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**Article**

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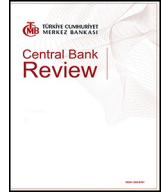
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# Domestic demand and exports: Evidence from Turkish firms

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## ABSTRACT

This study examines the relationship between real domestic sales and real exports for Turkish manufacturing firms. Dynamic panel data estimations based on firm-level data for the period 2004–2014 suggest that the two variables are substitutes. Other factors held constant, we estimate that a 10 percent decline in real domestic sales is associated with around 2.7 percent increase in real exports, on average. However, this relationship varies among manufacturing sub-sectors which are defined according to 2-digit NACE classification. Results indicate that substitutability between domestic and foreign sales is stronger for export-oriented, low-leveraged and younger firms and firms that operate in sectors whose exports are less import-dependent. Besides, the degree of substitution between the two variables significantly rises when domestic demand conditions are weak. This shows that exporter firms in the Turkish manufacturing industry can shift from domestic to international markets as a response to domestic demand shocks.

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## 1. Introduction

The manufacturing firms that sell their products in domestic markets and abroad are open to external shocks originating from domestic and international factors. For instance, a decline in domestic demand may decrease a firm's domestic sales, while an increase in its trade partners' growth may lead its exports to increase. Firms adjust their sales among domestic and international markets by taking several determinants into account, such as the level of demand for their products, the existence of production constraints, the amount of the costs, some of which are already sunk, etc. In any case, the possibility to switch between two markets is important for minimizing the effects of demand shocks. The relationship between domestic sales and exports can be regarded as an indicator of this possibility.

This relationship generally takes the attention of those who are responsible for forecasting the outlook of economic activity in response to demand shocks, domestic and/or international. They want to know how the exports perform when domestic demand conditions are weaker (or stronger) than the potential.

Alternatively, the behavior of domestic sales also attracts attention when a positive (or negative) international demand shock occurs. In this scenario, the mechanism works in the reverse direction that domestic sales are affected by the variations in exports. In this study, we are interested in the first case that is the response of exports to the changing domestic demand conditions.

The empirical literature regarding the relationship between domestic and foreign sales dates back to the seminal paper of Ball et al. (1966), which examine the British case and document a negative relationship between the two. Although many papers have examined the *exports-to-domestic sales* direction so far, only a few have investigated the *domestic sales-to-exports* direction. Among those few studies, which dominantly focus on Europe, results generally favor a negative relationship between domestic sales and exports. Examples of the recent empirical studies in this context include Almunia et al. (2018) for Spain, Rua et al. (2018) for Portugal, Esteves and Prades (2016) for twelve European Countries, Bobeica et al. (2016) for the Euro Area, Belke et al. (2015) for five Euro Area countries and Vannoorenberghe (2012) for France. On the other hand, studies such as Bardaji et al. (2019) and Berman

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et al. (2015) for France provide evidence that domestic sales and exports are complements. Although it is relatively limited, there is also evidence suggesting that the relationship between the two series vary with respect to business cycles (Bugamelli et al. (2015)).

Besides being relatively limited, the previous literature has some shortcomings. First, prior mainly focuses on firm-level evidence from advanced countries. However, relatively little attention has been paid to the firm-level relationship for emerging markets such as Turkey. In the studies focusing on emerging markets, the primary interest is on China, in which the integration to global value chains is solid (see Anwar and Sun (2016) and Sun and Anwar (2017)). OECD statistics show that China has a higher foreign value-added share of gross exports, an indicator of integration to global value chains, compared to Turkey over the sample period.<sup>2</sup> Thus, we expect the relationship between exports and foreign sales to differ for Turkey, a small open economy with relatively less integration to global production cycles. Second, previous studies interested in the phenomena provide diverse, even contradictory, results regarding the aforementioned relationship. Although most of them are in favor of a negative relationship between domestic sales and exports, few report either positive or insignificant relationship (see Salomon and Shaver (2005), Berman et al. (2015), and Erbahar (2020)). Therefore, there is still a need for more evidence regarding the characteristics of the relationship. Third, although previous empirical work has provided evidence for the manufacturing industry as a whole, it has not focused on the sector-level. Since the dynamics of each industry differ considerably, the relationship between domestic sales and exports is also expected to vary among manufacturing sub-sectors. In this study, we provide evidence for eight sub-sectors of the Turkish manufacturing industry. Finally, the interaction of the relationship between domestic sales and exports with domestic demand conditions has not been analyzed before in this context.

This study aims to contribute to the empirical literature by addressing the existing limitations and adding to our knowledge on the phenomena by providing firm-level evidence from an emerging market. To do so, we estimate a dynamic model of exports using panel data of Turkish manufacturing firms for the period 2004–2014. Our study has three main findings. First, there exists a negative relationship between domestic sales and exports at the firm-level. Quantitatively, a 10 percent decline in real domestic sales is associated with around a 2.7 percent increase in real exports, on average. This finding suggests that firms have a degree of flexibility to adjust their sales among domestic and international markets. Second, results indicate that there is heterogeneity in the degree of this flexibility among sectors and according to several firm characteristics. Findings show that substitutability between domestic sales and exports is stronger for export-oriented, low-indebted and younger firms and firms that operate in sectors whose exports are less import-dependent. Third, results suggest that the flexibility in shifting from domestic sales to exports is significantly stronger following the years when domestic demand conditions are weak. Put differently, as a response to a decline in domestic sales, firms sell more in international markets if the domestic demand in the previous year was weak. Since the mechanism is counter-cyclical, it helps smooth the weakening in the domestic economic activity.

The rest of the paper is organized as follows. In Section 2, we provide a brief literature review on the relationship between domestic sales and exports at the firm-level that includes theoretical explanations behind the phenomena as well as the recent empirical research. We present the model and the data in Section 3. Empirical

findings and the conclusion are provided in the following sections, respectively.

## 2. Literature review

The relationship between domestic sales and exports is interpreted as: they are substitutes if one increases (decreases) when the other decreases (increases) and they are complements if both increase (decrease) simultaneously. Several theoretical approaches attempt to explain the correlation between the two variables. The main arguments are related to the: (i) capacity (or production) constraints, (ii) liquidity constraints, (iii) existence of multinationals and FDI spillovers, and (iv) characteristics of exporting behavior such as persistency. The capacity constraints argument asserts that as the domestic demand increases, firms decrease their exports to satisfy the additional domestic demand if the capacity constraints are binding, which is expected in the short-term.<sup>3</sup> Domestic and foreign sales of a firm can be increased simultaneously if the firm has no capacity constraints. Similarly, by expanding its production capacity, a firm can grow its sales at a pace that satisfies both additional domestic and foreign demands. From a different perspective, increasing production scale leads to a cost advantage for a firm against its competitors by declining marginal costs. This may enable the firm to increase its market shares in domestic and international markets by selling more in both. Therefore, domestic sales and exports can be substitutes or complements depending on the degree of capacity constraints of the firm.

Examples of the recent empirical studies following capacity constraints explanation are Belke et al. (2015) for five Euro area countries, Crespo and Muñoz-Sepulveda (2015) for Spanish firms, Ahn and McQuoid (2017) for Indonesia, and Liu (2018) for Colombia. All of these studies provide evidence in favor of a negative correlation between domestic and foreign sales. Belke et al. (2015) take the countries with previous current and trade account deficits into account. They report that domestic sales and exports are substitutes during extreme periods of business cycles, while they are complements at other times. Crespo and Muñoz-Sepulveda (2015) examine the significance of both physical and financial constraints on the relationship between domestic sales and exports. They provide supporting evidence that domestic sales and exports are substitutes for constrained firms. Ahn and McQuoid (2017) develop a structural model that also takes the physical and financial constraints into account. They incorporate exports and firm-level productivity measures into a single equation for domestic sales. Their findings support the negative relationship between domestic sales and exports, which is attributed to the increasing firm-level marginal costs. Liu (2018) develops a dynamic export model that includes short-term capacity constraints. Unlike the approach that the above studies follow, she does not assume that marginal production costs are constant. Following this assumption, exporters face a decision between domestic sales and exports since they cannot freely expand their production capacity. She then fits the model to Colombian plant-level data and estimates it using the simulated method of moments approach. Her findings confirm the existence of substitution between exports and domestic sales for the exporters.

The second argument suggested by the earlier research to explain the phenomena is the liquidity constraints. It states that firms suffering from financing constraints can generate revenues by selling more goods abroad or in domestic markets. Thus, they can use this extra cash to meet their liquidity constraints. Following the

<sup>2</sup> Trade in Value Added (TIVA) Dataset (OECD (2019c)).

<sup>3</sup> See Esteves and Rua (2015) for a more comprehensive discussion and related literature on the capacity constraints argument.

liquidity constraints argument, [Berman et al. \(2015\)](#) investigate whether domestic sales and exports are substitutes or complements by combining balance sheet data with the product-destination-specific export information of French firms. Having controlled the domestic demand conditions, they assume that the variations in exports emerge only as a result of the variations in foreign demand. Their findings suggest that exports and domestic sales are complements to each other that a 10 percent exogenous increase in exports leads to a 1 to 3 percent increase in domestic sales. They show that the effect is significantly stronger for firms that face tighter financing constraints in the short-term.

The third main explanation for the correlation between domestic and foreign sales takes foreign direct investments (FDIs) into account. For instance, [Wang et al. \(2014\)](#) investigate the effect of foreign multinational enterprises, which they call FMNEs, on the domestic and foreign sales of Chinese manufacturing firms. They provide a detailed summary of research that investigates the impact of FDIs on firms' domestic sales. Unlike the previous studies that examine the domestic sales and exports separately, they consider the two variables simultaneously. They interpret the relationship between domestic sales and exports via two channels: (i) global production networks and (ii) competitor analysis. While the *global production networks* channel suggests that indigenous firms are exposed to the positive FDI spillovers from the multinational firms, the *competitor analysis* channel asserts that the foreign multinational firms and indigenous firms can be competitors. Using a firm-level data set, [Wang et al. \(2014\)](#) show that the presence of FMNEs simultaneously affects the indigenous firms' domestic sales negatively and their exports positively.

Two recent studies that examine the role of FDI inflows in determining the correlation between domestic and foreign sales are also interested in Chinese firms. [Anwar and Sun \(2016\)](#) investigate the impact of FDIs on the domestic sales and exports of local firms. They estimate two equations for domestic sales and export intensity simultaneously. By using industry-level data of leather shoe, textile and garment manufacturing industries and controlling for firm size and R&D activities in the estimation, they provide evidence that the presence of FDIs leads the domestic sales and export intensity of local firms to increase. Similarly, [Sun and Anwar \(2017\)](#) use firm-level data of the Chinese textile industry and incorporate firm size, R&D intensity, FDIs, and a competition indicator into equations for domestic revenues and export revenues. Their findings indicate that the presence of FDIs affects local firms positively via a direct channel and negatively via an indirect channel. The direct channel is associated with positive productivity spillovers, while the indirect channel is related to the increased level of competition in the domestic market after the presence of FDIs. The total effect is determined by the relative impacts of these two separate effects. Empirically, their results indicate that the presence of FDIs negatively affects the domestic sales of indigenous firms, whereas it leads their exports to increase.

The characteristics of firm-level exporting behavior, such as whether a firm is a permanent or temporary exporter, is the last main argument raised to explain the correlation between domestic sales and exports in the relevant literature. Following this approach, [McQuoid and Rubini \(2014\)](#) differentiate the exporter firms in the Chilean manufacturing industry into two categories as transitory and perennial exporters. Their findings indicate that while the correlation between domestic sales and exports is negative for transitory exporters, it is positive for perennial exporters. They explain these findings with the relationship between marginal cost and firm size. Since transitory exporters in their sample are mostly small firms, decreasing returns to scale leads to a negative correlation between domestic sales and exports for the transitory exporters.

Apart from the arguments mentioned above, two caveats that might lead negative correlation between domestic sales and exports should also be noted ([Berman et al. \(2015\)](#)). First is the measurement error that results if the exports are computed by subtracting domestic sales from exports. In our case, this is not valid since the data set records domestic sales and exports separately. The second caveat is related to the choice of mode of exports. Firms may directly serve their goods to international buyers or choose an intermediary to export their products. Unfortunately, our data set does not include information on whether they sell directly to export markets or indirectly through other firms.

Very few studies in the previous literature are interested in the impact of domestic demand conditions on the relationship between domestic sales and exports. Unlike our study, these studies do not utilize time-series information regarding the domestic demand conditions via interaction with domestic sales. Instead, they investigate the phenomena by dividing the samples according to some criteria indicating the state of the domestic demand. For instance, in their estimation model, [Bugamelli et al. \(2015\)](#) allow the coefficient that represents the correlation between domestic sales and exports to differ over the business cycles. They identify three time intervals to indicate the business cycles of the Italian economy during the period 2001–2012. These intervals are 2001–2007 in which the businesses are usual, 2008–2010 in which the global crisis is effective, and 2011–2012 in which there is a sovereign debt crisis in Italy. They provide evidence that a decline in domestic sales leads the exports to increase, at least for the first period. However, the size of the impact varies over the business cycles. [Almunia et al. \(2018\)](#) examine the strong performance of Spanish exports during and after the global crisis referring to the so-called Spanish export miracle that occurred between 2009 and 2013. They investigate whether this export performance is associated with the contraction in domestic demand or not. To do that, they divide the sample that is composed of Spanish firms during the period 2002–2013 into two parts: the boom period (2002–2008) and the bust period (2009–2013). Their results show that a larger decline in domestic sales in the bust period relative to the boom period leads the exports to increase more. They also claim that the negative relationship between domestic sales and exports explains almost one-half of the export expansion in the bust period. Another strand of the empirical literature regarding the impact of domestic demand conditions on the relationship between exports and domestic sales uses time-series data and methods. For instance, [Belke et al. \(2015\)](#) use a smooth transition model to reveal the impact of the business cycles on the relationship between exports and domestic sales. They examine five European countries (Spain, Portugal, Italy, France, and Greece) that have improved their current account balances since the adoption of the Euro. They investigate if weak domestic demand conditions helped develop the re-balancing process by substitution of the sales towards the foreign markets. Using capacity utilization as an indicator for the state of the business cycle, they find that a strong negative relationship between exports and domestic sales exists, especially during periods with lower capacity utilization. In another study using time methods, [Esteves and Rua \(2015\)](#) report a substitution relationship between domestic demand pressure and exports for Portugal. They use the error correction mechanism (ECM), which employs an export model that includes the excess export supply as the dependent variable and domestic demand (public and private consumption and investment) as one of the main regressors. Their results suggest that the relationship is asymmetric, i.e., it is stronger when the domestic demand is weak.

Previous work has been limited to address the phenomena and build a consensus regarding the sign of the correlation between domestic and foreign sales in Turkey. By using sector-level panel



data for the period 1996–2010, [Ciftci and Ciftci \(2013\)](#) examine the relationship between domestic sales and exports for the Turkish manufacturing industry and they find that domestic sales and exports are substitutes to each other, i.e., an increase in domestic sales is associated with a decline in exports of manufacturing industry. To investigate the relationship between domestic sales and exports, [Toraganli and Yalcin \(2016\)](#) incorporate the GDP variable into the export equation. While its coefficient estimate may indicate the impact of variations in the GDP on exports, it does not provide evidence regarding the relationship between domestic and foreign sales during periods with different demand conditions.

Recently, two studies have provided contradicting findings regarding the sign of the correlation between domestic sales and exports for the Turkish manufacturing industry. The first, [Guncavdi and Kayam \(2018\)](#), use time series methods to examine the domestic demand pressure and export performance in Turkey during the period 1998–2015. By claiming that policy actions to support exports in the recent period did not work well, they look for other explanations behind the export dynamics of Turkey. Their findings based on dis-aggregated data suggest that exports and domestic sales in the manufacturing industry are substitutes.

The second recent study on the Turkish case, [Erbahar \(2020\)](#), examines the relationship between domestic sales and exports at the firm-level during a similar period to our study's, 2005–2014. Unlike our study, he is interested in the *exports-to-domestic sales* direction rather than the *domestic sales-to-exports* direction. His data set provided by TurkStat (Turkish Statistical Institute) differs from our data set by including information about export products. He is interested in the impact of exogenous export shocks on domestic sales. He provides contradictory findings to the existing evidence for Turkey and many other countries. Similar to [Berman et al. \(2015\)](#), he reports a positive relationship between domestic sales and exports. His results show that a doubling in exogenous exports leads to a 26 percent increase in domestic sales. When he accounts for the product fixed effects in his specifications, the coefficient estimate increases almost by a half. He interprets these findings with the existence of liquidity constraints. According to this argument, an increase in domestic sales provides firms with the cash necessary to sell abroad. However, [Erbahar \(2020\)](#) does not define cash flow using firms' financial figures. Alternatively, he uses the change in a firm's non-produced exports (carry-along exports) as a proxy of the change in its cash flow or liquidity constraints. This approach may suffer from measurement errors since the liquidity constraints are not determined only by the revenues from non-produced exports. Although the exogenous characteristics of the revenues from those exports are aimed to be exploited, the variations in the revenues from produced exports are also needed to be considered in terms of the firms' liquidity constraints.

In this study, we use a panel data set of Turkish manufacturing firms to examine the relationship between domestic sales and exports. We are interested in the recent period, 2004–2014, in which significant transformations took place in both domestic and international dimensions. We use a dynamic methodology keeping in mind the persistence of exporting behavior over time and to avoid the endogeneity problem. Our study aims to contribute to the relevant empirical evidence, especially on Turkey, in mainly three ways. First, we add to the existing evidence regarding the Turkish case in which recent research provides contradictory findings on whether domestic and foreign sales are substitutes or complements (see [Guncavdi and Kayam \(2018\)](#) and [Erbahar \(2020\)](#)). Second, we examine the correlation not only for the whole economy or manufacturing industry but also for the main manufacturing sectors. Given that the dynamics in each sector may considerably differ from the manufacturing industry-average and the lack of sector-level evidence on the phenomena, our findings provide valuable

implications for policymakers. Finally, our study investigates whether there are significant changes in the mentioned relationship during weak domestic demand conditions, which has not yet been examined in a similar methodological context to ours.

### 3. Data and method

Our main data source is the Central Bank of the Republic of Turkey's (CBRT) Company Accounts Database, one of the most comprehensive databases, including balance sheets, income statements, and firm characteristics of Turkish non-financial firms. Although the data set spans the period 1990–2014, we only consider the period 2004–2014 because of a change in accounting legislation starting with 2004. To avoid the impact of possible mergers and acquisitions, we narrow the sample to only firms that do not more than double their real assets in a year. Besides, we limit the accounting ratios such as leverage ratio, profitability ratio and cash ratio to a hundred percent. Our final sample includes an unbalanced panel of 6286 firms with 27567 firm-year observations.

We define domestic sales as a firm's sales within the country in a given year. Similarly, exports are the firm's sales abroad.<sup>4</sup> Another main variable of the analysis is the inventories that are composed of the unsold final products in the previous years and the raw materials to be used in the production of the coming years. Since we attempt to reveal the relationship between domestic sales and exports, information regarding whether a firm exports or does not export in a given year is important. 99.6 percent of the sample has nonzero domestic sales observations, while this figure is around 73.5 percent for exports. To identify the exporting behavior more properly, we apply three alternative transformations commonly used when there are so many non-positive observations in the sample. The first transformation that we use in the baseline estimations is the Neglog transformation, also known as log-modulus transformation following [John and Draper \(1980\)](#). Using this transformation to analyze credit card statistics, [Whittaker et al. \(2005\)](#) suggest that the procedure works better for certain financial variables. The Neglog transformation, formulated as  $N(x) = \text{sign}(x) * \ln(|x| + 1)$ , generates mappings that preserve the sign of the original observations while transforming the magnitudes accordingly. The second and third transformations that we use in the robustness estimations are the inverse-hyperbolic-sine (IHS) transformation and the cubic transformation, respectively. Following [Burbidge et al. \(1988\)](#), IHS transformation can be formulated as  $\sinh^{-1}(x) = \log(x + (x^2 + 1)^{0.5})$ . This procedure also maps the zero observations to zero. The third transformation simply projects each observation into its cubic root. In addition to the exports, we apply these transformations to the other two series that are domestic sales and inventories. To better control the characteristics of the exporting behavior, we construct a dummy variable, *permanent*, that takes the value 1 if a firm exports every year during the period and zero otherwise. We observe that almost half of the sample (49.4) consists of permanent exporters.

All the items in the balance sheet, including the exports, are recorded in Turkish liras. The nominal variables, such as domestic sales, exports, and inventories, are deflated using the manufacturing sector producer price index according to the NACE 2-digit sector classification. Age is a categorical variable constructed for firms with ages between 0 and 50. There are ten age categories, each spanning 5 years. We proxy the size of a firm with

<sup>4</sup> [Berman et al. \(2015\)](#) note that computing the domestic sales by subtracting exports from total sales may lead negative correlation between the series. This type of measurement error is not valid for our study since our data set records exports and domestic sales separately.

its employment, which is defined as the log of the number of employees. Firm-specific characteristics such as leverage, profitability and cash level are defined as ratios. Leverage ratio is the ratio of the sum of short and long term liabilities to total assets. It is an indicator of how much a firm is indebted and can be regarded as a sign of creditworthiness. The profitability ratio is the share of annual net profits in total assets. A high profitability ratio is regarded as a sign of sound firm performance. The cash ratio is the ratio of cash and cash equivalents to short-term liabilities. It shows the level of short-term liabilities that a firm can pay using its liquid assets. It is an indicator that a firm is able to meet its short-term obligations.

Table 1 presents summary statistics for the variables. The average real domestic sales are higher than the average real exports for the firms in the sample. One year lagged real inventories, which is an indicator of the persistence of stocks or indirectly the existence of capacity constraints, is close to current real domestic sales for an average firm in the sample. The leverage ratio is around 58 percent on average, which indicates that the degree of firm indebtedness is considerably high. The average profitability ratio is about 4.2 percent that is reasonable considering that all figures in our analysis are in real terms. Indeed, the average annual growth rate of Turkey's GDP is almost 5.9 percent during the same period. We observe that the cash ratio is 20 percent on average, implying that the sum of a firm's liquid assets can pay almost one-fifth of its short-term debt. It can be considered adequate given that holding excess cash also has opportunity costs. The age category is around 4 on average, which corresponds to the ages between 15 and 20. The average number of employees of a firm in the sample is 283, which is close to the size of a medium-sized firm. For the sake of brevity, we provide the summary statistics for manufacturing sub-samples, constructed according to 2 digit NACE classification, in Table A1 of the appendix.

We present the course of domestic sales and exports over the period graphically in Fig. 1.<sup>5</sup> The average real domestic and foreign sales for the manufacturing industry are computed using the individual values of firms. To make them comparable, we scale both variables to the base year 1990. It is observed that while both domestic and foreign sales follow a similar trend in the first decade of the century, they begin to diverge after the global financial crisis (GFC). Although average real domestic sales increased steadily after 2009, average real exports declined after 2012, mostly originated from weak foreign demand conditions related to European



Fig. 1. Average real exports and domestic sales for manufacturing firms.

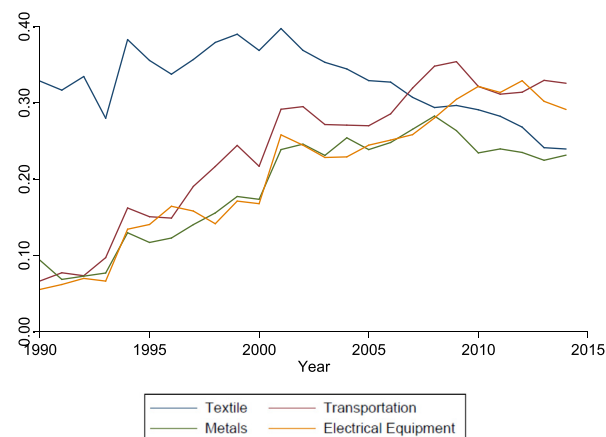
Sovereign Debt Crisis. In addition, we observe that the level of real exports declined following the GFC. The recovery after the crisis could not bring it to its pre-crisis level back.

Figs. 2 and 3 provide the average export ratio of firms by sectors, firm size and leverage ratio, respectively. These ratios are computed by dividing the exports to gross sales at the firm-level and then by averaging them according to the associated criteria. In terms of sub-

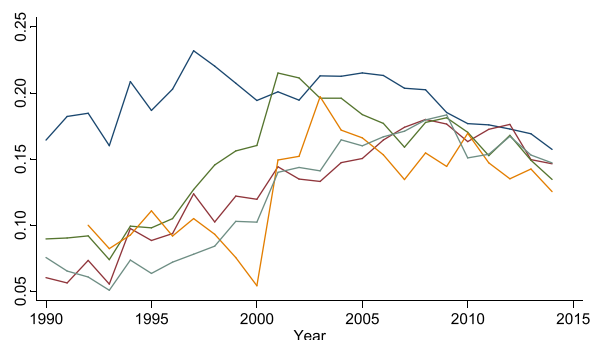
Table 1  
Descriptive statistics.

	Obs	Mean	Std.Dev	Min	Max
Real Exports	27567	11.59	6.38	0.00	18.94
Real Domestic Sales	27567	15.94	1.96	7.11	20.04
Real Inventories (Lagged)	27567	14.64	1.78	5.06	18.31
Leverage Ratio	27567	58.09	20.81	0.06	100.00
Profitability Ratio	27567	4.20	5.77	0.00	89.12
Cash Ratio	27567	19.98	23.17	0.00	100.00
Age	27567	4.46	2.12	0.00	9.00
Real Exchange Rate	27567	4.71	0.05	4.63	4.79
Relative Prices	27567	1.03	0.20	0.82	2.64
No of Employees	27567	283	667	1	19982

Neglog transformation is used to transform the real exports, real domestic sales, and real inventories.



(a) (High)



(b) (Low)

Fig. 2. Average export ratio by sectors.

<sup>5</sup> To present how the firm-level data set represents aggregate statistics, we provide Fig. A1 in the appendix that shows the annual export coverage of the estimation sample as a percentage of Turkey's total manufacturing exports. We observe that exports covered by the estimation sample are more than half of Turkey's total exports, on average, over the sample period.

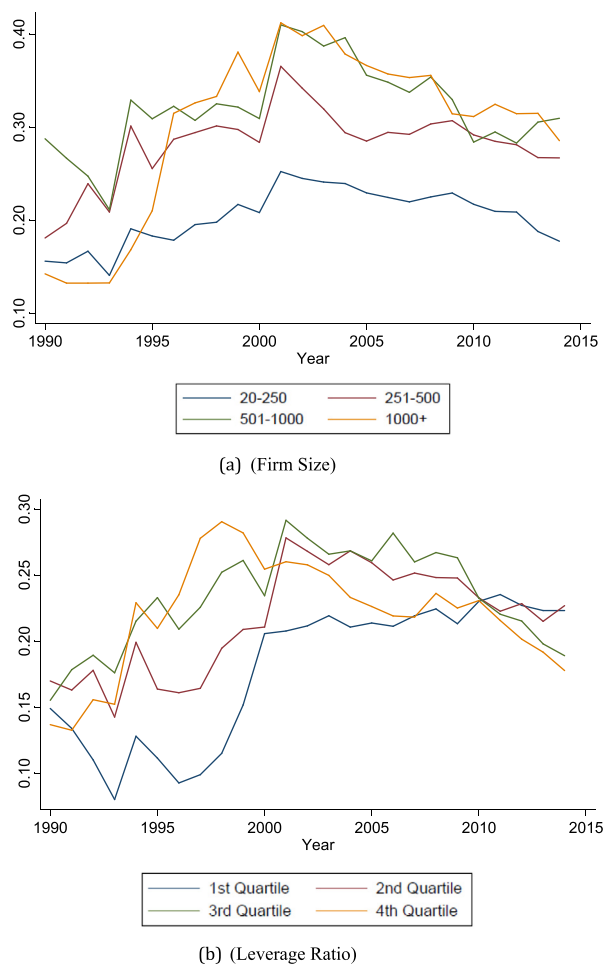


Fig. 3. Average export ratio according to firm size and leverage ratio.

sectors, we divide the firms with high and low export ratios as in Fig. 2. The manufacturing firms operating in textile, transportation vehicles, metals and electrical equipment sectors have average export shares between 0.25 and 0.35 in 2014, while firms operating in food, chemical products, minerals, furniture and other manufacturing sectors have average export shares between 0.12 and 0.16 in the same year. It is also noted that except for the textile and food manufacturing sectors, the steady increase of average export shares since 1990 has been interrupted by the GFC.

In terms of firm size, we observe that average exports over gross sales increase as the number of employees goes up. While it is about 0.18 for small and medium-sized firms (20–250 employees), it is almost 0.30 for firms that have more than a thousand employees. One compelling observation from the second panel of Fig. 3 is that after the GFC, the amount of exports in total sales declines as the leverage ratio increases only for firms with higher debt ratios (3rd and 4th quartiles).

To model the firm-level exports, we follow a similar approach as Salomon and Shaver (2005) and Berman et al. (2015). While they estimate a system of two equations, one for exports and the other for domestic sales using the 2SLS methodology, we estimate only one equation for exports using the system GMM method.<sup>6</sup> Recently, to investigate the correlation between the growth rates of exports

and domestic sales, Bugamelli et al. (2015) apply a single-model approach similar to our approach. Their dependent variable is the growth rate of exports, while their regressors are the growth rate of domestic sales and firm, year, and sector-fixed effects. Unlike our study, they estimate the model with the OLS. The models as mentioned above are *ad hoc* models that aim to investigate the sources of variations in the exports at the firm-level empirically. Following the theoretical explanations regarding the phenomena, we have variables to control for the capacity constraints (such as the lagged inventories), liquidity (or financing) constraints (such as the leverage ratio and the cash ratio), and the exporting behavior of the firm (such as being a permanent exporter) while we employ year-fixed effects to control for the presence of FDI in given years. In addition to those variables, we have firm-specific controls such as the profitability ratio, size and age of the firms.

The baseline empirical specification of the study can be represented as

$$ex_{it} = \alpha_0 + \beta_1 ex_{it-1} + \beta_2 ex_{it-2} + \alpha_1 dsales_{it} + \alpha_2 invent_{it-1} + \alpha_3 relative_{st} + \alpha_4 DP_{it} + \alpha_5 X_{it} + \mu_s + \phi_t + \vartheta_{it}, \quad (1)$$

where  $i$  stands for the firm,  $t$  represents the year and  $s$  is the manufacturing sub-sector in which the firm operates.  $ex_{it}$  is the real exports of a firm  $i$  in year  $t$ , similarly,  $dsales_{it}$  represents the firm's real domestic sales.  $invent_{it-1}$  stands for the lagged real inventories of the firm. Real exports, real domestic sales and real inventories are the log-transformed series that are transformed to account for the existence of zero observations following John and Draper (1980).  $relative_{st}$  is a sector-level variable that aims to capture the price differentials between selling abroad and selling in domestic markets.  $DP_{it}$  is a dummy variable that takes the value 1 if a firm exports each year during the period and zero otherwise.  $X_{it}$  represents the matrix of firm-specific control variables, such as age, size, leverage ratio, profitability ratio and cash ratio.  $\mu_s$  and  $\vartheta_{it}$  represent the sector-fixed effects and idiosyncratic errors, respectively. During the period 2004–2014, there exists various domestic and international shocks which may affect the firm's sales in domestic and international markets. To control firm invariant common shocks, we use year-fixed effects,  $\phi_t$ , in the empirical specifications. Since we do not have firm-or sector-level real exchange rate statistics, year fixed-effects also aim to account for the firm-invariant impact of real exchange rate movements on the exports.

To better control the price differentials between export prices and domestic prices that may play a role in determining a firm's exporting behavior, we use a relative price variable. This variable is defined as the ratio of export prices to domestic prices, both in domestic currency. When export prices increase more than domestic prices, we expect exporters to increase their sales in international markets. Unfortunately, while the export prices are available in the 2-digit ISIC classification, the consumer prices are not published in line with them. So we use the producer price index as a proxy of the consumer price index.<sup>7</sup>

The second main specification can be written as

$$ex_{it} = \alpha_0 + \beta_1 ex_{it-1} + \beta_2 ex_{it-2} + \alpha_1 dsales_{it} + \gamma dsales_{it} DD_{t-1} + \alpha_2 invent_{it-1} + \alpha_3 relative_{st} + \alpha_4 DP_{it} + \alpha_5 X_{it} + \mu_s + \phi_t + \vartheta_{it}, \quad (2)$$

which includes an interaction term that is defined as the product of

<sup>6</sup> Wang et al. (2014) also estimate the two equations, for exports and domestic sales, separately using the GMM.

<sup>7</sup> After we de-trend the two series using hp-filter, we get a pairwise correlation around 0.94 between consumer and producer prices.

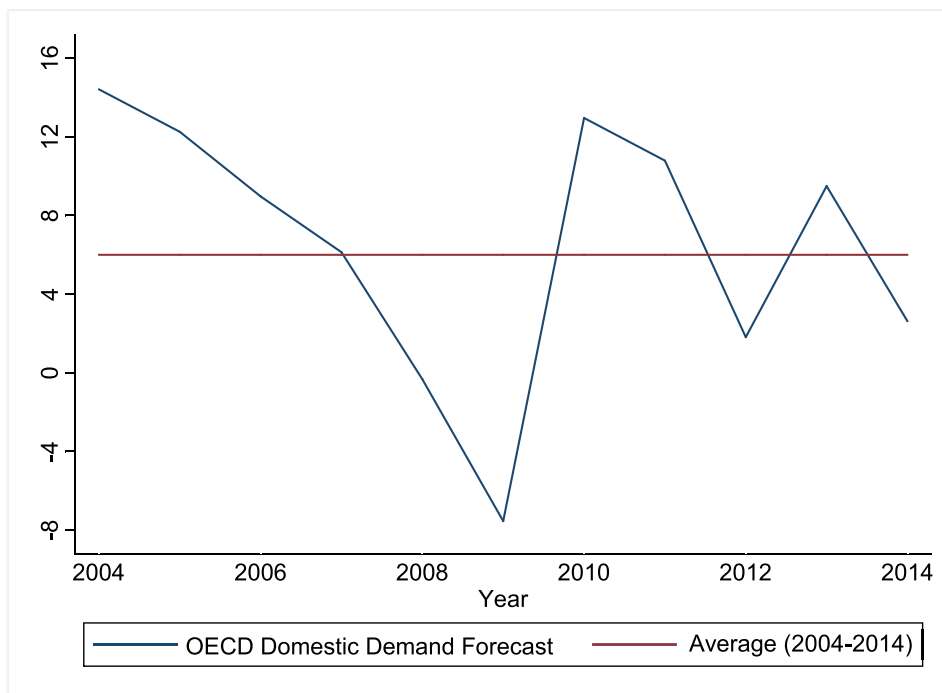


Fig. 4. OECD's domestic demand forecast.

real domestic sales and a dummy variable ( $DD_{t-1}$ ) which represents the domestic demand conditions in the previous year. This dummy variable takes the value 1 if the domestic demand conditions are weaker than average in the year before and zero otherwise. We consider the demand conditions in the previous year because firms need time to adjust their sales in domestic and international markets. Making a shift in the composition of the two takes some time. Since we have annual balance sheet data, this adjustment period is set as one year. As an indicator of the domestic demand, we use the OECD's domestic demand forecasts. OECD (2019a) publishes domestic demand forecasts for 41 countries, including its members and six non-member countries (China, Columbia, India, Lithuania, Argentina, and Costa Rica). OECD states that the domestic demand forecasts are based on empirical models as well as expert judgments. For each year, if this forecast is lower than its 2004–2014 average, then this particular year is considered as a year with weak domestic demand conditions in our analysis. Fig. 4 presents the OECD's domestic demand and its average during the sample period.

Endogeneity is one of the main issues in the estimation process. To account for the dynamic nature of exporting behavior and to avoid problems related to endogeneity, we employ the system GMM method, which uses the lagged values of variables as instruments.<sup>8</sup> Following Arellano and Bover (1995) and Blundell and Bond (1998), this dynamic estimator is commonly employed in the empirical literature for the panel data sets that have small time dimension (T) but large cross-sectional units (N). In this context, regressors do not necessarily need to be strictly exogenous that they are allowed to be correlated with past realizations of the error term. To solve the weak instruments problem that is a result of high persistency in the dependent variable, system GMM employs a

system estimation, which includes both difference and level equations.

To estimate the GMM models, we use the *xtabond2* command developed by Roodman (2009). Since the choice of instruments is important in the system GMM estimation, we carefully choose the instruments and confirm their validity by relevant tests. For the exports, domestic sales and potentially endogenous variables such as inventories and accounting ratios (the leverage ratio, profitability ratio, and cash ratio), we employ GMM-style instruments. Accordingly, we use IV-style instruments for the sector and year-fixed controls, the age and size of the firm, relative prices (as the ratio of export prices to producer prices), and the dummy variables (for being a permanent exporter and for weak domestic demand conditions). We instrument the higher lags of the variables that are used as dependent variable and regressors in the specification. For instance, since we use the first lag of real inventories in the model as a regressor, we employ the second (and third or higher) lags as instruments. The *collapse* option of the *xtabond2* command is used to limit the instrument proliferation. Indeed, the number of instruments we use in estimations is around 50, which is relatively small considering the sample size. In line with the empirical literature, we test the validity of instrument selection by the Hansen (1982) over-identifying test. In addition, we report the test results for auto-correlation up to three lags. We confirm that the moment conditions are correctly specified and there is no auto-correlation among residuals.

#### 4. Empirical results

Table 2 provides the main estimation results of the specifications that pass the diagnostic tests for the validity of instruments and the absence of second-order auto-correlation. The first column

<sup>8</sup> As a remark, one needs to scrutinize the implications from the study, given that the system GMM results imply a correlation rather than causality, and the lack of a more detailed data set including the mode of exports (direct exporting versus indirect exporting via intermediaries) and information of destinations.



**Table 2**  
The effects of real domestic sales on real exports.

Dependent: $\log(\text{Real Exports})_{it}$	All	Food	Textile	Chemicals	Furniture	Transport	Metals	Rubber and Plastics	Elect. Equip.
$\log(\text{Real Exports})_{it-1}$	0.438*** (0.151)	0.574*** (0.203)	0.673*** (0.163)	0.520*** (0.173)	0.766*** (0.265)	0.452** (0.184)	0.864*** (0.323)	0.437*** (0.146)	0.408*** (0.125)
$\log(\text{Real Exports})_{it-2}$	0.155** (0.065)	0.175 (0.115)	0.068 (0.085)	0.316** (0.125)	0.114 (0.184)	0.020 (0.122)	-0.115 (0.211)	0.366*** (0.124)	0.147* (0.085)
$\log(\text{Real Domestic Sales})_{it}$	-0.266** (0.112)	-0.811** (0.406)	-0.576*** (0.157)	-0.773* (0.402)	-1.014** (0.442)	-0.268 (0.264)	-0.625* (0.328)	-0.764* (0.397)	0.187 (0.234)
$\log(\text{Real Inventories})_{it-1}$	0.350*** (0.083)	0.671*** (0.230)	0.590** (0.273)	1.019*** (0.362)	0.423 (0.828)	0.666*** (0.194)	0.988** (0.391)	0.358* (0.212)	0.324 (0.299)
$DP_{it}$	0.149* (0.086)	-0.090 (0.307)	0.703*** (0.119)	0.258 (0.216)	0.636* (0.372)	0.004 (0.339)	0.324* (0.184)	0.039 (0.198)	0.434** (0.219)
Relative Price Ratio <sub>st</sub>	-0.314 (0.220)	-0.896 (4.126)	0.424 (3.888)	-0.734 (0.580)	-0.929 (1.321)	-0.310 (3.765)	-0.068 (4.776)	0.996 (1.714)	0.040 (3.060)
Leverage Ratio <sub>it</sub>	0.011 (0.007)	0.026 (0.018)	0.004 (0.005)	0.004 (0.017)	0.015 (0.028)	0.015 (0.012)	0.030 (0.021)	-0.011 (0.014)	0.017 (0.014)
Profitability Ratio <sub>it</sub>	0.020*** (0.007)	0.064*** (0.022)	0.035** (0.017)	0.029 (0.029)	0.058 (0.045)	0.034 (0.040)	0.058** (0.023)	-0.007 (0.021)	0.038*** (0.014)
Cash Ratio <sub>it</sub>	0.007*** (0.002)	0.000 (0.004)	0.009* (0.005)	-0.008 (0.008)	0.003 (0.007)	0.007 (0.013)	0.010** (0.004)	0.013** (0.006)	0.001 (0.001)
Age <sub>it</sub>	0.034* (0.021)	0.021 (0.048)	-0.036 (0.031)	-0.044 (0.038)	0.082 (0.064)	0.208* (0.117)	0.004 (0.041)	-0.015 (0.044)	0.055 (0.050)
Size <sub>it</sub>	0.870*** (0.222)	0.850** (0.360)	0.567** (0.287)	0.170 (0.264)	0.907* (0.502)	0.586* (0.327)	0.222 (0.411)	0.943** (0.459)	0.116 (0.300)
Hansen p value	0.176	0.467	0.224	0.667	0.516	0.915	0.271	0.195	0.809
AR(1) p value	0.001	0.013	0.000	0.036	0.047	0.011	0.010	0.020	0.008
AR(2) p value	0.819	0.498	0.273	0.795	0.701	0.850	0.198	0.468	0.862
AR(3) p value	0.275	0.425	0.886	0.141	0.814	0.571	0.731	0.928	0.773
# of instruments	50	32	48	43	42	42	36	42	51
# of firms	6286	966	1554	351	172	335	779	844	221
# of observations	27567	4430	6485	1645	716	1665	3443	3735	1069

Robust standard errors in parentheses. \* $p < 0.10$ , \*\* $p < 0.05$ , \*\*\* $p < 0.01$ . The specifications are estimated with the system GMM method. We select the instruments following Roodman (2009). For the year and sector-fixed variables, we use IV-style instruments while for the dependent variable and variables that are not strictly exogenous, we use GMM-style instruments. To limit the instrument proliferation, we employ the collapse option of the xtabond2 command. Hansen (1982) test confirms the validity of instruments and AR(p) tests show that there is no auto-correlation in the residuals.

of the table presents the results for the total manufacturing industry. Unlike the sector-level estimations in the following columns, we also control the sector-fixed effects in this specification.<sup>9</sup> Results indicate that one of the main drivers of current exports is the previous years' exports. Indeed, exporting behavior has a dynamic nature which makes it persistent over time. The coefficient estimate of the first lag of exports is positive and statistically significant for all of the specifications. The second lag of exports significantly contributes to explain the variations in the current exports for the manufacturing industry as a whole and the manufacturing sub-sectors such as chemicals manufacturing, rubber and plastics manufacturing and electrical equipment manufacturing.

The results for the whole manufacturing industry suggest that firms' real domestic sales and real exports are substitutes. It is observed that a 10 percent decline (increase) in real domestic sales, keeping all the other factors constant, is associated with an almost 2.7 percent increase (decline) in real exports. For the baseline model, we use manufacturing industry price indices to deflate both the nominal exports and domestic sales. To avoid the effects of price indices on the results, we apply a robustness check. Alternatively, we deflate the dependent variable using the export prices in Turkish liras that are published according to NACE 2-digit industry classification. Domestic sales and inventories are deflated by sectoral producer prices indices according to the NACE 2-digit industry classification as done in the baseline estimations. Results from the robustness test, which are available upon request, are in line with

<sup>9</sup> For robustness, we also control sector\*time fixed effects in the main specification for the manufacturing industry. Results, which are available upon request, are in line with the baseline findings presented in Table 2.

the results from the baseline estimation.

The internal dynamics of the manufacturing industry sectors exhibit a highly heterogeneous structure in terms of import content of production, integration to global value chains, capital or labor intensity of the production, degree of durability of the products, etc. Thus, the correlation between domestic sales and exports is expected to differ significantly due to the heterogeneous characteristics of the sectors. Therefore, our results provide valuable implications for the policymakers that aim to construct sector-level trade policies. Estimations indicate that the correlation between domestic sales and exports of manufacturing firms varies among the manufacturing sub-sectors.<sup>10</sup> The eight manufacturing sub-sectors constructed according to the 2-digit NACE classification have diverse coefficient estimates for domestic sales. Furniture manufacturing and food and beverage manufacturing sectors have the highest degree of substitution between domestic sales and exports. For instance, a 10 percent decline in domestic sales of furniture products is associated with, on average, an increase with almost identical magnitude in exports of these products. On the other side, textile, wearing apparel and leather products, and basic and fabricated metal products manufacturing sub-sectors have the lowest degree of substitution. For a similar decline in domestic sales of textile products we expect, on average, a 5.8 percent increase in exports of those products. For transportation products manufacturing, we still observe a negative coefficient estimate for the domestic sales, although it is not statistically significant. Our

<sup>10</sup> Refer to the summary statistics in Table A1 of the appendix for the content of manufacturing sub-sectors. For instance, textile manufacturing in our analysis corresponds to the manufacturing of textile, wearing apparels, and leather products.

findings indicate that there is no substitution between domestic sales and exports of electrical equipment manufacturing. Also, we do not observe a complementarity relationship between domestic sales and exports for any of the sub-sectors.

Results for the two manufacturing sectors, motor vehicles and other transport equipment manufacturing, and textile, wearing apparel and leather products manufacturing, with the highest shares in Turkey's total exports on average during the period, 16 percent and 22 percent respectively, deserve more attention. While the first sector is more technology-intensive and better integrated into the global value chains, the second sector is more labor-intensive and it uses less foreign inputs in production. We interpret the insignificant relationship between domestic sales and exports for the transportation products manufacturing mainly with the degree of integration to the global value chains. Most of the automotive sector that produces cars or parts of transportation products are connected to the international markets through the multinational firms operating in Turkey. These multinationals make investment plans in longer horizons and their supply schedules, as well as their demand for Turkish final or intermediate transportation products, depend less on the variations in domestic demand conditions. Therefore, a decline in domestic demand may lead to a contraction in demand for domestic transportation products while it generally has relatively less impact on exports.

On the contrary, textile and wearing apparels manufacturing is more labor-intensive and it requires relatively lower technology in production compared to the automotive industry. Considering that expanding and maintaining production with higher technology require higher capital costs, we expect textile and wearing apparels manufacturing to respond to the variations in the domestic demand more flexibly than the capital-intensive sectors such as transportation products manufacturing.

Another explanation related to the impact of integration to global value chains on the relationship between domestic sales and exports may be the dependency of exports on the imported contents. In Table 2, the first four sub-sectors (food, textile and wearing apparels, chemical products, and furniture manufacturing) are the sectors in Turkey that have less imported content in their exports compared to the manufacturing industry average (OECD (2019b)). On the contrary, the last four sub-sectors have more imported content in their exports than the industry average. We observe that a negative and significant correlation between domestic sales and exports exists for all of the first four sectors while it exists for only two of the last four sectors (metals, and rubber and plastics manufacturing). This finding provides some evidence that import dependency of exports may play a role in explaining the aforementioned relationship. Unfortunately, we have data of sector-level import content of exports for only one period, the mid-2000s. We do not have sector-level time-series data or firm-level statistics regarding import dependency of exports. Further research may provide more insights into this perspective.

The heterogeneous export market structure across the sectors due to trade barriers, tariffs, requirements and contracts may also be considered as one of the factors to determine the correlation between domestic sales and exports at the sector-level. For instance, we would expect export contracts in the textile and clothing industry to be made several months before the season. This may be among the several explanations behind the low degree of substitution between foreign and domestic sales in this sector. On the other hand, export contracts in some sectors are relatively short-termed since the products are mostly non-durable and perishable. For instance, food and chemical products generally have shorter expiration dates. Therefore, firms operating in these sub-sectors should turn over their products by selling in domestic and international markets faster than the firms operating in other sub-

sectors such as furniture or metals manufacturing, in which the durability of the products is higher. This may help explain the high correlation between domestic and foreign sales in these sectors.

The coefficient estimate of the lagged inventories is statistically significant for the manufacturing industry and its sub-sectors, excluding furniture and electrical equipment manufacturing. Results suggest that a rise in the previous year's inventories is associated with an increase in the current exports. Since inventories are indicators of firms' capacity constraints, we provide evidence that the relationship between exports and domestic sales exists when we also control firms' production constraints.<sup>11</sup> Coefficient estimates of the lagged inventories are the strongest for chemicals and, basic and fabricated metals manufacturing.

The results of the study do not provide evidence that the relative movements of export prices and domestic prices have statistically significant effects on real exports. Two main reverse channels determine the impact of relative prices on exports. On the one hand, an increase in relative prices makes selling abroad more profitable than selling in domestic markets. On the other hand, the increase in relative prices leads exports to decline, if this increase is mainly originated from a larger rise in Turkish export prices than the competitor countries' export prices. Thus, a combination of the effects of these two main reverse channels may result in inconclusive coefficient estimates. A better treatment is to use firm or sector-level export prices of the corresponding sectors of competitors, which are unfortunately not available in our analysis.

The findings indicate that the persistence of exporting behavior is a significant determinant of real exports at the firm-level. According to the estimations, permanent exporters export more, on average, than the temporary exporters in the sample. For the whole manufacturing industry, switching from temporary exporting to permanent exporting leads a firm's exports to increase by almost 16 percent.<sup>12</sup> The impact is also significant for textile and wearing apparels, basic and fabricated metals, furniture products, and electrical equipment manufacturing. If an average firm operating in textile and wearing apparels manufacturing switches from temporary exporting to permanent exporting, its exports are almost doubled. The impact is around 89 percent for firms in furniture manufacturing, 54 percent for firms in electrical equipment manufacturing, and 39 percent for the firms in basic and fabricated metals manufacturing.

The coefficient estimate of the leverage ratio is not statistically significant, implying that the level of indebtedness does not constrain firms' foreign sales. The result may be convincing considering that almost half of the sample is composed of permanent exporter firms. Previous studies on the relationship between firms' financial constraints and their exporting behaviors provide evidence that exporter firms are less likely to be financially constrained (See Wagner (2014) and Muuls (2015)). Results also show that profitability has a positive and statistically significant effect on exports. If the firm is more profitable or it has stronger performance, on average we expect, it will export more. Another important finding is that the cash ratio, an indicator of the level of firms' short-term liquidity, affects the export performance positively. Unlike the leverage ratio, which mainly indicates the external financing constraints, cash flow is related to the internal financing

<sup>11</sup> We also attempted to control for the lagged domestic sales in the specifications. However, in almost all of the specifications, their coefficient estimates were statistically insignificant. Since the correlation between the lagged domestic sales and lagged inventories is strong (0.75) in the sample, we used the second one as a control for firms' capacity constraints.

<sup>12</sup> Since the export model is log-linear, the interpretation of the coefficient estimate of the dummy variable differs.  $100[\exp(\alpha_4) - 1]$  shows the % impact of switching from being a temporary exporter to being a permanent exporter.

constraints or liquidity constraints. Thus, there is still some evidence regarding the limiting effect of financing constraints on exports.

The findings of the study provide evidence that size is a major determinant of firms' real exports. The larger a firm is, the more products it can produce and sell in international and domestic markets. In addition to that, entry to international markets, in which the competition is high, brings additional costs, which generally the larger firms can handle, along with it. There is also some evidence that there is a positive correlation between a firm's age and its real exports.

As a comparison with the results of the previous empirical literature, our results support the evidence provided by [Ciftci and Ciftci \(2013\)](#) for Turkey, [Belke et al. \(2015\)](#) for Euro area, [Esteves and Rua \(2015\)](#) for Portugal, [Crespo and Muñoz-Sepulveda \(2015\)](#) for Spain, [Ahn and McQuoid \(2017\)](#) for Indonesia, and [Liu \(2018\)](#) for Colombia that generally explain the relationship between exports and domestic sales with the capacity constraints argument. However, our findings differ from the findings of previous research by [Salomon and Shaver \(2005\)](#) for Spain, [Berman et al. \(2015\)](#) for France, and [Erbahar \(2020\)](#) for Turkey that mainly concentrate on the role of liquidity constraints in determining the aforementioned relationship. Since the earlier studies do not have sector-level evidence, we cannot make a comparison between our sector-level results and previous empirical evidence.

We undertake further analysis to investigate if the relationship between domestic sales and exports differs with respect to firm-specific factors. [Table 3](#) provides the estimation results for samples divided according to firms' exporting status, age, level of indebtedness, and the degree of import dependency of the sector that the firm operates in. Sector averages that are calculated

according to 4-digit NACE classification are used to divide the sample into sub-samples. For instance, if a firm's annual exports as a share of its total sales are greater than the corresponding figure of the 4-digit manufacturing sector the firm belongs to, then this firm is classified as an export-oriented firm. If it is lower than the sector-average, then the firm is classified as a domestic-oriented firm. For the degree of indebtedness and age, a similar procedure is followed. To divide the sample according to import content of exports, we use the [OECD \(2019b\)](#)'s Trade-in Value Added (TiVA) statistics. OECD's industry-level statistics on import content of Turkish exports show that half of the sub-sectors under our consideration (Food and Beverages, Textile, Wearing Apparel and Leather Products, Chemicals and Pharmaceutical Products, and Furniture Manufacturing) uses less imported-inputs in exports than the manufacturing industry average in the mid-2000s. On the contrary, the other half (Motor Vehicles and Other Transport Equipment, Basic and Fabricated Metal Products, Rubber, Plastic and Non-metallic Mineral Products, and Electrical Equipment Manufacturing) consumes more imported-inputs to produce export-products compared to the manufacturing industry average.

Results in [Table 3](#) show that export-oriented firms, on average, have greater substitutability between domestic sales and exports compared to domestic-oriented firms. While export-oriented firms are already more integrated into global markets, domestic-oriented firms need to undertake several costs in international markets such as entry costs, search costs, cost regarding acquiring customer loyalty, etc. In addition to these factors, one should also clearly identify the relative sizes of the domestic and export markets of Turkey. If the domestic market of a sector is relatively small than its export market or the ratio of exports to domestic sales in a specific sector is very high, responding to domestic demand shocks by

**Table 3**  
The effects of real domestic sales on real exports: Sub-samples.

Dependent: $\log(\text{Real Exports})_{it}$	Export Oriented	Domestic Oriented	Low Leveraged	High Leveraged	Young	Old	Less Import Dependent	More Import Dependent
$\log(\text{Real Exports})_{it-1}$	0.623** (0.311)	0.673*** (0.246)	0.719*** (0.116)	0.699*** (0.210)	0.777*** (0.208)	0.334* (0.183)	0.302* (0.155)	0.466*** (0.141)
$\log(\text{Real Exports})_{it-2}$	0.037 (0.083)	0.124 (0.203)	0.088 (0.061)	0.001 (0.093)	0.074 (0.078)	0.170* (0.087)	0.225*** (0.069)	0.123* (0.072)
$\log(\text{Real Domestic Sales})_{it}$	-0.681*** (0.262)	-0.093 (0.347)	-0.439*** (0.138)	-0.173 (0.157)	-0.229* (0.120)	-0.068 (0.134)	-0.617*** (0.158)	-0.109 (0.115)
$\log(\text{Real Inventories})_{it-1}$	0.886** (0.439)	0.272 (0.268)	0.386*** (0.149)	0.274** (0.118)	0.133 (0.181)	0.329** (0.130)	0.306*** (0.105)	0.300*** (0.099)
$DP_{it}$	-0.055 (0.088)	0.466*** (0.089)	0.333*** (0.068)	0.123 (0.104)	0.265** (0.132)	0.182 (0.119)	0.166 (0.121)	0.067 (0.106)
Relative Price Ratio <sub>st</sub>	0.084 (0.259)	-0.352 (0.239)	-0.108 (0.280)	-0.339 (0.271)	-0.490 (0.305)	0.045 (0.346)	-0.301 (0.235)	-0.353 (0.578)
Leverage Ratio <sub>it</sub>	0.005 (0.009)	0.010 (0.007)	0.007 (0.006)	0.002 (0.004)	-0.012 (0.010)	0.007 (0.005)	-0.005** (0.003)	0.001 (0.004)
Profitability Ratio <sub>it</sub>	0.033*** (0.011)	0.019* (0.011)	0.028*** (0.008)	0.019* (0.010)	0.030** (0.012)	0.013 (0.008)	0.027*** (0.008)	0.014 (0.009)
Cash Ratio <sub>it</sub>	0.000 (0.002)	0.022*** (0.005)	0.005* (0.002)	0.001 (0.001)	0.010** (0.005)	-0.000 (0.001)	-0.004* (0.002)	-0.000 (0.000)
Age <sub>it</sub>	0.322 (0.267)	-0.001 (0.024)	0.009 (0.020)	0.008 (0.028)	-0.036 (0.040)	0.069** (0.035)	0.026 (0.028)	0.044 (0.028)
Size <sub>it</sub> size1	0.137 (0.129)	0.356** (0.162)	0.551** (0.234)	0.578 (0.374)	0.493 (0.319)	0.872** (0.375)	1.305*** (0.240)	0.799*** (0.246)
Hansen p value	0.173	0.103	0.480	0.836	0.251	0.197	0.193	0.267
AR(1) p value	0.091	0.046	0.000	0.001	0.000	0.016	0.012	0.000
AR(2) p value	0.220	0.749	0.167	0.219	0.110	0.302	0.154	0.782
AR(3) p value	0.145	0.356	0.319	0.563	0.122	0.258	0.719	0.666
# of instruments	40	54	57	60	54	61	48	56
# of firms	3011	4622	3997	4324	3822	3255	3186	2300
# of observations	11242	16220	13545	13924	13054	14352	15314	11736

Robust standard errors in parentheses. \*p < 0.10, \*\*p < 0.05, \*\*\*p < 0.01. The specifications are estimated with the system GMM method. We select the instruments following [Roodman \(2009\)](#). For the year and sector-fixed variables, we use IV-style instruments while for the dependent variable and variables that are not strictly exogenous, we use GMM-style instruments. To limit the instrument proliferation, we employ the *collapse* option of the *xtabond2* command. [Hansen \(1982\)](#) test confirms the validity of instruments and AR(p) tests show that there is no auto-correlation in the residuals. Since the firms' exports share, leverage ratio, age, and the sector they operate in varies over time, the sum of the # of firms does not match with the # of firms in the estimation sample. However, we use the sample throughout the analysis which is also confirmed by the # of firm-year observations.

selling more in foreign markets may be limited. We observe that this is not the case for Turkish exporters. We compute the ratio of exports to total supply (domestic production and imports) for the two manufacturing sectors, textile and wearing apparels, and transportation products, with the highest shares in Turkey's exports. The computed ratio is an indicator of the relative sizes of foreign and domestic markets for these sectors. During the period, the ratios are, on average, around 37 and 35 percent for the textile products and transportation products manufacturing sectors, respectively. This shows that even for the two most-exporting sectors, Turkish domestic markets are still large relative to their export markets. Thus, there is room to switch from domestic sales to exports as a response to weak domestic demand conditions. Considering that they have cost and experience advantages, export-oriented firms are more likely to use this room than domestic market-oriented firms.<sup>13</sup> Our findings show that low-leveraged firms are more flexible in substituting exports for domestic sales when the domestic sales decline. Increasing exports to international markets requires additional financing, some of which is probably in foreign currency. Other variables held constant; it is more likely for low-leveraged firms to access finance when they want to increase their exports to international markets.

Evidence suggests that the negative relationship between domestic sales and exports is stronger for younger firms. Older firms are less elastic in adjusting their exports as a response to the variations in domestic sales. One of the possible explanations may be suggested as seller-customer loyalty and business habits. Older exporter firms generally have a long history of exporting, which helps construct a longer-term relationship with their customers. They may be a part of the supply chain in the production cycle of foreign firms, which can make them bounded to particular buyers and be less reluctant to respond to short-term variations in domestic sales.

Results indicate that firms that belong to manufacturing sub-sectors with lower imported-content of exports are more likely to have a substitution between domestic sales and exports. Alternatively, firms that operate in manufacturing sub-sectors that depend more on imported-inputs are generally not able to adjust their sales among exports and domestic sales in response to a variation in domestic sales. For instance, a negative shock to domestic sales of a product stimulates the increase in exports. However, if the exports are highly dependent on imports, it may not always be feasible to compensate for the decline in domestic sales with an expansion in foreign sales. The finding is in line with the individual sub-sector level results in [Table 2](#). For firms operating in less import-dependent sectors, such as textile and wearing apparels manufacturing, we have documented a negative and statistically significant relationship between domestic sales and exports. The products of these firms are generally more labor-intensive and require lower technology. However, products such as automobiles that are capital and technology-intensive require more imported-content. Thus, import dependency may be one reason that helps to explain the inconclusive coefficient estimate of domestic sales for transportation products manufacturing.

When the domestic demand is weak, firms are expected to compensate for the decline in domestic sales by increasing their sales abroad. This expectation follows the capacity constraints argument that a decrease in domestic sales releases some

production capacity to produce and sell in international markets. The interaction between weak domestic demand conditions and the relationship between domestic and foreign sales is examined using Equation (2). We expect that the coefficient estimate of the interaction term to be negative, implying that weaker domestic demand conditions increase the degree of substitutability between domestic sales and exports. [Table 4](#) presents the estimation results for Equation (2). The coefficient estimate of the interaction term for the total manufacturing industry is negative and statistically significant, indicating that the substitution relationship between real domestic sales and real exports significantly strengthens when the domestic demand conditions are weaker than the period's average. This finding suggests that if the domestic demand conditions were weak in the previous year, firms on average increase their foreign sales more in the following year along with a decline in domestic sales. This is an indicator that manufacturing firms have the elasticity to respond to changes in domestic demand conditions. The results regarding the increased substitution between domestic sales and exports during periods of weak demand conditions support the evidence of the recent studies that mainly focus on European firms such as [Esteves and Rua \(2015\)](#), [Belke et al. \(2015\)](#), and [Bobeica et al. \(2016\)](#).

For the robustness of the results, we employ several additional robustness tests. First, to better measure the variations in domestic demand, we use two alternative domestic demand dummy variables that are based on indicators such as the annual growth rate of final consumption and hp-filtered household consumption. Second, to control the impact of the estimation method on the results, we estimate the exports and domestic demand equations simultaneously as a system of equations using the 3SLS method. Finally, to avoid the effects of the transformation method we use to transform the exports, domestic sales and inventories, we follow two alternative transformation approaches, the inverse-hyperbolic-sine (IHS) transformation and the cubic transformation that are explained in the previous section. We observe that all of the estimations from the robustness tests are in line with the baseline results.<sup>14</sup>

The findings of this study can be compared with those of [Bugamelli et al. \(2015\)](#) and [Almunia et al. \(2018\)](#) that also analyze the impact of weaker demand conditions on the correlation between domestic and foreign sales at the firm-level. [Bugamelli et al. \(2015\)](#) estimate the coefficient of correlation between domestic sales and exports that varies during three periods of the Italian Economy. In the first period, domestic demand is usual, while in the last two periods, there are two crises as the global crisis and the sovereign debt crisis. In line with our findings, they report that the relationship is negative during the first period. On the contrary, they provide evidence that the relationship becomes positive during the last two periods. They claim that the aforementioned correlation varies over the business cycles depending on the liquidity and capacity constraints. Besides, our findings are in line with [Almunia et al. \(2018\)](#) that provide evidence in favor of a negative relationship between domestic sales and exports. They analyze the Spanish firms for two periods, one is the boom period and the other is the bust period. Even they control for the firms' supply determinants in their structural export model, they still observe the substitution between the two markets. They interpret the findings with the capacity constraints argument that Spanish firms had the free capacity in the burst period because of the decline in domestic demand and the firms used this free capacity to expand their exports.

<sup>13</sup> We provide further robustness tests regarding the effect of exporting behavior on the relationship between exports and domestic sales. We split the whole sample into three bins: bottom, middle and upper terciles of export share. They are constructed according to the exports-to-total sales ratios of the firms in the full sample. The results from the robustness test, which is available upon request, support the baseline findings that an increase in export orientation leads firms to be more flexible to switch between markets.

<sup>14</sup> Results from robustness tests are available upon request.



**Table 4**  
Interaction with weak domestic demand conditions.

Dependent: $\log(\text{Real Exports})_{it}$	All	Food	Textile	Chemicals	Furniture	Transport	Metals	Rubber and Plastics	Elect. Equip.
$\log(\text{Real Exports})_{it-1}$	0.361*** (0.131)	0.749*** (0.197)	0.437** (0.179)	0.830*** (0.265)	0.938*** (0.276)	0.322 (0.232)	0.625* (0.354)	0.420** (0.185)	0.567*** (0.116)
$\log(\text{Real Exports})_{it-2}$	0.184*** (0.057)	0.079 (0.109)	0.089 (0.085)	0.127 (0.162)	-0.004 (0.200)	0.058 (0.173)	0.131 (0.163)	0.216** (0.098)	0.234* (0.128)
$\log(\text{Real Domestic Sales})_{it}$	-0.319*** (0.098)	-0.800* (0.469)	-0.654** (0.278)	-0.895* (0.536)	-1.099** (0.484)	-0.293 (0.471)	-0.687* (0.413)	-0.946** (0.402)	0.417 (0.491)
$\log(\text{Real Domestic Sales})_{it} \cdot \text{DD}_{t-1}$	-0.173* (0.095)	-0.038 (0.604)	-1.211* (0.676)	-0.151 (0.461)	-1.302* (0.774)	-0.055 (0.545)	-1.358* (0.732)	-0.001 (0.352)	0.323 (0.849)
$\log(\text{Real Inventories})_{it-1}$	0.131* (0.068)	0.619* (0.336)	1.275*** (0.403)	1.478** (0.671)	-0.396 (0.428)	0.054 (0.441)	0.782* (0.404)	0.080 (0.206)	0.001 (0.296)
$DP_{it}$	0.213*** (0.082)	0.069 (0.302)	0.856*** (0.168)	0.826 (0.687)	0.112 (0.360)	0.066 (0.431)	0.525** (0.248)	-0.187 (0.260)	0.352* (0.189)
Relative Price Ratio <sub>st</sub>	-0.375 (0.231)	-1.554 (5.391)	-5.446 (34.936)	-1.207 (0.815)	-0.699 (1.309)	-2.444 (2.460)	3.863 (26.811)	-0.356 (4.119)	-1.088 (3.333)
Leverage Ratio <sub>it</sub>	0.009 (0.006)	0.033 (0.033)	-0.003 (0.005)	-0.032 (0.024)	-0.022 (0.021)	0.029 (0.020)	0.038 (0.033)	0.005 (0.007)	0.018 (0.012)
Profitability Ratio <sub>it</sub>	0.017** (0.008)	0.078*** (0.029)	0.071 (0.119)	0.029 (0.039)	0.032 (0.032)	-0.005 (0.026)	0.072** (0.032)	-0.003 (0.013)	0.026 (0.016)
Cash Ratio <sub>it</sub>	0.000 (0.000)	0.002 (0.005)	0.004 (0.006)	0.001 (0.011)	-0.003 (0.007)	0.001 (0.008)	0.010* (0.006)	0.007 (0.004)	0.004 (0.005)
Age <sub>it</sub>	0.053*** (0.020)	0.023 (0.052)	-0.036 (0.041)	-0.091 (0.058)	0.163* (0.095)	0.243* (0.138)	0.031 (0.055)	0.057 (0.054)	0.008 (0.042)
Size <sub>it</sub>	1.196*** (0.175)	0.654** (0.328)	0.748** (0.302)	-0.389 (0.486)	1.882*** (0.643)	1.605*** (0.424)	0.756 (0.539)	1.806*** (0.563)	-0.267 (0.317)
Hansen p value	0.259	0.493	0.494	0.467	0.473	0.124	0.189	0.581	0.274
AR(1) p value	0.001	0.002	0.002	0.025	0.024	0.041	0.028	0.013	0.008
AR(2) p value	0.352	0.775	0.793	0.289	0.401	0.518	0.741	0.782	0.837
AR(3) p value	0.581	0.277	0.399	0.104	0.845	0.967	0.416	0.426	0.996
# of instruments	44	32	38	39	48	35	31	49	52
# of firms	6286	966	1554	351	172	335	779	844	221
# of observations	27567	4430	6485	1645	716	1665	3443	3735	1069

Robust standard errors in parentheses. \*p < 0.10, \*\*p < 0.05, \*\*\*p < 0.01. The specifications are estimated with the system GMM method. We select the instruments following Roodman (2009). For the year and sector-fixed variables, we use IV-style instruments while for the dependent variable and variables that are not strictly exogenous, we use GMM-style instruments. To limit the instrument proliferation, we employ the collapse option of the xtabond2 command. Hansen (1982) test confirms the validity of instruments and AR(p) tests show that there is no auto-correlation in the residuals.

Regarding the sector-specific findings, results indicate that the elasticity of firms to shift from domestic sales to exports when the domestic demand conditions are weaker is strongest for the basic and fabricated metal products manufacturing. The other two sectors, in which there is a significant impact of the variations in domestic demand on the aforementioned relationship, are furniture, and textile and wearing apparels manufacturing. Although the coefficient estimates are generally negative for the rest of the sub-sectors, they are not statistically significant. Similar to previous findings in Table 2 regarding the relationship between domestic sales and exports, the coefficient estimate for the interaction term is not statistically different than zero for electrical equipment manufacturing.

Finally, we test if the interaction between domestic demand conditions and the relationship between domestic and foreign sales differs for sub-samples divided as permanent and non-permanent exporters. Results from the robustness test, which is available upon request, indicate that the coefficient estimate for the interaction term is negative for both permanent and non-permanent exporters. However, it is only statistically significant for permanent exporters. These results support the previous results of our study that permanent exporters have more flexibility to switch between domestic and international markets.

**5. Conclusion**

The nature of the relationship between domestic sales and exports is critical for policy-makers who need to know the future performance of the economy while responding to a domestic demand shock. Capacity constraints, liquidity constraints, the existence of multinationals and the FDI spillovers, and the persistence

of a firm's exporting behavior are the main arguments to explain this phenomenon. In this study, using firm-level data from the Turkish manufacturing industry, we examine the relationship between real domestic sales and real exports and we investigate whether this relationship changes in response to variations in domestic demand conditions.

The conclusions of the study can be summarized with several statements. First, older and larger firms, on average, tend to export more than younger and smaller firms. There is some evidence that the more profitable a firm is, the more it exports. Besides, the persistence of exporting behavior matters in terms of the amount a firm exports. Permanent exporters, on average, export more than the exporters with similar firm characteristics but are transitory exporters.

Second, we have weak evidence that financing constraints are binding on a firm's exports. If we take into account that almost half of the sample is composed of permanent exporters, this result may be convincing. Indeed, earlier studies document that exporter firms are less likely to be financially constrained.

Third, results indicate that manufacturing firms' domestic sales and their exports are generally substitutes. This result is in line with the results of the previous research in the empirical literature that primarily focuses on the firm-level evidence from developed countries. Firms decrease their exports when their domestic sales increase, whereas they export more when their domestic sales decline. Implications from this result may be used by those who need to make projections about the course of real exports in the future, taking the domestic demand conditions into account.

Fourth, the relationship between domestic sales and exports varies among manufacturing sub-sectors. While the relationship exists for the labor-intensive, lower-technology user and less

import-dependent textile and wearing apparels manufacturing, there is weak evidence regarding the existence of the relationship for transportation products manufacturing which is capital-intensive, higher-technology user and more import-dependent. This finding is important when we consider that both of the two sectors together account for almost 40 percent of Turkey's manufacturing exports during the sample period. A supporting result is that the relationship is stronger for the firms that belong to manufacturing sectors whose exports are less dependent on imported-contents. The degree of import dependency may be one of the factors to consider in terms of the flexibility of firms to respond to domestic demand shocks. Further research may provide evidence on the channels through which import dependency affects the aforementioned relationship. In addition, there is evidence that the substitution between domestic sales and exports is more pronounced for export-oriented, low-

leveraged and younger firms compared to domestic-oriented, high-leveraged, and older firms.

Finally, results suggest that the relationship between domestic sales and exports significantly strengthens when the domestic demand conditions are relatively weaker. This finding, which is robust to alternative domestic demand indicators, implies that exporter firms in the Turkish manufacturing industry can shift from domestic sales to exports as a response to weak domestic demand conditions. Because the mechanism is counter-cyclical, it helps smooth the weakening in the domestic economic activity.

## Appendix

**Table A1**  
Descriptive statistics.

	Nace Rev. 2.	Sector	Obs.	Mean	Std.Dev	Min	Max
Log of Real Exports	10 + 11	Food and Beverages	4430	10.16	7.25	0.00	20.26
	13 + 14+15	Textile, Wearing Apparel and Leather Products	6485	11.88	6.15	0.00	19.74
	20 + 21	Chemicals and Pharmaceutical Products	1645	12.15	5.74	0.00	19.63
	22 + 23	Rubber, Plastic and Non-metallic Mineral Products	3735	10.68	6.72	0.00	19.73
	24 + 25	Basic and Fabricated Metal Products	3443	12.77	6.04	0.00	21.15
	27	Electrical Equipment	1069	14.43	4.51	0.00	21.50
	29 + 30	Motor Vehicles and Other Transport Equipment	1665	12.89	6.14	0.00	21.95
	31	Furniture	716	10.36	5.98	0.00	18.07
	Section C	All Manufacturing	27567	11.61	6.40	0.00	22.26
	Log of Real Domestic Sales	10 + 11	Food and Beverages	4430	16.22	2.26	0.00
13 + 14+15		Textile, Wearing Apparel and Leather Products	6485	15.49	2.10	0.00	19.84
20 + 21		Chemicals and Pharmaceutical Products	1645	16.37	2.30	0.00	20.46
22 + 23		Rubber, Plastic and Non-metallic Mineral Products	3735	16.08	1.99	0.00	20.29
24 + 25		Basic and Fabricated Metal Products	3443	16.27	2.22	0.00	22.21
27		Electrical Equipment	1069	16.28	2.43	0.00	21.70
29 + 30		Motor Vehicles and Other Transport Equipment	1665	15.99	2.52	0.00	21.89
31		Furniture	716	15.43	1.86	0.00	19.60
Section C		All Manufacturing	27567	15.91	2.25	0.00	23.58
Log of Real Inventories		10 + 11	Food and Beverages	4430	14.90	1.73	0.00
	13 + 14+15	Textile, Wearing Apparel and Leather Products	6485	14.60	1.77	0.00	19.57
	20 + 21	Chemicals and Pharmaceutical Products	1645	14.76	2.01	0.00	19.34
	22 + 23	Rubber, Plastic and Non-metallic Mineral Products	3735	14.48	1.74	0.00	18.89
	24 + 25	Basic and Fabricated Metal Products	3443	14.81	2.22	0.00	21.20
	27	Electrical Equipment	1069	14.99	1.95	0.00	20.32
	29 + 30	Motor Vehicles and Other Transport Equipment	1665	14.62	2.59	0.00	20.08
	31	Furniture	716	14.31	1.62	0.00	18.06
	Section C	All Manufacturing	27567	14.63	1.98	0.00	21.43
	Leverage Ratio	10 + 11	Food and Beverages	4430	60.42	20.75	0.62
13 + 14+15		Textile, Wearing Apparel and Leather Products	6485	56.08	20.99	0.18	99.96
20 + 21		Chemicals and Pharmaceutical Products	1645	55.16	20.43	1.29	99.95
22 + 23		Rubber, Plastic and Non-metallic Mineral Products	3735	57.74	20.95	0.10	99.79
24 + 25		Basic and Fabricated Metal Products	3443	59.54	20.57	2.00	100.00
27		Electrical Equipment	1069	59.94	19.24	4.35	99.49
29 + 30		Motor Vehicles and Other Transport Equipment	1665	57.86	19.97	3.14	99.78
31		Furniture	716	63.95	18.41	8.56	99.43
Section C		All Manufacturing	27567	58.09	20.81	0.06	100.00
Profitability Ratio		10 + 11	Food and Beverages	4430	3.64	5.29	0.00
	13 + 14+15	Textile, Wearing Apparel and Leather Products	6485	3.28	4.77	0.00	74.09
	20 + 21	Chemicals and Pharmaceutical Products	1645	5.03	6.21	0.00	72.43
	22 + 23	Rubber, Plastic and Non-metallic Mineral Products	3735	4.49	6.03	0.00	62.45
	24 + 25	Basic and Fabricated Metal Products	3443	4.70	5.94	0.00	41.60
	27	Electrical Equipment	1069	4.89	5.95	0.00	34.51
	29 + 30	Motor Vehicles and Other Transport Equipment	1665	5.90	7.35	0.00	48.87
	31	Furniture	716	3.28	4.68	0.00	37.01
	Section C	All Manufacturing	27567	4.20	5.77	0.00	89.12
	Cash Ratio	10 + 11	Food and Beverages	4430	16.52	20.61	0.00
13 + 14+15		Textile, Wearing Apparel and Leather Products	6485	19.78	23.35	0.00	99.97
20 + 21		Chemicals and Pharmaceutical Products	1645	26.02	26.22	0.00	99.81
22 + 23		Rubber, Plastic and Non-metallic Mineral Products	3735	22.60	24.67	0.00	99.99
24 + 25		Basic and Fabricated Metal Products	3443	20.60	23.04	0.00	99.99
27		Electrical Equipment	1069	19.89	21.98	0.00	99.98
29 + 30		Motor Vehicles and Other Transport Equipment	1665	17.39	21.67	0.00	99.94
31		Furniture	716	18.76	23.55	0.00	99.88

(continued on next page)

Table A1 (continued)

	Nace Rev. 2.	Sector	Obs.	Mean	Std.Dev	Min	Max
Age	Section C	All Manufacturing	27567	19.98	23.17	0.00	99.99
	10 + 11	Food and Beverages	4430	4.34	2.09	0	9
	13 + 14+15	Textile, Wearing Apparel and Leather Products	6485	4.15	1.79	0	9
	20 + 21	Chemicals and Pharmaceutical Products	1645	4.82	2.52	0	9
	22 + 23	Rubber, Plastic and Non-metallic Mineral Products	3735	4.36	2.19	0	9
	24 + 25	Basic and Fabricated Metal Products	3443	4.79	2.34	0	9
	27	Electrical Equipment	1069	4.89	2.22	0	9
	29 + 30	Motor Vehicles and Other Transport Equipment	1665	4.77	2.24	0	9
	31	Furniture	716	3.86	1.70	0	9
	No of Employees	Section C	All Manufacturing	27567	4.46	2.12	0
10 + 11		Food and Beverages	4430	263	810	1	16686
13 + 14+15		Textile, Wearing Apparel and Leather Products	6485	314	501	1	9415
20 + 21		Chemicals and Pharmaceutical Products	1645	223	372	1	5250
22 + 23		Rubber, Plastic and Non-metallic Mineral Products	3735	237	358	1	3664
24 + 25		Basic and Fabricated Metal Products	3443	262	577	1	7539
27		Electrical Equipment	1069	460	1431	1	16982
29 + 30		Motor Vehicles and Other Transport Equipment	1665	534	1158	1	9693
31		Furniture	716	222	341	1	3818
		Section C	All Manufacturing	27567	283	667	1

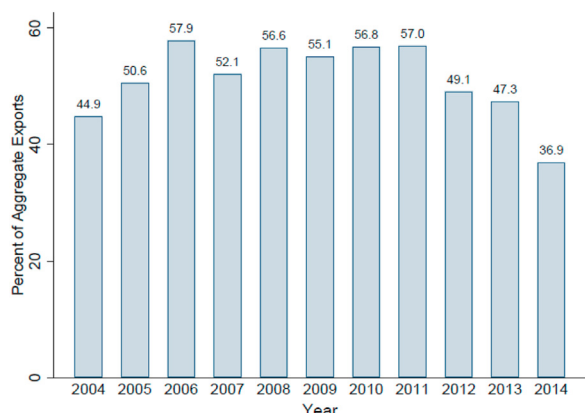


Fig. A1. Representativeness of the Data Set in terms of Aggregate Manufacturing Exports.

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