crisis (2000-2002)	0.04***	0.004	4.3%	12457	4970	0.16
2008 Crisis (2007-2010)	0.04***	0.004	3.9%	13757	4398	0.19

Source: Author's own calculations.

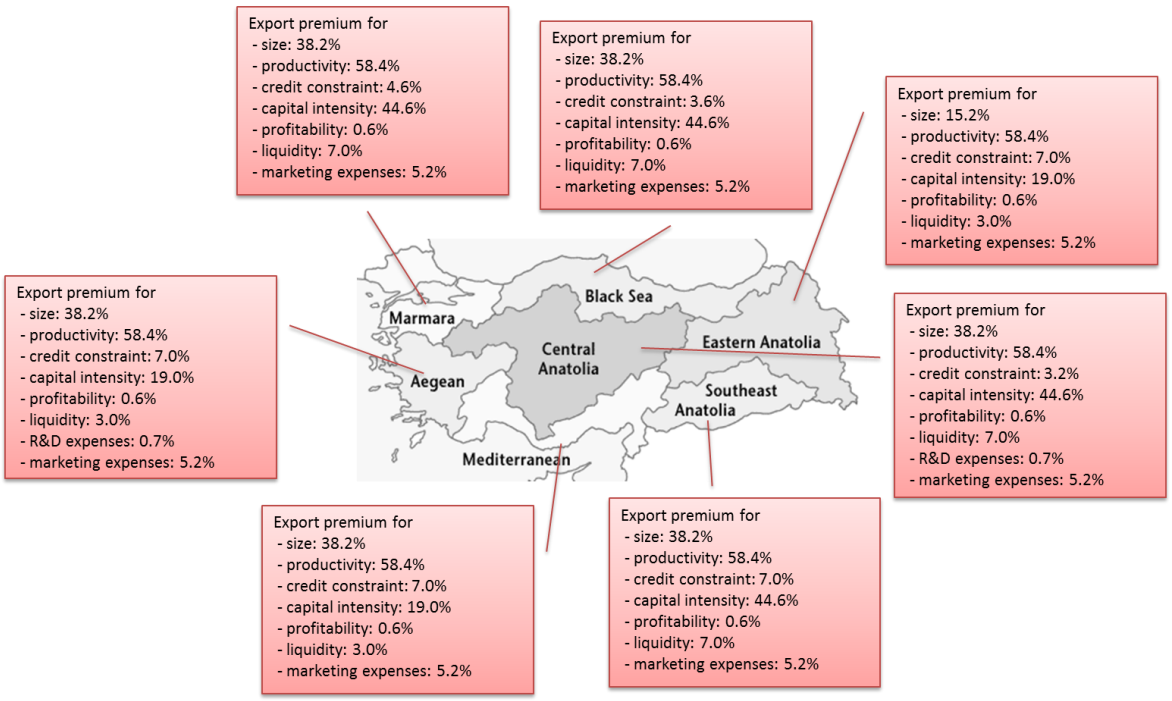
Reported coefficient estimates are the coefficients on export status in a random effect panel data regression of logarithm of the firm specific performance measures for the full sample covering 1990-2010 and sub-samples covering 1993-1995, 2000-2002 and 2007-2010. All regressions include logarithm of the total employment (except regression for size), sector, region and time dummies. Models that are using full sample, crisis dummies for 1994, 2001 and 2008 are also included as explanatory variables. The model is estimated as random effects regression and cluster standard errors at firm level are used. *, **, *** indicates significance at 10 % level, 5 % level and 1% level respectively. Reported calculated premiums are the percentage differences given by $(\exp(\hat{\beta})-1)*100$.

According to the calculated exporter premiums, when full sample results are considered for all of the selected performance measures the average percentage differences between exporters and non-exporters are found to be statistically significant. The most distinct difference between exporters and non-exporters arises in the productivity, size and capital intensity. Exporters are found to be on average 36.7 percent larger, 48.7 percent more productive and 22.1 percent more capital intensive than non-exporters. Moreover they are 4.7 percent less credit constrained and more spending for

marketing. Even for liquidity, profitability and technology usage calculated export premiums are not notable from economic point of view, they are found to be statistically significant.

Sectoral and regional differences can also be important for the exportation. In order to investigate those effects, interaction terms of export status with region and sector dummies are added as explanatory variables in Equation 1. Estimation results portray the following regional figures for the export premiums[8].

Figure 12. Regional Export Premiums



Estimation results reveal certain interesting regional differences between exporters and non-exporters. The most obvious difference arises in the Eastern Anatolia; the percentage difference between exporters and non-exporters within this region is smaller for most of the selected performance measures. Export premium of size, capital intensity and liquidity are found to be lower than that of other regions (Figure 12).

Sectoral export premiums are given in Table 4[9].

[8] Due to space considerations, estimation results are not given in details.
[9] Estimated coefficient results are given in the appendix.

Table 4. Calculated Sectoral Export Premiums (%)

	Size	Productivity	Credit constraint	Capital intensity	Profitability	Liquidity	Marketing expenses
Food	36.0	40.8	5.9	7.5	0.2	2.9	8.1
Tobacco	36.0	40.8	**-13.7**	7.5	0.2	2.9	8.1
Textiles	**53.7**	**55.5**	5.9	7.5	**0.8**	2.9	**5.2**
Wearing	36.0	**63.5**	5.9	7.5	0.2	**0.7**	**4.1**
Leather	36.0	40.8	5.9	7.5	0.2	2.9	**3.4**
Wood	36.0	**58.6**	**3.4**	**28.0**	**0.7**	2.9	**3.9**
Paper	36.0	**63.5**	5.9	**47.4**	0.2	**0.3**	**4.4**
Publishing	36.0	40.8	**2.3**	**36.8**	0.2	**0.1**	**4.7**
Petroleum	36.0	**-29.0**	5.9	**-34.6**	0.2	2.9	8.1
Chemicals	36.0	40.8	**4.1**	**18.6**	0.2	**0.1**	**4.5**
Plastics	36.0	**61.7**	5.9	**38.4**	0.2	2.9	**3.7**
Non-metallic	36.0	**60.0**	**2.9**	**24.3**	**1.0**	2.9	**4.3**
Basic metals	36.0	40.8	**7.9**	**20.8**	0.2	2.9	**5.2**
Fabr. Met.	36.0	40.8	**3.3**	**17.8**	0.2	**0.5**	**3.3**
Machinery	36.0	40.8	**3.5**	7.5	0.2	2.9	**3.4**
Office mach.	**-22.8**	**242.9**	**21.6**	7.5	0.2	2.9	8.1
Electrical mach.	**18.8**	**65.0**	**1.8**	**20.4**	0.2	2.9	**4.8**
Radio, TV	36.0	**130.8**	5.9	**49.6**	0.2	2.9	**1.4**
Medical	36.0	**40.8**	**-1.2**	7.5	0.2	2.9	**0.3**
Motor Vehicles	36.0	**73.3**	**2.9**	**24.9**	0.2	**0.8**	**0.7**
Other Transport	36.0	**279.4**	5.9	**65.0**	0.2	2.9	**-4.5**
Furniture	36.0	40.8	**3.5**	7.5	**0.8**	2.9	8.1

Calculated sectoral export premiums display significant sectoral differences. These simple but primary results about the superiority of the Turkish manufacturing exporters are all consistent with the previous findings which encourage for further analysis.

4.2 Self-Selection Hypothesis

Heterogeneous trade theory assets that trade costs constitute a threshold that only can be surpassed by the most productive firms. In other words, a firm self-selects into export markets on the basis its relative performance in the domestic market and this implies that even before start to export positive performance premium exists. Therefore, self-selection hypothesis can be tested empirically by assessing the pre-export performance difference of export starters and non-exporters. Then, if firms do self-select into export markets then it should be expected to find significant differences in performance measures between future export starters and future non-exporters several years before some of them begin to export. Wagner (2007) recommends estimating the following equation with the sample of firms that did not export between year t-δ and t-1 for testing the validity of the self-selection hypothesis.

$$\ln(y_{it-\delta}) = \alpha + \beta\, \text{Export}_{it} + \gamma Z_{it-\delta} + \varepsilon_{it} \qquad (2)$$

Here, the dependent variable y_{it} shows the selected performance measures namely number of employees (size), productivity, credit constraint, capital intensity, profitability, marketing expenses, liquidity and R&D expenses of firm i at time t. Export_{it} is a dummy variable taking the value of 1 if the firm i starts to export at the current year t. $Z_{(it-\delta)}$ contains number of control variables. These are logarithm of number of employee for handling size effect, sector and region dummies to capture unobserved sector and region specific differences and time dummies to capture the influence of time varying macro-economic variables. ε_{it} is the regression error.

The pre-entry premium, computed from the estimated coefficient β as 100×(exp(β)-1), shows the average percentage difference between today's exporters and non-exporters δ years before starting to export. Estimated coefficients for specified dependent variables and calculated pre-entry premium of the future exporters are given in Table 5.

Table 5. Self-Selection: Pre-entry Export Premium in Levels

		δ=3	δ=2	δ=1	Obs(1)	Firm(2)
Size	Coefficient	0.17***	0.19***	0.18***	28481	6310
	Std. Error	0.017	0.013	0.011		
	Premium (%)	**18.57**	**21.46**	**19.81**		
Productivity	Coefficient	0.16***	0.14***	0.16***	28472	6308
	Std. Error	0.019	0.016	0.014		
	Premium (%)	**17.71**	**15.34**	**17.38**		
Credit Constraint	Coefficient	0.01**	0.02***	0.02***	28467	6308
	Std. Error	0.004	0.003	0.003		
	Premium (%)	**0.97**	**1.53**	**2.51**		
Capital Intensity	Coefficient	0.14***	0.18***	0.18***	28481	6310
	Std. Error	0.022	0.018	0.015		
	Premium (%)	**15.57**	**19.85**	**20.00**		
Profitability	Coefficient	0.00	0.002*\	0.001	28373	6285
	Std. Error	0.001	0.001	0.001		
	Premium (%)	**0.02**	**0.19**	**0.12**		
Liquidity	Coefficient	0.01	0.00	0.00	28481	6310
	Std. Error	0.004	0.003	0.002		
	Premium (%)	**0.51**	**0.52**	**0.37**		
R&D Expenses	Coefficient	0.00	0.00	0.00	28481	6310
	Std. Error	0.001	0.001	0.001		
	Premium (%)	**-0.12**	**0.06**	**0.06**		
Marketing Expenses	Coefficient	0.00	0.00	0.01***	28481	6310
	Std. Error	0.004	0.004	0.003		
	Premium (%)	**-0.45**	**-0.10**	**0.67**		

Source: Author's own calculations.
(1) The reported coefficients are obtained from random effects panel data regression of logarithm of performance measure on export status dummy.
(2) The reported estimated premium are the average percentage difference given by (exp(β)-1)*100 where β is the export dummy coefficient from regression 3
(3) Robust standard errors are given.
(4) *, **, *** indicates significance at 10 % level, 5 % level and 1% level respectively.
(5) All regressions (except regression for size) include logarithm of number of employee, region, sector and time dummies. Regression for size includes region, sector and time dummies. (1) is the number of observations available for the model with d=1. (2) represents the number of firms available for the model with d=1.

Estimation results indicate that the pre-entry export premiums for efficiency measures and credit constraints are positive and statistically different than zero which can be regarded as strong evidence for the validity of self-selection hypothesis. It is found that export starters have already displayed better performance during the pre-entry period. Future exporters are found to be on average larger, more productive, more capital intensive and less credit constrained in the pre-entry period. Our finding about self-selection of better firms into export markets not only shows consistency with the existing literature but also provides important policy implications.

For policy standpoint this finding has several implications. Self-selection of more efficient and less credit constrained firms suggests that the higher efficiency (larger, more productive and more profitable) of firms, the more likely they are to export. Hence trade policies that support productivity of large and financially unconstrained firms will increase exports and in turn overall output. Therefore trade policies that focuses on improving firms' efficiency by reducing the distortionary costs of government intervention and investing in infrastructure.

4.3 Learning by Exporting Hypothesis

In the previous section, it is concluded that one source of observed superiority of the exporting firms comes from self-selection of good firms into export market. In this section, other direction of the causality will be investigated that is to say validity of learning-by-exporting will be tested. Learning-by-exporting asserts that international markets are more competitive and once a firm enters into export markets, he learns how to cope with intense competition which leads to faster improvement in the performance measures. Hence, according to the learning-by-exporting hypothesis, engaging exporting activity improves the firm's performance and it points out the other direction of the causal relation.

In the literature, previous research results related with learning-by-exporting hypothesis have been contradictory. The pioneers of this literature, Bernard and Jensen (1999b) and Clerides et al. (1998) failed to find evidence of learning-by-exporting for US and Colombia and Morocco firms respectively. Likewise, Aw et al. (2000) for Korean and Arnold and Hussinger (2004) for German manufacturing firms find no statistically significant evidence for this effect. Contrary to non-supportive evidences for learning effect derived from previous empirical studies, with more elaborate investigation of the recent studies reveal the importance of learning effect especially for the developing countries. Kraay (1999) for China, Isgut and Fernandes (2007) for Colombia, Bigsten et al. (2004) for sub-African countries, Blalock and Gertler (2004) for Indonesia, DeLoecker (2007) for Slovenia, and Albornoz and Ercolani (2007) for Argentina concluded on the behalf of significant positive effect of export experience on the productivity of the firms.

Learning-by-exporting has also been studied using different data and techniques for Turkish manufacturing firms. Yasar and Rejesus (2005), Yasar et al. (2007) and Maggioni (2012) using TURKSTAT Annual Manufacturing Survey studied learning effect of exporting and found supportive evidence for it. Aldan and Günay (2008)[10] used CBRT Company Accounts data set and also concluded that learning-by-exporting holds for Turkish manufacturing firms. On the other hand, Kılıçaslan and Erdoğan (2012) using Turkey's top 1000 industrial enterprises for 1997-2007 periods found no statistically significant evidence for the learning effect. However, this conflicting conclusion can be the result of bias sample that the authors used[11].

Here, using relatively more representative sample, the learning effect will be re-examined for 1990-2010 period. There are two commonly used methods for testing validity of the learning-by-exporting hypothesis. Formerly including export status as an independent variable into the firm's performance equation has been proposed but this approach has been criticized due to the existence of self-selection bias. Thereafter, treatment evaluation techniques such as Propensity Score Matching

[10] They used same dataset, from CBRT but their analyses were based on different variables for a restricted period 1989-2003.

[11] Already, in several studies such as Bin et al. (2012) for China and Albornoz and Ercolani (2007) for Argentina concluded that learning-by-exporting effects vary considerably with the size of the firms and smaller firms learn more from exporting. Therefore, Kılıçaslan and Erdoğan (2012) conclusion about no statistically significant learning-effect can be due to the considering only large firms.

(PSM) and difference-in-difference (DID) approaches gain increasingly popularity in the recent empirical literature since they offer to mitigate, observable and non-observable, selection biases.

Adaptation of PSM to our framework includes matching export starters (treatment group) with non-exporters (control group) that have similar pre-entry observable characteristics and then evaluating the average treatment effect on the treated. PSM was designed for cross sectional data and only deals with selection bias arises from observable characteristics of the firms. However, in order to handle also unobserved firm specific characteristics, Heckman, Ichimura and Todd (1997) combined PSM with DID method and extended this method for panel data. Here, PSM with DID is used.

At the first stage, firms are classified according to their export history. A firm is called export starter if it does not export at time t-2 and t-1, starts to export at time t and continue to export at time t+1 and t+2. The control group contains non-exporters which are identified as not export for all of the years from t-2 to t+2. Therefore, recursive time spans with five years are considered. Starting with 1989-1993 period, firms are classified as export starters and non-exporters, and then moved to 1990-1994 period and so on. Hence, with this classification, firms with irregular export strategy are omitted. The pre-entry and post-entry firm characteristics are determined by the averages of the covariates. Pre-entry characteristic for a firm that starts to export at time t is defined as the average of firm characteristic at time t-1 and t-2. Post-entry characteristic is defined as the average of firm characteristic at time t+1 and t+2. Therefore, it is end up with 10073 observations for 1991-2008 period in which 8609 of the observations belong to non-exporters and 1458 observations to export starters.

Propensity scores are estimated for each firm in the sample by the following discrete choice model:

$$\begin{aligned}\mathrm{Estart}_i = \Theta(&\alpha + \beta_1 \mathrm{Size}_0 + \beta_2 \mathrm{Productivity}_0 + \beta_3 \mathrm{Credit}_0 + \beta_4 \mathrm{Capital}_0 \\ &+ \varphi S_i + \gamma T + \varepsilon_i) \end{aligned} \quad (3)$$

where $Estart$ is the dummy variable that takes the value of 1 if the firm is export starter and zero if the firm is non-exporter as explained above. The subscript 0 implies the pre-entry performance measures. Therefore, the propensity of starting to export is assumed to depend on the pre-entry size, productivity, credit constraint, capital intensity and profitability. S and T stands for the sector and time dummies. In Table 6, estimation result for the propensity score model is presented.

Table 6. Propensity Score Model Coefficient Estimates

	Coefficient	Standard Error
Size	0.31**	0.02
Productivity	0.08***	0.02
Credit Constraint	0.43***	0.10
Capital Intensity	0.16***	0.02
Profitability	0.92***	0.55
Number of observations		10036
Number of export starters		1450
Number of non-exporters		8586
Log likelihood		-3487
Pseudo R2		0.16

Source: Author's own calculations.

Pre-entry firm size, productivity, credit constraints, capital intensity and profitability are found to be statistically significant determinant for starting export. Using estimation results, propensity score for 10073 firms for 1991-2008 periods are calculated and the matching of the export starters and non-exporters are carried out using the user-written STATA program psmatch2 (Leuven and Sianesi, 2003)[12].

The matching quality of the algorithm is examined by means of investigation balancing property of pre-entry covariates. Table 7 gives the tests for the success of the matching of covariates.

Table 7. Assessing the Matching Quality: Balancing Property of the Pre-Entry Covariates

		Pre-entry					
		Mean			% Red.	t-test	
		Export Starter	Non-exporter	%Bias	|Bias|	t	p>|t|
Size	Unmatched	4.21	3.57	56.80		20.44	0.00
	Matched	4.17	4.17	0.00	99.9	0.01	0.99
Productivity	Unmatched	4.83	4.80	2.60		0.92	0.36
	Matched	4.83	4.84	-0.50	79.8	-0.15	0.88
Credit Constraint	Unmatched	0.19	0.17	14.50		5.15	0.00
	Matched	0.19	0.19	-1.80	87.4	-0.48	0.63
Capital Intensity	Unmatched	2.94	2.72	18.80		6.78	0.00
	Matched	2.94	2.99	-3.10	83.7	-0.82	0.41
Profitability	Unmatched	1.80	1.79	10.50		3.77	0.00
	Matched	1.80	1.80	0.10	99.9	0.03	0.97
Liquidity	Unmatched	0.33	0.30	17.60		5.95	0.00
	Matched	0.33	0.33	-1.90	88.9	-0.54	0.59
R&D Expenses	Unmatched	0.01	0.01	3.20		1.17	0.24
	Matched	0.01	0.01	1.90	33.7	0.54	0.59
Marketing Expenses	Unmatched	0.15	0.17	-12.90		-4.39	0.00
	Matched	0.15	0.16	-7.60	41.0	-2.11	0.04
		Pseudo R2	LR chi2	p>chi2			
	Unmatched	0.060	500.10	0.00			
	Matched	0.002	6.08	0.64			

Source: Author's own calculations.

The first sign for the success of the matching algorithm is the obtained insignificant t-statistics after matching. The t-tests given in the following table show that matching quality is satisfactory since after matching, differences between the mean values of the treated (export starters) and control (non-exporters) groups disappear for each variables. Another sign for the success of the matching is the pseudo R^2 before and after matching that is given at the bottom panel of the table. After matching, fairly low pseudo R^2 is expected if the matching is satisfactory. In our case, pseudo R^2 declines even

[12] Nearest neighbour with caliper 0.01 matching algorithm is preferred based on the evaluation of the other alternatives.

approaches to zero after matching. Lastly, the joint F test statistics for testing whether variables are jointly balanced imply that matching algorithm did good job. Hence, matching quality assessment shows that the chosen algorithm yields a satisfactory result and we obtain a control group which has similar pre-entry firm-specific factors that enables us to evaluate the impact of starting export on firm's performance.

Table 8. Estimated Average Treatment Effect of Export Starters

	Entry Period Bootstrap				Post-Entry Period Bootstrap			
	ATT	Std. Err.	Z	P>|z|	ATT	Std. Err.	Z	P>|z|
Size	0.09**	0.05	1.94	0.05	0.16***	0.04	3.89	0.00
Productivity	0.12***	0.04	2.69	0.01	0.19***	0.04	4.84	0.00
Credit constraint	0.05***	0.01	7.27	0.00	0.07***	0.01	8.31	0.00
Capital Intensity	0.07	0.07	1.00	0.32	0.12*	0.07	1.72	0.09
Profitability	0.00	0.00	1.51	0.13	0.01***	0.00	4.00	0.00
Liquidity	0.01	0.01	1.38	0.17	0.02***	0.01	3.17	0.00
R&D Expenses	0.00	0.00	0.44	0.66	0.00	0.00	0.93	0.35
Marketing Expenses	0.02**	0.01	2.12	0.03	0.05***	0.01	6.38	0.00

Source: Author's own calculations.
ATT stands for the average treatment effect on treated.
*, ** and *** denotes significance at 0.10, 0.05 and 0.01 level respectively.

First and foremost, positive and highly significant coefficient estimates for size, productivity, credit constraints and marketing expenses provide strong evidence for the existence of the learning-effect. Our results support both immediate positive entry and positive post-entry effects of export activity on size, productivity, financial health, quality competition and capital intensity. Efficiency gains (size and productivity), improvement in financial health (credit constraints) and increase in quality competition (marketing expenses) for export starters observed immediately after entering the export market. Moreover, as time passes the efficiency gains, liquidity constraints relaxation and quality competition improves further in the post-entry period. In the post-entry period, positive effect of export activity is observed not only in productivity, size, and credit constraint and quality competition but also observed in capital intensity, profitability and liquidity. The results show that as export starters learn more by exporting they start to be larger, more productive, less credit constraint, more capital intensive, more profitable, more liquid and more quality competitive.

Findings supporting evidence for the existence of learning-effect for Turkish manufacturing firms are consistent with the recent empirical literature which asserts that learning-by-exporting is more plausible for developing countries. Moreover, the validity of the learning effect for Turkish manufacturing firms has been shown by various previously conducted studies that used different dataset and/or methods. As mentioned before, Yaşar and Rejesus (2005), Yaşar et al. (2007), Aldan and Günay (2008) and Moggioni (2012) used propensity score matching approach with difference-in-difference method for testing the hypothesis. These studies found evidence supporting the importance of learning-effect. Our findings in this section confirm previous findings and extend the analysis of Aldan and Günay by considering wider range of firm specific characteristics for wider time horizon.

4.4 Testing Existence of Sunk-Costs

In order to gain more understanding of exporting behavior of Turkish manufacturing firms in this section existence of sunk-costs is investigated. Firms that are planning to enter into export markets may need to pay additional costs, referred to as sunk export costs. According to general belief only "good" firms can afford those sunk-costs and this is the leading reason for observing strong evidence for the self-selection of the exporters.

Roberts and Tybout (1997) proposed an empirical model for testing the validity of this belief. Their empirical model is based on the theoretical model given by Dixit (1989a, 1989b), Baldwin (1989), Baldwin and Krugman (1989) and Krugman (1988) in which they show that existence of sunk entry costs produces hysteresis in trade flows. Proceeding from this finding, Roberts and Tybout (1997) proposed dynamic discrete choice model for testing the existence of sunk cost.

In Roberts and Tybout (1997), it is assumed that for each period t, firm's expected gross profits differ by the amount $\pi_i(p_t, s_{it})$ if exports. Here, p_t denotes exogenous market-level variables and s_{it} denotes state variables specific to firms. Assume that firm faces an export market entry cost of F_i^0 if it never exported previously and face a re-entry cost of F_i^j if it last exported in year $t-j$ ($j \geq 2$). Hence, their earnings become $\pi_i(p_t, s_{it}) - F_i^0$ if they enter export market for the first time and $\pi_i(p_t, s_{it}) - F_i^j$ if they exit and re-enter the export market at period t. Finally, a firm that exported in the previous period earns $\pi_i(p_t, s_{it})$ during period t by continuing exporting and $-X_i$ if exists. This information was collapsed together in a single expression and the following discrete choice is derived:

$$Y_{it} = \begin{cases} 1 \text{ if } \pi_i(p_t, s_{it}) + \delta\{E_t(V_{it+1}(\Omega_{it+1})|Y_{it}=0\} \geq F_i^0 - (F_i^0 + X_i)Y_{it-1} + \sum_{j=2}^{J_i}(F_i^0 - F_i^j)\tilde{Y}_{it-j} \\ 0 \text{ otherwise} \end{cases} \quad (4)$$

Due to its difficulty, Roberts and Tybout pursued reduced form approach and assume that $\pi_i(p_t, s_{it}) - F_i^0$ depends on three factors: time-specific effects that reflect sector specific or macro-level changes in export conditions (μ_t) such as exchange rates, credit market and policy conditions, firm specific factors (Z_{it}) such as set of sector dummies, size, productivity, capital stock, age and standard error terms, ε_{it}.

$$\pi_i(p_t, s_{it}) - F_i^0 = \mu_t + \beta Z_{it} + \varepsilon_{it} \quad (5)$$

Additional restriction on sunk entry and exit costs are needed in order to identify the model. It is assumed that $\gamma_i^j = \gamma_i^0 = F_i^0 + X_i (j \geq t+1)$ implying that experience is completely depreciated if it was acquired more than J years ago. With this simplifying assumption the following dynamic discrete choice equation for the export market participation is obtained:

$$Y_{it} = \begin{cases} 1 \; if \; \mu_t + \beta Z_{it} + \gamma^0 Y_{it-1} + \sum_{j=2}^{J} \gamma^j \tilde{Y}_{it-j} + \varepsilon_{it} \geq 0 \\ 0 \; otherwise \end{cases} \quad (6)$$

The export decision at time t does not depend on the exporting history which implies no persistence pattern in export behavior that is to say no sunk-costs exist if γ^j's are all zero in Equation

6. Therefore, with this setting, testing joint significance of $\gamma^0$and γ^1 is equivalent to test the existence of sunk-cost. It is also possible to analyze the rate of depreciation of experience and accumulated knowledge in export activities by looking at these coefficients individually.

The estimation of this dynamic binary choice model faces two main problems. One is the serially correlated error terms due to the presence of unobserved heterogeneity. To account for this, in general, random effects probit model is used. The other serious problem is known as the "initial conditions problem". There are several approaches for dealing the initial condition problem that is encountered in the dynamic discrete choice models. Heckman (1981) suggests specifying a conditional distribution for the initial condition, while Wooldridge (2005) suggestion is much simpler. He proposes to include the initial value of the dependent variable and the mean values of the time variant explanatory variables for each firm as additional explanatory variables for the solution of initial condition problem. Due to its practical ease Wooldridge approach is preferable.

Here following Roberts and Tybout (1997), the existence of sunk-cost is tested by setting discrete choice model for the current export status of the firm (Y_{it}) as a function of export history($\sum_{j\geq 1}\gamma^j \tilde{Y}_{t-j}$), economy wide variables (X_t) and firm specific factors (Z_{it}).

$$\mathrm{Y_{it}} = \alpha + \sum_{\mathrm{j}\geq 1}\gamma^{\mathrm{j}}\,\widetilde{\mathrm{Y}}_{\mathrm{t-j}} + \beta\mathrm{X_t} + \theta\mathrm{Z_{it}} + \varepsilon_{\mathrm{it}} \qquad (7)$$

We choose j to be three so that the export history of the firms characterized by ($\widetilde{\mathrm{Y}}_{\mathrm{it-1}}, \widetilde{\mathrm{Y}}_{\mathrm{it-2}}, \widetilde{\mathrm{Y}}_{\mathrm{it-3}}$) where $\widetilde{\mathrm{Y}}_{\mathrm{it-k}}$ is a dummy variable that indicates the firm i exports last in k years ago. More precisely,

$$\widetilde{\mathrm{Y}}_{\mathrm{it-1}} = \begin{cases} 1, \text{if } \mathrm{Export_{it-1}} > 0 \\ 0, \text{otherwise} \end{cases}, \quad \widetilde{\mathrm{Y}}_{\mathrm{it-2}} = \begin{cases} 1, \text{if } \mathrm{Export_{it-1}} = 0 \text{ and } \mathrm{Export_{it-2}} > 0 \\ 0, \text{otherwise} \end{cases}$$

and

$$\widetilde{\mathrm{Y}}_{\mathrm{it-3}} = \begin{cases} 1, \text{if } \mathrm{Export_{it-1}} = 0 \text{ and } \mathrm{Export_{it-2}} = 0 \text{ and } \mathrm{Export_{it-3}} > 0 \\ 0, \text{otherwise} \end{cases} \qquad (8)$$

Then current export status of the firms is modelled as a function of the previous export history($\tilde{Y}_{t-1}, \tilde{Y}_{t-2}, \tilde{Y}_{t-3}$), firm-specific factors ($\mathrm{Z_{it}}$) such as efficiency measures (productivity, profitability and competitiveness), quality measures (endogenous sunk costs, R&D and capital intensity) and financial measures (credit constraints and liquidity). In order to account for the size, sector and regional differences, size, region and sector dummies are included. For capturing business cycle effect time dummies are included. In addition to these standard independent variables, in order to investigate the variation of sunk-cost during the crisis interaction terms of the crisis dummies with lagged export status $\tilde{Y}_{it-1}$are also considered.

Unobserved time invariant heterogeneity problem is accounted by estimation the model with random effects[13]. Moreover, initial export status ($\mathrm{Y_{i,0}}$) and the averages of time varying firm-specific

[13] Technical explaination for chosing random effects model is given in Roberts and Tybout (1997). Briefly, referring to Heckman (1981), for the models in which the time dimension is large, standard logit/probit estimator using firm-specific dummy variables will not yield consistent slope coefficient. Here, in our case T= 18 which is comparatively higher than T=8 that was noted as "...the bias in slope coefficients from a dynamic probit with unobservable effects is "distrubingly large" (p.180) when T=8" (p.16).

regressors ($\bar{Z}_i$) are included in order to account for the initial condition problem as suggested in Wooldridge. Estimation results of the dynamic Logit model are given in Table 9.

Table 9. Testing Existence of Sunk-cost: Dynamic Logit Estimation Results

Dependent Variable, Y_{it} : Export Status of the Firm i at time t (Dummy variable that takes value of one if the firm foreign sales is positive at time t and zero otherwise)			
Independent Variables	**Coefficient**	**Std. Error**	**Marginal Effect**
Previous Export Status			
$\tilde{Y}_{t-1}$	2.26***	0.04	0.412
$\tilde{Y}_{t-2}$	0.33***	0.05	0.048
$\tilde{Y}_{t-3}$	-0.11	0.07	-0.017
Interaction of Previous Export Status and Crisis Dummy			
$\tilde{Y}_{t-1} x\ D1994$	-0.67***	0.12	-0.127
$\tilde{Y}_{t-1} x\ D2001$	0.09	0.13	0.014
$\tilde{Y}_{t-1} x\ D2008$	0.55***	0.14	0.076
Size Dummies(2)			
Micro	-1.27***	0.07	-0.264
Small	-0.49***	0.03	-0.082
Large	0.43***	0.05	0.063
Other Firm Specific Variables			
Productivity	0.11***	0.02	0.017
Credit constraint	0.63***	0.09	0.100
Capital Intensity	0.08***	0.02	0.012
Profitability	0.78**	0.38	0.124
Liquidity	-0.27**	0.11	-0.044
R&D Expenses	0.49*	0.25	0.078
Marketing Expenses	0.71***	0.1	0.114
Macro-Economic Variables			
Dummy for 1994	0.44***	0.06	0.063
Dummy for 2001	-0.14	0.11	0.005
Dummy for 2008	-0.31**	0.14	-0.055
$\sigma_{\vartheta}^{(3)}$	0.77	0.030	
Rho(2)	0.16	0.008	
Number of Observations	76236	$\chi^2_{(73)} = 17714^4$	
Number of Firms	8734	$\chi^2_{(3)} = 46.19^5$	
Log Likelihood	-21325		

Source: Author's own calculations.
(1) *, **, *** indicates significance at 10 % level, 5 % level and 1% level respectively.
(2) Medium sized firms are the control group
(3) $\boldsymbol{\sigma_v}$ stands for the panel-level variance component and rho=$\sigma_v^2/(1+\sigma_v^2)$ shows the share of panel-level variance in total variance. $\chi^2_{(1)}$ is the LR-test statistics for testing the significance of rho; Ho: rho=0.
(4) $\chi^2_{(42)}$ is the Wald chi-square test statistics for joint significance of the estimated parameters that show the performance of the given specification.
(5) $\chi^2_{(3)}$is the test statistics for testing H_o: $Coefficients\ for\ \tilde{Y}_{t-1} \times D1994,\ \tilde{Y}_{t-1} \times D2001, \tilde{Y}_{t-1} \times D2008$ are all jointly equal to zero.

In the second and the third columns of the table, coefficients and their corresponding robust standard errors for the parameters from dynamic logit model are given. In the last column, the marginal effects at the means for each continuous covariate and discrete changes for the dummy variables are presented. Specification tests and the general model information are given at the bottom part of table. Estimated model seems to perform well. Model specification test statistics, $\chi^2_{(73)}$, implies that jointly insignificance of the parameters cannot be accepted. Moreover, the rejection of the null hypothesis for rho equals to zero, shows that panel estimation is appropriate for this model.

When estimation results are considered, it is observed that the lagged export status,$\tilde{Y}_{t-1}$, is highly significant and positively large, implying highly persistence pattern in export status. Significance of the previous export status reveals the importance of sunk-cost on the export propensity of the Turkish manufacturing firms. When marginal effect of the previous year's export

status is taken into account, the persistence becomes more obvious. The firm's export probability increases by 0.412 when it exported last year. Referring to the theoretical hysteresis literature, this persistence (or hysteresis in other words) is the result of existing sunk-cost. Therefore, estimation result provides strong evidence for the existence of the sunk-cost on the export decision. Besides significance of lagged export status, the coefficient on last exported two years ago is diminishing but still positively significant which implies that the benefits of past export market participation do not depreciate fully immediately after the exit. However, statistically insignificant coefficient on, $\tilde{Y}_{t-3}$, points out that previous export market experience perishes after three years and firms that last exported three years earlier face re-entry costs. The existence of sunk-costs for the case of Turkey was first studied by Özler et al. (2010) using different dataset coming from TURKSTAT for the period 1990-2001. They found high sunk-costs of entry into export markets and moreover full history of the exporting matters for the current export decision. Consistent with our findings they concluded that past export market experience depreciates rapidly.

When other firm specific factors are considered, all variables are found to be statistically significant determinants of the likelihood of becoming exporter. Increases in efficiency (size, productivity and profitability) and quality (capital intensity, R&D and marketing expenses) increase the probability of exporting. Moreover, as borrowing capacity increases the probability of exporting increases. This can also be considered as an evidence for the existence of sunk-cost. If the sunk-cost is financed through credit then borrowing power is more likely to be an important determinant for the exporting probability. Negatively significant estimate for the liquidity implies deliberate approach of the firms. Liquidity variable is constructed as the ratio of trade receivables to total assets. Trade receivables contain credit sales which entertain a risk of bad debt. Hence, in case of which liquidity level increases as a result of credit sales then firms may prefer to wait and see if they can get the payments. This wait and see strategy of the firms is thought to be the initiative for the negative sign for the liquidity variable.

Among the firm specific factors, R&D and marketing expenses variable requires special attention since their implications are important to discuss. The variable that is named as marketing expenses includes expenditures for marketing, advertisement and distribution. Together with the R&D expenditures, they are considered as firm's investment for non-price competition. Sutton (1991) argued that marketing, advertising and all other costs for enhancing consumer's willingness to pay for the firm's products are sunk-costs but they are endogenous since firm can choose to invest in. Unlike the exogenous sunk-costs, increase in endogenous sunk-costs has positive impact on exporting propensity since increase in endogenous sunk-costs implies increasing quality competition. The estimated coefficients for R&D and marketing expenditures (endogenous sunk-costs) are statistically significant and positive. Another important point is that marginal effects on the probability of

becoming exporter are pretty high. Therefore, in addition to importance of exogenous sunk-costs, it is found that endogenous sunk-costs are also important factors in the exporting behavior of the firms.

Turning to the sunk-costs variables, the interaction terms between the time dummies that correspond to the years of crises (i.e. 1994, 2001 and 2008) and the previous export status show the sunk-cost variation during the crisis years. First of all, joint significance of these terms is checked and it is concluded that at least one of the interaction terms is different than zero. This finding implies that sunk costs vary during the crisis. Negatively significant interaction coefficient estimate for 1994, $\tilde{Y}_{t-1} \times D1994$, implies that for 1994 crisis, the importance of the sunk-cost is found to be weakened which facilitates entrance into export markets. On the contrary, the estimated interaction coefficient for 2008, $\tilde{Y}_{t-1} \times D2008$ is found to be statistically significant and positive which implies with the occurrence of 2008 crisis the importance of sunk-cost magnifies. As mentioned in Roberts and Tybout (1997), it is easier to enter into an expanding world market than shrinking one. Hence, during 2008 global crisis, the world demand shrunk considerably which makes engaging export activity difficult and positively significant coefficient for the interaction term reflects this challenge. For 2001 crisis, no statistically significant sunk-cost difference is observed.

When the time dummies for the crisis years are considered, it is observed that in 1994 the propensity to become exporter increased. With the declining sunk-cost expected profits from exporting increased and in turn stimulated export market entry. On the other hand in 2001 crisis, neither sunk-cost nor export propensity change is observed. This can be due to the characteristics of the crisis. Stagnated domestic demand, depreciated Turkish lira and banking sector failures characterized 2001 crisis. Although devaluated currency and shrinking domestic demand as in 1994 can be regarded as encouraging factors for firms to become exporter, failing banking system posed as the biggest obstacle for the potential exporters. Therefore, insignificant impact of 2001 crisis on the export propensity can be regarded as an evidence for the existence of credit rationing of banking sector to smaller and less productive firms. Lastly when 2008 crisis is considered, it is observed that export propensity of the firms affected negatively in this period. Unlike, previously experienced crisis, in 2008 crisis, relatively mild currency devaluation and sharp contraction in foreign demand was experienced. Estimation results related with the sunk-cost variation during the crisis suggested that sunk-cost increased during 2008 crisis which made export entrance more difficult for the Turkish manufacturing firms.

5. Conclusion

There are many studies that assess Turkey's export performance from macro-perspective however micro-level analysis seems to have attracted little attention contrary to recent empirical trade literature. This paper has examined the export behavior of Turkish manufacturing firms comprehensively by using a stream of analysis. Using firm-level data for 1989-2010 period the performance differences of exporting and non-exporting firms, export behavior and export propensity has been investigated. Based on existing empirical literature, the export performance differences between exporters and non-exporters investigated through simple descriptive and regression analysis. Estimation results imply that exporters are on average more efficient (larger, more productive and more profitable), more quality oriented (spending more for R&D, marketing and advertisement) and less credit constrained. However, during the crisis periods the export premiums are shrinking which implies crisis leads to reduction in the average percentage differences between exporters and non-exporters.

It is also observed that larger, more productive and more capital-intensive firms self-select into export markets. Findings of this paper also reveal that learning-effect of exportation leads to improvements in size, productivity and financial health of the firms. Moreover, after entering into export markets, firms become more quality oriented and more profitable.

In order to determine the impact of sunk entry costs on the export market participation decision of the firms, dynamic discrete choice model is utilized. The estimation results reveal that previous export market experience plays crucial role in the current export status of the firms. Referring to the hysteresis literature, significant impact of previous export status implies existence of sunk-entry costs into export markets. Existence of sunk-costs explains the self-selection of better firms into export markets. Those large, productive and capital-intensive firms can afford high export sunk-costs. In addition to previous export status, firm's efficiency level, financial health and quality competitiveness are found to be significant determinant for the propensity to become exporter. Another important finding emerges from this analysis is that importance of sunk-costs varies with the occurrence of crises. It has been shown that during 1994 crisis sunk-costs declined whereas for 2001 crisis there was no statistically significant change in the sunk-costs and in 2008 crisis it declined. Consistent with the sunk-cost variations, it has been found that occurrence of 1994 crisis led to increase in the propensity to become exporter and 2008 crisis decreased the propensity. No statistically significant impact is observed for the case of 2001 crisis.

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