Two Worlds Apart? Export Demand Shocks and Domestic Sales

Aksel (A.) Erbahar[1]

[1] Erasmus School of Economics

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Export Demand Shocks and Domestic Sales*

Aksel Erbahar[†]

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Abstract

Traditional heterogeneous firms and trade models predict no causal relationship between firms' exports and domestic sales. This paper, using a rich dataset on Turkish firms for the 2005-14 period, analyzes the relationship between firm-product sales in different markets for the first time in the literature to identify the *channels* that link exports and domestic sales. First, I use an instrumental variables strategy and establish that an exogenous doubling of exports increases a firm's domestic sales by 26 percent on average–a result that is mostly driven by small firms. Second, I do an analogous exercise at the firm-product level, and find coefficients that are 62 percent larger, hinting to the importance of product-specific scale effects. Moreover, I propose a novel approach to isolate the production versus non-production factors that influence firm dynamics by focusing on non-produced (or carry-along trade, CAT) exports. I find that CAT exports also affect domestic sales positively, suggesting that spillovers at the firm level such as the easing of liquidity constraints play a role. In the process, I reveal that export demand shocks influence firms' expansion in terms of employment, wages per employee, and investment.

JEL codes: F1, F14, F61, L20
Keywords: international trade; domestic sales; export shocks; carry-along trade

1 Introduction

Exporters generally serve at least two markets: home and foreign. However, the relationship between exporters' sales in different markets is seldom investigated in the literature. Traditional heterogeneous firms and trade models such as Melitz (2003) and Chaney (2008) predict no causal relationship between firms' exports and domestic sales in the short-run (abstracting from general-equilibrium effects). By analyzing the relationship between sales in different markets at the firm-product level for the first time in the literature, this paper seeks to identify the *channels* that link exports and domestic sales. This question is important mainly due to two reasons. First, the traditional trade models' assumption of profit maximization with perfectly segmented markets and constant marginal costs might not be correct, leading to misleading trade liberalization effects on firm-level adjustments such as productivity gains. Second, understanding the link between firms' sales in different markets can help policymakers alleviate the negative consequences of cross-border business cycle transmissions.

To examine the mechanism that links firms' sales at home and abroad, I use a detailed dataset on Turkish firms for the 2005-14 period that allows me to match firms' product-level production and sales data with product-level exports. First, I instrument firm-level exports with destination-product-year specific imports from the world to proxy for exogenous demand shocks. I find that an exogenous doubling of exports increases a firm's domestic sales by 26 percent on average, confirming the findings of Berman et al. (2015) for French firms. I show that this effect exists for both positive and negative changes in exports, and is mostly driven by small firms. To corroborate the results, I use the great trade collapse of 2008-09 as a quasi-natural experiment and find that the domestic sales of firms whose exports were destined to the EU (the most heavily affected export destination) before the crisis fared worse than other firms' domestic sales.

The finding that there is a positive causal relationship between sales in different markets is useful to predict aggregate firm-level sales dynamics, but it is not sufficient to understand the mechanism that transmits these shocks. The literature identifies three main channels that can explain the relationship between firms' sales in different markets: (i) capacity constraints at the firm-product level that would generate a *negative* relationship, (ii) liquidity constraints at the firm level that would generate a *positive* relationship, and (iii) efficiency gains that can be both at the firm and firm-product level that would generate a *positive* relationship. This type of efficiency or productivity gains is also known as "learning by exporting" in the heterogeneous firms and trade literature, whereby some firms increase their productivity once they begin exporting. In the short-run, this third channel is likely due to increasing returns to scale at the firm-product level, where an exogenous demand shock would cause the firm to move along its (non-constant) marginal cost curve.[1]

To identify the mechanism described above, I first differentiate between the firm and firm-product channels. Thus, I examine the relationship between firms' sales in different markets at the firm-

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[1] In the long-run, the marginal cost curve can also shift downwards due to investment in more efficient technologies and/or management practices at the firm level. However, the long-run consequences of export demand shocks on firms is beyond the scope of this paper.

product level, and find coefficients that are 62 percent larger than the ones found in the firm level regressions, hinting to the importance of product-specific scale effects. This result is robust to a battery of sensitivity analyses using alternative controls, weights, and multiple instruments. Then, following Bernard et al. (forthcoming) who show the prevalence of carry-along trade (CAT) for Belgian firms, I separate Turkish exporters' foreign sales into produced versus non-produced (or CAT) exports, and show that the complementary relationship is also due to CAT exports. This, and the finding that the relationship between sales is strongest for smaller firms suggest that spillovers at the firm level such as the easing of liquidity constraints also play a role.[2] In the process, by examining produced and CAT exports separately, I propose a novel approach to isolate the production versus non-production factors that influence firm dynamics. Moreover, I show that export demand shocks influence firms' employment, wages per employee, and investment decisions as in Lileeva and Trefler (2010) and Bustos (2011).

This paper is mainly related to two strands of the heterogeneous firms and trade literature. First, it is related to the nascent literature on the relationship between exports and domestic sales. Berman et al. (2015), using French firm-level data, find that firms' exports and domestic sales are complements, not substitutes. More precisely, they find that an exogenous 10 percent increase in a firm' exports increases its domestic sales by 1 to 3 percent in the short-run. Even though they show suggestive evidence that the link between sales might be due to liquidity constraints, they cannot identify the precise channel since they do not observe sales at the firm-product level. Almunia et al. (2018), on the other hand, find that Spanish firms whose domestic sales were negatively affected by the Great Recession increased their exports, and explain this "venting-for-surplus" phenomenon by building a Melitz-type model with non-constant marginal costs.[3] Bugamelli et al. (2015) use Italian firm-level data to find a business-cycle dependent correlation (not causation) between exports and domestic sales. Overall, these results are contrary to what is predicted by traditional trade models such as Melitz (2003) and Chaney (2008) which project that exogenous shocks to one export-market should have no effect on that firm's sales to other markets in the short-run. Other papers that examine the effects of foreign shocks on firms include Ekholm et al. (2012) who find that Norwegian firms that were more exposed to the appreciation of the Krone restructured manufacturing, and Hummels et al. (2014) who find that positive export shocks caused Danish firms to pay higher wages.[4] However, these papers are mostly silent about the channel of transmission as they lack firm-product data, and thus cannot observe product-market segmentation. My paper contributes to this literature by finding that export demand shocks do influence domestic sales positively, and this is due to both firm and firm-product level spillovers. The firm-product specifications that shut down the firm factors by firm-year

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[2]Manova (2013) highlights the importance of credit constraints in an international trade context by building on Melitz (2003). While she focuses on the effect of credit constraints on the extensive and intensive margins of exporting, I focus on the intensive margin of domestic operations.

[3]Even though these papers' conclusions seem contradictory, they use different methodologies and examine different countries and time periods.

[4]I confirm the findings of Hummels et al. (2014) and show that export demand shocks influence firms' average wages positively in Turkey–see Section 4.2.3.

fixed effects reveal a strong link, and thus give support to scale effects. Nevertheless, the positive effect of CAT exports on domestic sales suggests that factors unrelated to production (e.g. liquidity constraints) also contribute to the link between sales in different markets. The results are informative as in a world that is increasingly integrated through supply-chains, exogenous foreign demand shocks can have large spillover effects in home countries. When these shocks are negative, firms' sales to their home market can be adversely affected as well, hinting to policy recommendations that encourage product-market diversification.

Second, by analyzing the relationship between firms' sales in different markets, this paper is related to a newly growing literature that seeks to deduce firms' cost structures. Papers in this literature argue that the constant marginal cost assumption made by traditional trade models might not be correct due to, for example, capacity constraints which would entail increasing marginal costs. Vannoorenberghe (2012), Soderbery (2014), Ahn and McQuoid (2017), and Almunia et al. (2018) are works that argue for increasing marginal costs that generate a substitutable relationship between firms' sales in different markets. A model with liquidity constraints, on the other hand, can produce a complementary relation between sales in different markets. This is what is proposed by Berman et al. (2015) as an explanation for their finding: an exogenous increase in exports allows the firm use the surplus cash-flow to expand domestic operations by causing a downward shift in the firm's marginal cost curve. Models of firm dynamics with liquidity constraints such as the ones developed by Cooley and Quadrini (2001) and Kohn et al. (2016) would also predict a positive relationship between exports and domestic sales due to cash flow fluctuations.[5]

The rest of the paper is organized as follows. In Section 2, I explain the empirical identification strategy to analyze the effect of export demand shocks on domestic sales, as well as the strategy to identify the channels that link firms' sales in different markets. Section 3 describes the data. Section 4 provides the results with robustness checks. Finally, Section 5 concludes.

2 Identification Strategy

In this section, I present the methodology used to examine whether exogenous export demand shocks have an effect on firms' domestic sales. Note that there might be reverse causality between a firm's domestic sales and exports. For instance, an exogenous demand shock at home that affects domestic sales can also have spillover effects on firms' exports in the short-run. Thus, the identification strategy relies on instrumenting exports so that the variation comes only from exogenous sources. In fact, Appendix Table A1 shows a negative and significant coefficient for exports using OLS, indicating that there might be endogenous substitution between sales in different markets, which might be confounding the causal effect that this paper is interested in.

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[5]This paper is also indirectly related to the vast literature on "learning by exporting." See, for example, De Loecker (2007, 2011, 2013) who builds on the TFP estimation literature, and Atkin et al. (2017) who use a randomized experiment. Most papers in that literature examine the effect of exporting for the first time (extensive margin) on firm productivity, while my paper analyzes the effect of a change in exports (intensive margin) on domestic sales. Even though less likely in the short-run, one of the channels that can explain the relationship between sales is this "learning" effect.

As a preliminary step, I first run the 2SLS regressions at the firm level with robustness checks including a difference-in-differences analysis. Then, I turn to the main contribution of this paper and dig deeper by (i) examining the relationship at the firm-product level, and (ii) separating exports into produced versus CAT exports to illuminate the channel.

2.1 At the firm level

The first and second stages of the firm-level regressions respectively are:

$$\ln X_{it} = \alpha \ln FD_{it} + \theta \ln DD_{it} + \mu_i + \delta_{nt} + \nu_{it}, \tag{1}$$

$$\ln Y_{it} = \beta \widehat{\ln X_{it}} + \gamma \ln DD_{it} + \mu_i + \delta_{nt} + \epsilon_{it}, \tag{2}$$

where $\ln Y_{it}$ is domestic sales of firm i in year t, $\widehat{\ln X_{it}}$ is the predicted value of log exports from equation (1), μ_i and δ_{nt} are firm and sector-year fixed effects (FE) respectively, and ν_{it} and ϵ_{it} are errors that are potentially serially correlated.[6] Throughout all firm-level regressions, I use firm FE to examine within-firm variation in sales, and sector-year FE to control for sector-wide supply and demand shocks (and price levels) that might drive exports and domestic sales simultaneously.

The identification strategy relies on an exogenous demand shock in the importing country boosting the firm's exports. For this, I follow the methodology proposed by Hummels et al. (2014) and Berman et al. (2015), and instrument exports with the following foreign demand, or FD:

$$FD_{it} = \sum_{ch} \omega_{ich} \, (\text{imports})_{cht},$$

where ω_{ich} is the average weight of a country-product ch in firm i's total exports in 2005-14, and imports are importing-country-product-year (cht) specific (and excludes imports from Turkey). This instrument is meant to proxy for a shift in the import demand curve of product-markets that the firm serves.[7] In most settings, the instrument is a strong predictor of firm exports, and satisfies the exclusion restriction since another country's imports from the rest of the world is assumed to be exogenous to a single firm in a third-country. Still, demand shocks might be correlated across countries; thus, I control for Turkey's product-specific (import) demand with the following domestic demand variable, or DD:

$$DD_{it} = \sum_{h} \eta_{ih} \, (\text{imports})_{TUR,ht},$$

where η_{ih} is the average weight of a product in a firm's total exports in 2005-14, and $(\text{imports})_{TUR,ht}$ is Turkey's imports of product h in year t.

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[6] Here, sector refers to the 2-digit NACE (*Nomenclature Statistique des Activités Économiques dans la Communauté Européenne*) of the firm's self-reported primary industry.

[7] This type of exogenous demand shock proxy is widely used in the heterogeneous firms and trade literature, including how it affects firms' product allocation as in Mayer et al. (2016).

As an alternative dependent variable, I use *produced* domestic sales (domestic sales of products that are produced by the firm itself), which is simply total produced sales minus total produced exports. As shown in Table 1, firms also have domestic CAT sales.[8] This differentiation is important to get a glimpse at whether the underlying mechanism between sales in different markets is via production synergies. I estimate the above system using 2SLS and cluster standard errors by firms since ϵ_{it} might be serially correlated. Looking at equation (2), a negative and significant β coefficient would support the capacity constraints hypothesis, whereas a positive and significant β would reveal that the relationship is due to liquidity constraints and/or efficiency gains.

Note that especially for the liquidity constraint channel, it is crucial that the effect is symmetric. In other words, a credit-constrained firm whose export cash flow is negatively affected should be as likely to alter its domestic operations as when its export cash flow gets a boost. To check for this, I interact the exports variable with a dummy that indicates whether the exports have risen over the previous year. Also, since smaller firms are more likely to be credit constrained, I run additional regressions by interacting the exports variable with a dummy that indicates whether the firm is large (i.e. have at least the mean number of employees: 125).

As an additional robustness check, I use the great trade collapse (GTC) of 2008-09 as a quasi-natural experiment to identify the effect of a decrease in exports on domestic sales. Noting that Turkey's exports to the EU were the most heavily affected compared to other destinations, I calculate an exposure index based on the average share of a firm's exports to the EU before the crisis (in 2005-07). Then, I run the following difference-in-differences regression at the firm level:

$$\ln Y_{it} = \beta \left(\text{GTC}_t * \text{Exposed}_i \right) + \gamma \ln DD_{it} + \mu_i + \delta_{nt} + \epsilon_{it}, \tag{3}$$

where GTC_t is a dummy that equals 1 for years 2008 and 2009, and Exposed_i indicates whether the firm's average share of exports to the EU in 2005-07 was at least 40 percent (the mean value). A negative and significant β would suggest that firms that were more exposed to the GTC lowered their domestic sales relatively more.

2.2   Identifying the channel

There are three main mechanisms that can generate a relationship between firms' sales in different markets. I describe them below, and explain in detail how my methodology can identify them in the following subsections.

The first, and perhaps the most obvious, channel is capacity constraints. This channel would predict a negative relationship between sales at home and abroad as firms would have to cut back in other markets in order to serve the expanding market (or boost sales in other markets in order to compensate for the declining market: "venting-for-surplus"). Theoretically, this type of relationship, which is likely to be strongest in the short-run, can be generated with a model with increasing marginal

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[8]Since I do not observe non-produced domestic sales at the product-level, these domestic CAT sales might also include non-manufactured goods such as agricultural products and services.

costs as in Vannoorenberghe (2012), Soderbery (2014), Ahn and McQuoid (2017), and Almunia et al. (2018). I test for this channel by shutting down firm factors and examining the relationship at the firm-product level, where capacity constraints would play a large role.

The second channel is liquidity constraints whereby an exogenous increase in exports would provide the firm with extra cash flow to expand domestic operations. In addition, these extra exports can allow the firm to get credit (or cheaper credit) by using exports as collateral. This channel predicts a positive relationship between sales in different markets, and is especially important for small firms who are likely to be more credit constrained,[9] particularly in a developing country like Turkey where "access to finance" was chosen as one of the top obstacles to business according to the The World Bank's (2013) Enterprise Surveys on Turkey. Theoretically, this type of transmission mechanism can be generated by dynamic firm models with financial frictions such as the ones developed by Cooley and Quadrini (2001) and Kohn et al. (2016). I test for this mechanism by separating produced versus non-produced (or CAT) exports, and examine the differential effect at the firm level. This novel approach is advantageous as it allows me to focus on an exogenous change in cash flow that is not related to production. Thus, finding a positive link between a firm's CAT exports and domestic sales would mean that the mechanism can be at least partly explained by the easing of liquidity constraints.

The third channel is efficiency or productivity gains through exporting, also known as "learning by exporting." This can be both at the firm and firm-product level, and it would generate a positive relationship between exports and domestic sales, as an exogenous increase in exports would cause the firm to become more efficient. This paper is chiefly interested in the short-run relationship between exports and domestic sales, where this learning can be characterized by firm-product-specific efficiency gains through scale effects (moving along the marginal cost curve). I test for this channel by examining the relationship at the firm-product level. Also, to get a glimpse at how the firm uses the extra cash, I analyze the effect of exogenous export demand shocks on firms' employment, wages per employee, and investment. Positive links between exogenous changes in cash flow and these elements would indicate that the previously constrained firm is now able to expand to reach its optimal size.

2.2.1 At the firm-product level

In order to see whether capacity constraints or product-specific efficiency gains play a role, and since the majority of firms produce and export multiple products (88 percent of manufacturing firms in 2010), I now turn to regressions at the more disaggregate firm-product level. Note that in these estimations, products that are sold exclusively to the domestic market or exported à la CAT are dropped. Thus, I am only examining firm-products that are produced and sold both domestically and abroad.

The first and second stages for the firm-product regressions are:

$$\ln X_{iht} = \alpha \ln FD_{iht} + \theta \ln DD_{ht} + \mu_{ih} + \delta_{it} + \nu_{iht}, \tag{4}$$

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[9]Among others, Beck et al. (2005) and Forbes (2007) show that smaller firms face tighter credit constraints.

$$\ln Y_{iht} = \beta \ \widehat{\ln X_{iht}} + \gamma \ln DD_{ht} + \mu_{ih} + \delta_{it} + \epsilon_{iht}, \tag{5}$$

where $\ln Y_{iht}$ is domestic sales of firm i product h (classified at the Harmonized Schedule (HS6+) level as described in Section 3) in year t, $\widehat{\ln X_{iht}}$ is the predicted value of log exports from equation (4), μ_{ih} and δ_{it} are firm-product and firm-year fixed effects respectively, and ν_{iht} and ϵ_{iht} are errors that are potentially correlated within firm observations. I use firm-product FE to partial-out inherent firm-product efficiency, and firm-year FE to control for time-varying firm productivity. Including firm-year FE means that the identification relies on multi-product producers' sales variation. Moreover, it allows me to shut down time-varying firm factors such as liquidity constraints and managerial efficiency, and pinpoint the transmission mechanism. As before, I estimate the above system using 2SLS, clustering standard errors by firms.[10]

The instrument for export sales becomes:

$$FD_{iht} = \sum_c \omega_{ich} \ (\text{imports})_{cht},$$

where ω_{ich} is the average weight of a country in a firm's total exports of a product in 2005-14, and imports are importing-country-product-year specific (and excludes imports from Turkey). Like before, I control for Turkey's (import) demand in the second-stage with the domestic demand (DD_{ht}) variable that is proxied by Turkey's imports of product h. If the estimated β is negative, then capacity constraints play a role; if it is positive, then the culprit is product-specific efficiency gains through scale effects.

Taking advantage of the dataset's richness, and since imports might not pick up domestic demand fluctuations perfectly, I also use an alternative proxy variable based on non-exporters' product-specific sales (which are by definition all domestic sales).[11] As additional robustness checks, I use weights based on firms' first year of exporting (initial weights), and use an additional instrument based on destination-product MFN tariffs to test for over-identifying restrictions. The tariff instrument, which is assumed to be exogenous to firms in Turkey, is constructed analogous to the main instrument as detailed in Appendix Section A2. Finally, I do a difference-in-differences analysis using the great trade collapse as in the firm-level regressions, but this time a firm-product is labeled as exposed if its pre-crisis exposure share is at least 25 percent (the mean value in the sample).

2.2.2 Produced and CAT exports separated

The methodology described above in Section 2.2.1 excludes non-produced (CAT) exports. In this section, I focus on the effect of a change in a firm's CAT exports which proxies for a change in cash flow (or equivalently liquidity constraint). Importantly, a change in CAT exports should not affect

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[10]An alternative strategy by clustering multi-way at the firm and HS6+ level to control for correlated errors along multiple non-nested groups (as suggested by Cameron et al., 2011) is also presented.

[11]Note that to get a consistent β coefficient, the domestic demand variable is necessary only to control for the part of the domestic demand shock that is correlated with the export demand shock. Thus, it does not need to perfectly capture domestic demand conditions.

the physical productivity (or manufacturing ability) of the firm. A positive and significant coefficient on produced exports would support the hypothesis that the complementarity is due to efficiency gains through scale effects, whereas a positive and significant coefficient on CAT exports would imply that the complementarity is due to firm-level spillovers such as the easing of liquidity constraints.[12]

Here, I construct FD_{it} that are specific for produced and CAT exports to get FDP_{it} and FDC_{it}, and estimate separate 2SLS regressions for produced versus CAT exports. I do not include both types of exports in the same specification as the instruments FDP_{it} and FDC_{it} are highly correlated (0.45), resulting in substantial efficiency loss.

3   Data

I use three main datasets in this paper. First is the *Industry and Services Statistics* database which has annual firm-level statistics such as total sales, employment, wage bill, investment, and costs for all firms that have at least 20 employees for the period 2003-14.[13] I use this dataset mainly to infer firms' total domestic sales. The second dataset is the *Foreign Trade Statistics* database which is the customs data that reports exports and imports (both values and volumes) at the firm-country-product level for the 2002-14 period. Products are classified at the 12-digit GTIP (*Gümrük Tarife İstatistik Pozisyonu*) level, but I collapse it to the internationally standardized 6-digit Harmonized Schedule (HS) level for the empirical analysis. To make sure that the set of products are defined consistently over the sample period, I concord the trade data overtime to the HS2007 nomenclature using Pierce and Schott's (2009) algorithm and the HS correspondence tables from the UN Statistics Division.

Most of the empirical international trade literature utilize the combination of the above mentioned two types of datasets. I use an additional unique dataset, *Industry Production Statistics*, that allows me to observe the value and volume of production and sales of each product that is produced by manufacturers in Turkey for the 2005-14 period. Products are classified according to the 10-digit PRODTR classification and are concorded overtime by the Turkish Statistical Institute (TÜİK) to the 2010 classification. In order to match the production data with the trade data, I apply the algorithm developed by Van Beveren et al. (2012) to the PRODTR-GTIP correspondence tables provided by TÜİK at the HS6 level and create uniform HS6+ codes. These are codes that match one-to-one to HS6 codes as well as codes that include multiple HS6 codes to fix the issue of one-to-many and many-to-many PRODTR-HS6 matches. Combined with the overtime concordance, this results in 2,572 HS6+ products as opposed to 4,622 HS6 products (in manufacturing).

There are 545,651 unique firms from all sectors in the *Industry and Services Statistics* database in 2005-14. Since this study is interested in the manufacturing sector, I merge this data with *Industry Production Statistics* to get 53,191 unique manufacturing firms. Then, I use the subset of

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[12]Alternatively, a negative and significant coefficient on produced exports (but not on CAT exports) would give support to capacity constraints.

[13]The database also includes firms that have less than 20 employees but these firms are not required to participate in the census, and thus are not consistently in the database for all years.

Table 1: Summary statistics, 2005-14

	mean	median	sd.
Export share	0.20	0.10	0.24
CAT share	0.54	0.60	0.42
Total sales	51.75	8.80	434.78
Total exports	9.71	0.76	100.44
Produced exports	5.36	0.09	77.98
Domestic sales	42.04	6.70	372.41
Produced domestic sales	36.49	6.95	263.03
Imports	16.23	0.33	247.51
Investment	3.61	0.22	63.99
Number of workers	144	50	534
Wages per worker	15,712	11,913	12,627
Number of produced HS6+	2.2	1	2.2
Number of exported HS6+	9.3	4	17.3

Notes: The summary statistics are for the benchmark sample used in Table 2 column (1). The number of observations is 85,043, with 21,926 unique firms. CAT share is the share of non-produced exports in total exports. Values of sales, exports, imports, and investment are in millions of Turkish liras. Wages per worker are in Turkish liras.

manufacturing firms that have exported at least once in 2005-14; this gives me 26,738 firms. Further restricting the sample to firms with at least 20 employees results in 25,230 firms. In addition, in order to exclude unreliable data, I drop observations where exports are larger than total sales, or where production sales (the sum of firm-product level sales) are larger than total sales, to get 24,451 firms. Finally, I keep firms that have produced and exported at least one manufactured good in 2005-14 to exclude firms that export only non-manufactured products (i.e. agriculture and raw materials). This results in 21,926 unique firms which make up about two-thirds of manufacturing sales and half of all manufacturing exports and imports.

Table 1 shows key summary statistics for my sample. Note that the average (median) export share (exports/sales) of exporters in the sample is 20 (10) percent. The majority of firms export less than 10 percent of their sales and this share increases monotonically. This share is similar at the firm-product level when the set of products consists of goods produced and sold in both domestic and foreign markets. However, since I do not observe domestic sales of non-produced goods at the firm-product level, it is not clear whether non-produced exported goods (CAT products) have a similar export share. I infer total domestic sales by subtracting total exports from total sales, and infer produced domestic sales by subtracting total produced exports from total produced sales.

It is important to emphasize the role of CAT in the Turkish economy as this will be crucial in identifying the non-production related factors that influence firms' domestic sales. As shown in Table 1, the median firm is a single-good producer, but a multi-product exporter. Similar to the findings of Bernard et al. (forthcoming) for Belgian firms, I find that CAT is also prevalent in Turkey: about

90 percent of manufacturing exporters export at least one good (HS6+) that they do not produce. However, when compared to Belgium, CAT in Turkey, a large developing country, is more substantial in terms of value, as these exports make up 43 percent manufacturing firm exports in 2010, as opposed to 30 percent that was found for Belgian firms in 2005 by Bernard et al. (forthcoming). Other papers that show the ubiquity of CAT include Abreha et al. (2013), Di Nino (2015), and Arnarson (2016), for Danish, Italian, and Swedish firms respectively.

For the construction of the instruments and the controls, I use trade data from UN Comtrade and tariff data from UNCTAD's TRAINS.

4 Results

4.1 Results for the firm level

Table 2 shows the 2SLS results. The first two columns have total domestic sales as the dependent variable. Column (1) shows that an exogenous doubling of exports increases a firm's domestic sales by 22 percent, larger than the magnitude of 14 percent found for French firms by Berman et al. (2015). In benchmark column (2), since imports are certainly related to domestic sales and possibly correlated with export demand shocks, I control for firm imports, and find a similar coefficient at the magnitude of 26 percent. Columns (3) and (4) use produced domestic sales as the dependent variable and show similar results, indicating that the effect goes through the firm's domestic sales of "own" goods.[14] Domestic demand and imports have the expected positive and significant coefficients in almost all regressions, and the F-stat version of the Kleibergen-Paap (KP) statistic shows that the instrument is strong as the KP stats are higher than the critical value of 16.4 based on a 10 percent maximal IV size in all columns. Overall, these results already rule out that capacity constraints are the driving force behind the exports-domestic sales relationship.[15] Appendix Table A2 shows that the results in Table 2 are robust to using initial weights, having an alternative domestic demand proxy based on non-exporters' domestic sales, as well as including an additional instrument based on tariffs.[16]

Is the positive relationship between sales at home and abroad symmetric? Table 3 column (1) shows that the relationship is symmetric, with positive growth having a slightly lower effect in magnitude. Column (3) has produced domestic sales as the dependent variable and confirms the results. The finding that the relationship is positive and symmetric gives support to liquidity constraints and/or product-specific scale effects. Both positive and negative changes in cash flow would affect a firm either directly by altering its working capital or indirectly by changing is borrowing ability. Similarly, increasing returns to scale at the product level would indicate that exogenous changes in demand might push the firm into higher or lower segments of the marginal cost curve. On the other hand, the

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[14]The non-produced domestic sales can include domestic-CAT, sales of non-manufactured goods (i.e. agricultural products), and services.

[15]In unreported results, I find that the effect is larger for firms with higher export shares (exports/sales), revealing that sales synergies occur more intensely when exports make a non-negligible share of firms' sales. For a firm whose sales are equally divided between home and foreign markets, the coefficient on Table 2 column (2) rises to 0.77.

[16]Appendix Table A3 has the corresponding first-stage results.

Table 2: Effect of export demand shocks at the firm level

Dep. variable:	ln total domestic sales$_{it}$		ln produced domestic sales$_{it}$	
	(1)	(2)	(3)	(4)
ln exports$_{it}$	0.218***	0.256***	0.238***	0.232**
	(0.066)	(0.096)	(0.066)	(0.094)
ln DD_{it}	0.044***	0.034**	0.027**	0.018
	(0.012)	(0.015)	(0.012)	(0.013)
ln imports$_{it}$		0.040***		0.053***
		(0.014)		(0.013)
First-stage				
ln FD_{it}	0.094***	0.080***	0.095***	0.081***
	(0.016)	(0.019)	(0.016)	(0.019)
ln DD_{it}	-0.021	-0.009	-0.020	-0.009
	(0.028)	(0.031)	(0.028)	(0.032)
ln imports$_{it}$		0.138***		0.137***
		(0.006)		(0.006)
Observations	85,043	65,496	84,917	65,409
R^2	0.91	0.91	0.92	0.92
KP-stat.	33.99	17.22	34.31	17.43

Notes: Standard errors clustered by firms are in parentheses. All regressions are estimated with 2SLS and include firm and sector-year fixed effects. Sector refers to the 2-digit NACE of each firm. The critical value of the Kleibergen-Paap (KP) statistic based on a 10 percent maximal IV size is 16.38. ***, **, and * denote statistical significance at the 1, 5, and 10 percent levels respectively.

positive and symmetric finding rules out that capacity constraints or "learning by exporting" are the drivers of the link between exports and domestic sales. Capacity constraints should have generated a negative coefficient only for positive exogenous changes in exports. The learning by exporting hypothesis argues that exporting activity causes the firm to be more productive, but it does not claim that decreased exporting activity would cause the firm to be less productive, making the relationship direction-specific.

Does firm size in terms of employment play a role? The literature indicates that small firms are more likely to be credit constrained, and thus the liquidity constraint channel is undoubtedly more important for them. Table 3 column (2) indicates that firms benefit from the complementary relationship regardless of size.[17] However, the effect for large firms is lower, as a doubling of exports increases their domestic sales by 19 percent on average, compared to 30 percent for smaller firms. This is in line with the hypothesis that small firms have more to gain from extra cash flow to expand their domestic operations. Column (4) with produced domestic sales shows a similar result. The direction

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[17]Here, *large firm* is a dummy that equals 1 if the firm had at least 125 employees (mean value in the sample) in its initial year of exporting in 2005-14.

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Table 3: Direction of export growth and firm size

Dep. variable:	ln total domestic sales$_{it}$		ln produced domestic sales$_{it}$	
	(1)	(2)	(3)	(4)
ln exports$_{it}$	0.385**	0.297***	0.374**	0.269***
	(0.151)	(0.104)	(0.150)	(0.100)
ln exports$_{it}\times$	-0.025***		-0.021**	
(+) export growth$_{it}$	(0.009)		(0.009)	
ln exports$_{it}\times$		-0.102***		-0.117***
large firm$_i$		(0.036)		(0.033)
ln DD_{it}	0.035**	0.031**	0.028*	0.015
	(0.018)	(0.015)	(0.016)	(0.013)
ln imports$_{it}$	0.024	0.038***	0.033*	0.051***
	(0.018)	(0.014)	(0.018)	(0.014)
Observations	44,383	65,496	44,325	65,409
R^2	0.91	0.90	0.91	0.92
KP-stat.	6.04	8.35	6.05	8.47

Notes: (+) export growth$_{it}$ is a binary variable that is 1 if the firm's exports has increased over the previous year. large firm$_i$ is a binary variable that is 1 if the firm had 125 employees or more (the mean value in the sample) in its initial export year. Standard errors clustered by firms are in parentheses. All regressions are estimated with 2SLS and include firm and sector-year fixed effects. Sector refers to the 2-digit NACE of each firm. The critical value of the Kleibergen-Paap (KP) statistic based on a 10 percent maximal IV size is 7.03. ***, **, and * denote statistical significance at the 1, 5, and 10 percent levels respectively. See Appendix Table A4 for the corresponding first-stage results.

of the effects for firm size is similar to the findings of Berman et al. (2015).[18]

As an additional robustness check, I use the great trade collapse (GTC) of 2008-09 and do a difference-in-difference analysis as explained in Section 2.1. Figure 1 panel (a) reveals that Turkey's exports to its top trading-partner EU was affected more adversely than its exports destined to other countries in 2008-09. Figure 1 panel (b) shows how the domestic sales of firms evolved depending on whether they were exporting to the EU before the crisis hit. Notice how the domestic sales of all firms had a similar increase between 2005 and 2007. Then, in 2008, firms with EU-exposure had relatively flat domestic sales, while others increased their domestic sales.[19] Even though the crisis in 2009 affected almost all firms' domestic sales, firms with no exposure to the EU fared relatively better and continued increasing their domestic sales in the subsequent years as well. These figures point to a positive relationship between adverse export demand shocks and poor domestic sales.

Table 4 has the results from estimating equation (3). Column (1) shows that a firm that was highly exposed to the EU market before the GTC had about 2 percent lower domestic sales during the

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[18]In unreported results, I interact exports with a dummy indicating whether the 2-digit NACE sector is credit-dependent. For this, I use Rajan and Zingales (1998) measures of *external finance dependence* and *asset tangibility* (also used by Manova, 2013), and separate industries into two groups based on the median of the relevant measure. Regression results show that the interaction is not statistically significant, and thus the positive relationship is not driven by credit-dependent sectors–these results are available upon request.

[19]I use the 40 percent threshold in Figure 1 to label high exposure firms as it is the mean share of exporters in my sample in 2005-07.

GTC when compared to exporters not as exposed to the EU market. Column (2) shows that, when the dependent variable is changed to produced domestic sales, the coefficient loses its significance but retains its sign. Overall, the results in this section corroborate that the relationship is complementary. The next section aims to shed light on these findings, and identify the channels that link sales.

Figure 1: The great trade collapse of 2008-09 and domestic sales at the firm level

(a) Turkey's exports

(b) Evolution of domestic sales
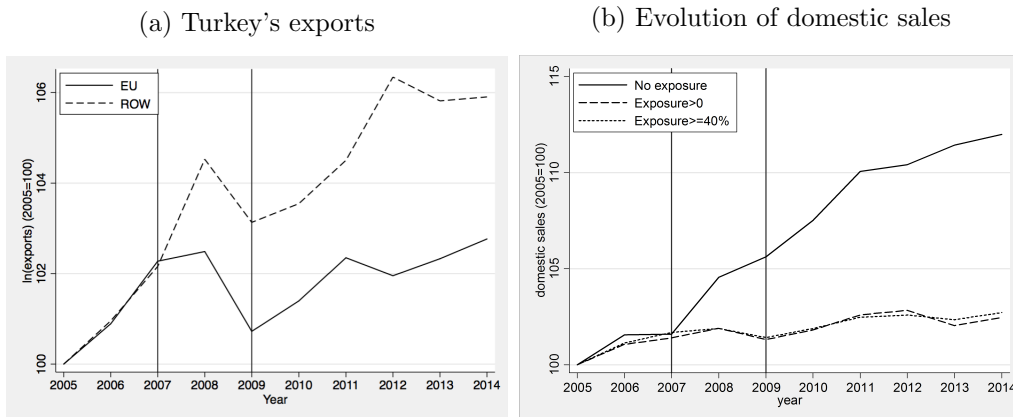
Notes: Panels (a) and (b) have ln(exports) and ln(domestic sales) indexed at 100 for 2005 on the y-axis respectively. In panel (b), exposure to the EU is based on a firm's average share of exports destined to the EU in 2005-07.

Table 4: The great trade collapse of 2008-09 (firm level)

Dep. variable:	ln total dom. sales$_{it}$	ln prod. dom. sales$_{it}$
	(1)	(2)
GTC$_t \times$ Exposed$_i$	-0.021**	-0.009
	(0.010)	(0.009)
ln DD_{it}	0.040***	0.023**
	(0.010)	(0.010)
Observations	87,715	87,584
R^2	0.94	0.94

Notes: GTC$_t$ is a dummy that is 1 for years 2008-09, and Exposed$_i$ is a dummy that is 1 if the firm's average share of exports to the EU in 2005-07 was at least 40 percent. Standard errors clustered by firms are in parentheses. All regressions include include firm and sector-year fixed effects. Sector refers to the 2-digit NACE of each firm. ***, **, and * denote statistical significance at the 1, 5, and 10 percent levels respectively.

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Table 5: Effect of export demand shocks at the firm-product level

Dep. variable:	no firm-year FE	benchmark	multi-cluster	alternative DD_{ht}	initial weights	+ tariff IV
$\ln \text{prod. dom. sales}_{iht}$	(1)	(2)	(3)	(4)	(5)	(6)
$\ln \text{exports}_{iht}$	0.241***	0.416**	0.416**	0.646**	0.392**	0.430**
	(0.090)	(0.168)	(0.174)	(0.295)	(0.161)	(0.168)
$\ln DD_{ht}$	0.057***	0.083***	0.083***	-0.009	0.083***	0.082***
	(0.011)	(0.024)	(0.025)	(0.015)	(0.024)	(0.024)
$\ln DTAR_{ht}$						0.097
						(0.091)
First-stage						
$\ln FD_{iht}$	0.120***	0.161***	0.161***	0.122***	0.170***	0.160***
	(0.019)	(0.040)	(0.048)	(0.041)	(0.042)	(0.040)
$\ln DD_{ht}$	0.017	0.024	0.024	0.020	0.022	0.023
	(0.018)	(0.030)	(0.034)	(0.014)	(0.031)	(0.030)
$\ln FTAR_{iht}$						-0.030
						(0.044)
$\ln DTAR_{ht}$						0.017
						(0.096)
Cluster	Firm	Firm	Firm & Product	Firm	Firm	Firm
Fixed effects	Firm-product & Year	Firm-product & Firm-year	Firm-product & Firm-year	Firm-product & Firm-year	Firm-product & Firm-year	Firm-product & Firm-year
Observations	84,270	84,270	84,270	80,299	84,270	84,123
R^2	0.90	0.97	0.97	0.96	0.97	0.96
KP-stat.	38.72	16.28	11.12	8.69	16.77	8.19
Hansen-p	.	.	.	.	.	0.95

Notes: Clustered standard errors are in parentheses. All regressions are estimated with 2SLS. Products are at the HS6+ level. The critical value of the Kleibergen-Paap (KP) statistic based on a 10 (15) percent maximal IV size is 16.38 (8.96) for columns (1)-(5), and 19.93 (11.59) for column (6). ***, **, and * denote statistical significance at the 1, 5, and 10 percent levels respectively.

4.2 What are the mechanisms that link exports and domestic sales?

4.2.1 Results for the firm-product level

Thus far, the results have shown that an exogenous demand shock to exports affects domestic sales positively at the firm level. In this section, in order to illuminate the channels, I focus on the relationship between exports and domestic sales at the firm-product level.

Table 5 shows the results. In column (1), I use firm-product and year FE, and thus do not control for time-varying firm-level factors such as liquidity constraints. The coefficient is 0.24, similar to the one found in the firm-level regressions. However, the coefficient on exports in column (2), where all firm factors are controlled with firm-year FE, indicates that an exogenous doubling of exports of a firm's product increases the domestic sales of that specific product by 42 percent–this is 62 percent larger than the 26 percent effect found at the firm level in Table 2 column (2). Note the strict firm-product and firm-year FE here, indicating that the only variation I am examining is the time-variation within a firm-product for multi-product firms that sell the same HS6+ to both markets. In column (3), I multi-cluster the standard errors by firms and products to control for correlated product shocks, and despite a slight uptick in standard errors, the results stay the same. In column (4), I use an alternative domestic demand proxy based on non-exporters' sales, and find a larger coefficient, with the caveat that the domestic demand variable loses its significance. In column (5), I use initial instead of average weights, and find a similar coefficient. Finally, column (6) uses tariffs as the second instrument, and shows a significant coefficient with a similar magnitude. Importantly, the Hansen p-value is higher than 0.10, indicating that the over-identification test cannot reject that the instruments are exogenous. The much larger coefficients generated from firm-product level regressions relative to the ones at the firm level suggest that the main link between sales at home and abroad in the short-run is product-specific efficiency gains through scale effects.

In order to check whether firm-product results are driven by scale-intensive sectors, I use Diewert and Fox's (2008) returns-to-scale estimations by SIC (Standard Industrial Classification) sector. They use US data and show robustly that nine out of the 18 manufacturing industries exhibit increasing returns to scale, whereas for the remaining industries constant returns to scale cannot be rejected. I match the SIC industries to HS6+ products by using the crosswalks between SIC-NACE and NACE-HS6 concordance files. In unreported results, I interact exports with a dummy that indicates whether the HS6+ is scale-intensive. These regressions show that the main effect is positive and significant, but the interaction is not statistically significant, revealing that the positive relationship is not driven solely by scale-intensive products.[20]

Table 6 depicts the results for difference-in-differences at the firm-product level. Column (1) uses firm-product and year FE and shows a negative and significant coefficient. However, when I add firm-year FE in column (2), the coefficient loses its significance. This, combined with the results in Table 4 reveals that the firms who were more exposed to the EU lowered their domestic sales during

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[20]These results are available upon request.

the GTC, but not necessarily at the firm-product level. This is likely due to these exposed firms facing even stricter liquidity constraints during the GTC, leading them to shrink their domestic operations of *all* products.

Table 6: The great trade collapse of 2008-09 (firm-product level)

Dep. variable:	ln prod. dom. sales$_{iht}$	
	(1)	(2)
GTC$_t \times$ Exposed$_{ih}$	-0.036**	-0.012
	(0.018)	(0.039)
ln DD_{ht}	0.052***	0.052**
	(0.009)	(0.016)
Fixed effects	Firm-product & Year	Firm-product & Firm-year
Observations	119,774	119,774
R^2	0.89	0.95

Notes: GTC$_t$ is a dummy that is 1 for years 2008-09, and Exposed$_{ih}$ is a dummy that is 1 if the firm-product's average share of exports to the EU in 2005-07 was at least 25 percent. Standard errors clustered by firms are in parentheses. ***, **, and * denote statistical significance at the 1, 5, and 10 percent levels respectively.

4.2.2 Produced and CAT exports separated

In Table 7, the first two columns regress *total* domestic sales on produced and CAT exports, and the last two columns regress *produced* domestic sales on produced and CAT exports. Columns (1) and (2) show that produced and CAT exports increase total domestic sales when they are included by themselves respectively. The coefficient on CAT exports, however, is larger and more precisely estimated. Comparing columns (3) and (4) reveals that the positive relationship between produced domestic sales and exports at the firm level is largely due to the non-produced (or CAT) portion of exports, as produced exports loses its significance in column (3), and the CAT exports coefficient stays significant and almost doubles in magnitude when compared to column (2). In all columns, domestic demand and imports have the expected positive signs and are generally significant. Overall, the coefficients on CAT exports indicate that non-production factors such as liquidity constraints also contribute to the relationship between exports and domestic sales.

4.2.3 Export demand shocks and firm expansion

If the transmission mechanism is due to liquidity constraints, then we should observe that the firm expands due to a positive export demand shock. In fact, Table 8 column (1) shows that a 10 percent increase in exports raises the number of employees of a firm by 1.7 percent. Another way the firm can take advantage of larger exports is to increase its productivity. This can be done by hiring workers

Table 7: Produced and CAT exports separated

Dep. variable:	ln total domestic sales$_{it}$		ln prod. domestic sales$_{it}$	
	(1)	(2)	(3)	(4)
ln produced exports$_{it}$	0.138*		0.036	
	(0.075)		(0.070)	
ln CAT exports$_{it}$		0.231**		0.454**
		(0.116)		(0.179)
ln DD_{it}	0.030**	0.050**	0.013	0.031
	(0.015)	(0.021)	(0.013)	(0.025)
ln imports$_{it}$	0.057***	0.047***	0.078***	0.029
	(0.010)	(0.016)	(0.009)	(0.024)
First-stage				
ln FDP_{it}	0.098***		0.100***	
	(0.027)		(0.027)	
ln FDC_{it}		0.075***		0.069***
		(0.026)		(0.025)
ln DD_{it}	-0.002	0.000	-0.000	-0.007
	(0.037)	(0.052)	(0.037)	(0.051)
ln imports$_{it}$	0.119***	0.131***	0.119***	0.130***
	(0.009)	(0.008)	(0.009)	(0.008)
Observations	45,633	58,860	45,550	58,791
R^2	0.93	0.91	0.95	0.82
KP-stat.	12.95	8.67	13.41	7.67

Notes: Standard errors clustered by firms are in parentheses. All regressions are estimated with 2SLS and include firm and sector-year fixed effects. Sector refers to the 2-digit NACE of each firm. The critical value of the Kleibergen-Paap (KP) statistic based on a 10 (15) percent maximal IV size is 16.38 (8.96). ***, **, and * denote statistical significance at the 1, 5, and 10 percent levels respectively.

with higher productivity, or by investing in more efficient production technologies as in Lileeva and Trefler (2010) and Bustos (2011). Column (2) of Table 8 indicates that firms do pay higher wages when faced with a positive export demand shock. The result in column (1) rules out that this rise in average wages is due to firms firing employees. It must be that firms hire high-skilled workers so that both employment and wages per employee increase. Column (3) reveals that firms also increase their investments when faced with a boost in exports. In addition, the previous result that larger firms benefit less from export shocks can be explained by the fact that they have probably already reached their optimal size.[21] Overall, these results give support to the liquidity constraints hypothesis.

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[21]In fact, running the regressions in Table 8 with firm size interactions show that smaller firms expand more in terms of employment when faced with positive export demand shocks.

Table 8: Impact of exports on firm expansion

Dep. variable:	$\ln \text{employment}_{it}$	$\ln \text{wage per employee}_{it}$	$\ln \text{investment}_{it}$
	(1)	(2)	(3)
$\ln \text{exports}_{it}$	0.168***	0.137***	0.711**
	(0.059)	(0.053)	(0.297)
$\ln DD_{it}$	0.009	0.008	0.088**
	(0.009)	(0.007)	(0.038)
$\ln \text{imports}_{it}$	0.030***	-0.014*	0.093**
	(0.008)	(0.008)	(0.042)
First-stage			
$\ln FD_{it}$	0.080***	0.080***	0.082***
	(0.019)	(0.019)	(0.021)
$\ln DD_{it}$	-0.009	-0.009	-0.006
	(0.031)	(0.031)	(0.033)
$\ln \text{imports}_{it}$	0.138***	0.138***	0.138***
	(0.006)	(0.006)	(0.007)
Observations	65,496	65,496	56,934
R^2	0.93	0.85	0.59
KP-stat.	17.22	17.22	15.13

Notes: Standard errors clustered by firms are in parentheses. All regressions are estimated with 2SLS and include firm and sector-year fixed effects. Sector refers to the 2-digit NACE of each firm. The critical value of the Kleibergen-Paap (KP) statistic based on a 10 (15) percent maximal IV size is 16.38 (8.96). ***, **, and * denote statistical significance at the 1, 5, and 10 percent levels respectively.

5   Conclusion

This paper showed that export demand shocks positively influence firms' domestic sales in a large open developing country, Turkey, and that this result can be explained by (i) product-specific scale effects and (ii) the easing of liquidity constraints at the firm level. By instrumenting firms' exports with destination-product specific demand levels, I found that an exogenous doubling of exports increases a firm's domestic sales by 26 percent on average. Results showed that this effect exists for both positive and negative changes in exports, and is larger for smaller firms. Using the great trade collapse of 2008-09 as a quasi-natural experiment, I found that Turkish firms that were more exposed to the EU in terms of their exports before the crisis had lower domestic sales during the crisis when compared to other firms, corroborating the earlier results.

By analyzing the relationship at the firm-product level, I found that the complementary relationship between sales at home and abroad can largely be explained by same-product efficiency gains through scale effects, with coefficients that are 62 percent larger than the ones found at the firm level. Still, by separating exports into produced and non-produced (or CAT) exports, I found that CAT exports also have an effect on domestic sales, hinting to the importance of non-production related firm-level spillovers such as liquidity constraints. Additional results on employment and investment

suggest that temporary export demand shocks can influence firm-level expansion.

This paper contributes to the literature by identifying the channels between firms' sales in different markets. Findings in this paper emphasize the scale effects that are generated by exogenous increases in demand, and also indicate that the average firm might be liquidity constrained in Turkey during the 2005-14 period. Policy implications for this paper hint to supporting exposed small-and-medium enterprises (SMEs), such as through subsidized credit, during "bad times" abroad, especially in important trading partner destinations. Another implication of my results is the importance of export-market diversification in order to suppress the potential adverse affects of recessions abroad. Future research should delve deeper and examine spillover effects between different export markets to better understand firms' profit maximization strategies when marginal costs are not constant.

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Appendix

A1. Additional results

Table A1: OLS results

Dep. variable:	ln total dom. sales$_{it}$		ln prod. dom. sales$_{it}$		ln prod. dom. sales$_{iht}$
	(1)	(2)	(3)	(4)	(5)
ln exports$_{it}$	-0.027***		0.019***		
	(0.003)		(0.002)		
ln exports$_{iht}$					0.043***
					(0.009)
ln prod. exports$_{it}$		-0.021***		-0.027***	
		(0.003)		(0.002)	
ln CAT exports$_{it}$		-0.008***		0.049***	
		(0.003)		(0.002)	
ln DD_{it}	0.032***	0.062***	0.016	0.040**	
	(0.012)	(0.020)	(0.011)	(0.018)	
ln DD_{iht}					0.095***
					(0.022)
ln imports$_{it}$	0.079***	0.077***	0.082***	0.079***	
	(0.003)	(0.004)	(0.002)	(0.003)	
Fixed effects	Firm & Sector-year	Firm & Sector-year	Firm & Sector-year	Firm & Sector-year	Firm-product & Firm-year
Observations	66,684	40,407	66,596	40,340	89,198
R^2	0.94	0.95	0.95	0.96	0.97

Notes: Standard errors clustered by firms are in parentheses. Sector refers to the 2-digit NACE of each firm. Products are at the HS6+ level. ***, **, and * denote statistical significance at the 1, 5, and 10 percent levels respectively.

Table A2: Sensitivity analyses at the firm level

(a) Dep. variable: $\ln \text{total domestic sales}_{it}$

	initial weights	alternative DD_{it}	+ tariff IV
	(1)	(2)	(3)
$\ln \text{exports}_{it}$	0.304**	0.270***	0.253***
	(0.123)	(0.099)	(0.094)
$\ln DD_{it}$	0.039**	0.015**	0.034**
	(0.017)	(0.006)	(0.015)
$\ln \text{imports}_{it}$	0.034*	0.038***	0.041***
	(0.017)	(0.014)	(0.013)
$\ln DTAR_{it}$			0.041
			(0.032)
Observations	65,496	65,284	65,496
R^2	0.89	0.90	0.91
KP-stat.	12.30	17.19	8.85
Hansen-p	.	.	0.89

(b) Dep. variable: $\ln \text{produced domestic sales}_{it}$

	initial weights	alternative DD_{it}	+ tariff IV
	(1)	(2)	(3)
$\ln \text{exports}_{it}$	0.259**	0.237**	0.240**
	(0.111)	(0.094)	(0.092)
$\ln DD_{it}$	0.016	0.008	0.018
	(0.014)	(0.005)	(0.013)
$\ln \text{imports}_{it}$	0.049***	0.052***	0.052***
	(0.015)	(0.013)	(0.013)
$\ln DTAR_{it}$			0.006
			(0.028)
Observations	65,409	65,197	65,409
R^2	0.92	0.92	0.92
KP-stat.	12.50	17.41	8.95
Hansen-p	.	.	0.55

Notes: Standard errors clustered by firms are in parentheses. All regressions are estimated with 2SLS and include firm and sector-year fixed effects. Sector refers to the 2-digit NACE of each firm. The critical value of the Kleibergen-Paap (KP) statistic based on a 10 (15) percent maximal IV size is 16.38 (8.96) for columns (1) and (2), and 19.93 (11.59) for column (3). ***, **, and * denote statistical significance at the 1, 5, and 10 percent levels respectively. See Table A3 for the corresponding first-stage results.

Table A3: First-stage results for Table A2

(a) Dep. variable: $\ln$ total domestic sales$_{it}$

Instrumented var:	initial weights	alternative DD_{it}	+ tariff IV
$\ln$ exports$_{it}$	(1)	(2)	(3)
$\ln FD_{it}$	0.075***	0.080***	0.081***
	(0.021)	(0.019)	(0.019)
$\ln DD_{it}$	-0.020	-0.003	-0.009
	(0.033)	(0.011)	(0.031)
$\ln$ imports$_{it}$	0.138***	0.138***	0.138***
	(0.006)	(0.006)	(0.006)
$\ln FTAR_{it}$			-0.017
			(0.020)
$\ln DTAR_{it}$			-0.026
			(0.074)
Observations	65,496	65,284	65,496
R^2	0.89	0.90	0.91
KP-stat.	12.30	17.19	8.85
Hansen-p	.	.	0.89

(b) Dep. variable: $\ln$ produced domestic sales$_{it}$

Instrumented var:	initial weights	alternative DD_{it}	+ tariff IV
$\ln$ exports$_{it}$	(1)	(2)	(3)
$\ln FD_{it}$	0.076***	0.081***	0.082***
	(0.021)	(0.019)	(0.019)
$\ln DD_{it}$	-0.019	-0.003	-0.009
	(0.033)	(0.011)	(0.032)
$\ln$ imports$_{it}$	0.138***	0.137***	0.137***
	(0.006)	(0.006)	(0.006)
$\ln FTAR_{it}$			-0.017
			(0.020)
$\ln DTAR_{it}$			-0.024
			(0.074)
Observations	65,409	65,197	65,409
R^2	0.92	0.92	0.92
KP-stat.	12.50	17.41	8.95
Hansen-p	.	.	0.55

Notes: Standard errors clustered by firms are in parentheses. All regressions are estimated with 2SLS and include firm and sector-year fixed effects. Sector refers to the 2-digit NACE of each firm. The critical value of the Kleibergen-Paap (KP) statistic based on a 10 (15) percent maximal IV size is 16.38 (8.96) for columns (1) and (2), and 19.93 (11.59) for column (3). ***, **, and * denote statistical significance at the 1, 5, and 10 percent levels respectively.

Table A4: First-stage results for Table 3

Instrumented var: $\ln \text{exports}_{it}$	$\ln$ total domestic sales$_{it}$		$\ln$ produced domestic sales$_{it}$	
	(1)	(2)	(3)	(4)
$\ln FD_{it}$	0.025	0.075***	0.025***	0.076***
	(0.032)	(0.021)	(0.021)	(0.021)
$\ln FD_{it}\times$	0.069***		0.069***	
(+) export growth$_{it}$	(0.001)		(0.001)	
$\ln FD_{it}\times$		0.028		0.027
large firm$_i$		(0.044)		(0.044)
$\ln DD_{it}$	-0.002	-0.009	-0.002	-0.009
	(0.032)	(0.031)	(0.032)	(0.032)
$\ln \text{imports}_{it}$	0.124***	0.138***	0.123***	0.137***
	(0.007)	(0.006)	(0.007)	(0.006)

Instrumented var: $\ln \text{exports}_{it} \times ...$	$\ln$ total domestic sales$_{it}$		$\ln$ produced domestic sales$_{it}$	
	(1)	(2)	(3)	(4)
$\ln FD_{it}$	-0.708***	-0.057***	-0.709***	-0.057***
	(0.056)	(0.007)	(0.056)	(0.007)
$\ln FD_{it}\times$	1.166***		1.166***	
(+) export growth$_{it}$	(0.003)		(0.003)	
$\ln FD_{it}\times$		0.499***		0.499***
large firm$_i$		(0.063)		(0.063)
$\ln DD_{it}$	0.014	-0.028	0.013	-0.028
	(0.052)	(0.019)	(0.052)	(0.019)
$\ln \text{imports}_{it}$	0.080***	0.032***	0.080***	0.032***
	(0.009)	(0.003)	(0.009)	(0.003)
Observations	44,383	65,496	44,325	65,409
R^2	0.95	0.90	0.95	0.92
KP-stat.	6.04	8.35	6.05	8.47

Notes: (+) export growth$_{it}$ is a binary variable that is 1 if the firm's exports has increased over the previous year. large firm$_i$ is a binary variable that is 1 if the firm had 125 employees or more (the mean value in the sample) in its initial export year. Standard errors clustered by firms are in parentheses. All regressions are estimated with 2SLS and include firm and sector-year fixed effects. Sector refers to the 2-digit NACE of each firm. The critical value of the Kleibergen-Paap (KP) statistic based on a 10 percent maximal IV size is 7.03. ***, **, and * denote statistical significance at the 1, 5, and 10 percent levels respectively.

A2. The tariff instrument

At the firm level, the tariff instrument is constructed as:

$$FTAR_{it} = \sum_{ch} \omega_{ich}(\text{tariffs})_{cht},$$

where ω_{ich} is the average weight of a destination-product in a firm's total exports in 2005-14, and MFN tariffs are from UN Comtrade (WITS). I also include an analogous control for Turkey's MFN tariffs:

$$DTAR_{it} = \sum_{h} \eta_{ih}(\text{tariffs})_{TUR,ht},$$

where η_{ih} is the average weight of a product in a firm's total exports in 2005-14. This system results in the following first and second stages respectively:

$$\ln X_{it} = \alpha \ln FD_{it} + \tau \ln FTAR_{it} + \theta \ln DD_{it} + \phi \ln DTAR_{it} + \mu_i + \delta_{nt} + \nu_{it},$$

$$\ln Y_{it} = \beta \widehat{\ln X_{it}} + \gamma \ln DD_{it} + \psi \ln DTAR_{it} + \mu_i + \delta_{nt} + \epsilon_{it}.$$

At the firm-product level, the instrument becomes:

$$FTAR_{iht} = \sum_{c} \omega_{ich}(\text{tariffs})_{cht},$$

where ω_{ich} is the average weight of a destination in a firm's exports of product h in 2005-14. The control variable $DTAR_{ht}$ at the firm-product level is simply Turkey's MFN tariffs on product h at year t. In the regressions, I add 1 to $FTAR_{iht}$ and $DTAR_{ht}$ before taking logs to keep observations with zero tariffs.