Linkages with Multinationals and Domestic Firms' Performance

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Integration and Trade Sector

August 2019

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1   Introduction

Multinational enterprises (MNEs) are major direct drivers of employment, growth and innovation. They tend to be significantly larger and more capital intensive and are much more likely to export than domestic firms (Antràs and Yeaple, 2014). Worldwide sales of foreign affiliates increased by 5 between 1990 and 2017 and altogether the 100 largest non-financial MNEs had almost 17 million employees in 2017 (UNCTAD, 2018). U.S. multinational firm parent companies performed almost 79% of the total business R&D conducted in the country in 2014 (National Science Board, 2018).

Apart from this direct impact, foreign MNEs also have important spillovers over the local economy. Foreign firms transfer the know-how acquired in their operations in different countries to their affiliates. There is evidence that foreign acquisitions significantly raise the productivity of the acquired firms and that firms with foreign capital are more integrated in global value chains via increased importing and exporting (Arnold and Javorcik, 2009).

MNEs may also have a wider impact over the local economy through their interactions with suppliers, that is, through backward linkages. Several studies link the presence of multinationals in downstream sectors with increased productivity, albeit relying on sector-level input-output tables to establish the links between industries (e.g. Javorcik, 2004; Blalock and Gertler, 2004).

In this paper, we aim to explore how the linkages between affiliates of multinational companies and local firms affect the domestic economy using firm-to-firm linkages from Uruguay. For that purpose, we use a unique database that combines matched Value Added Tax (VAT) records on sales, customs data on imports and exports and other administrative databases containing firm-level information on the number of employees, sector, foreign ownership status, date of establishment and location.

2   Data Description

The main source of pair-wise matched seller-buyer data in Uruguay is the Tax Form 2/181. This Form has to be completed by companies belonging to the group of *"Grandes Contribuyentes and CEDE"* (Large Taxpayers and members of the Special Control Group, hereinafter CEDE), which have the mandate to declare their sales and purchases on a monthly basis. Firms are included in this category according to their total VAT tax liability or due to other characteristics of their economic activity which, according to the General Taxation Office (*"Dirección General Impositiva"*, hereinafter DGI), require stricter reporting procedures. The latter includes, for instance, importers, exporters and firms established in a free trade zone (*"Zona Franca"*).

The original database obtained from the DGI has information at the level of total cumulative VAT payments accrued under a given tax rate in a natural year between the firm filling the Form and another firm, which may or not belong to the CEDE group. The level of the database is hence Company A - Company B - Tax Rate - Year. The Form has three clearly differentiated parts: sales, purchases with a positive tax rate and exempt purchases. Note that there is no information for exempt sales nor for transactions carried among companies not belonging to the CEDE group. Furthermore, those transactions with positive VAT tax rates carried out between two CEDE firms will appear twice (in the sales section of the seller and in the purchases section of the buyer). Table 1 summarizes the information sources according to the type of transaction.

Firstly, we use the tax rates to back out the total value of the transactions carried out over a one-year period for a given buyer-seller combination. In Uruguay, the basic VAT tax rate is 22%, whereas the minimum one is 10%. Information regarding exempt purchases is directly presented in terms of the total value of the transaction itself. Subsequently, we carry out some data cleaning, deleting duplicated observations (understood as seller-buyer-tax rate-year combinations). Negative and null transaction values are also eliminated from the analysis.

Table 1: *Form 2/181 Information Sources, by type of transaction*

Seller	Buyer	VAT Exempt?	Source
CEDE	CEDE	No	Duplicated in Sales and Purchases
CEDE	No CEDE	No	Sales
No CEDE	CEDE	No	Purchases
No CEDE	No CEDE	No	No information
CEDE	CEDE	Yes	Purchases
CEDE	No CEDE	Yes	No information
No CEDE	CEDE	Yes	Purchases
No CEDE	No CEDE	Yes	No information

Table 2: *Total Domestic Sales, million USD*

	Basic Rate (22%)	Minimum Rate (10%)	Exempt Purchases	Total	Nominal GDP	Total as a % of Nominal GDP
2013	22,148.68	3,236.44	7,431.38	32,726.50	57,531.12	57%
2014	30,017.37	4,196.12	11,833.80	46,047.30	57,236.02	80%
2015	29,786.01	4,109.58	10,857.92	44,753.51	53,274.43	84%
2016	26,148.53	4,141.43	10,197.18	40,487.14	52,687.77	77%

The average total volume of domestic sales recorded in the Form 2/181 is approximately 40 billion USD, equivalent to roughly 75% of the GDP of Uruguay. Out of those sales, approximately two thirds correspond to transactions taxed at the basic rate of 22%, a tenth corresponds to transactions taxed at the minimum rate of 10% and the remaining 25% to tax-exempt transactions (see Table 6).

Another benchmark for the coverage of the database is the total volume of domestic sales according with the tax forms 2/148 and 2/149; the declarations for the payment of the Tax on Industry and Commerce Revenue (*Impuesto a las Rentas de la Industria y el Comercio*, IRIC) for, respectively, CEDE and non-CEDE taxpayers. Using information from these tax forms, the coverage of the current matched seller-buyer VAT database is approximately 60% of the total sales in Uruguay. Note that total domestic sales are higher than nominal GDP by approximately 10 billion USD.

The total number of (CEDE) firms that submitted their Form 2/181 in Uruguay increased from 9,739 in 2013 to 13,466 in 2016. However, since we also have information on other non-CEDE companies via their declarations, the total number of firms is significantly higher: over 120,000 sellers and over 300,000 buyers.

3 Stylized Facts

Table 3 shows the distribution of annual sales per company. The average company has sales of approximately 300,000 USD. The distribution is strongly left-skewed, with the mean located around the 92th percentile. A relatively small percentage of firms concentrate most of the domestic sales. Tables **??** and **??** show the corresponding distribution for number of buyers and number of suppliers. Both exhibit the same skewness: the median number of buyers (suppliers) is 2 (3), whereas the mean is significantly larger (35 and 15, respectively).

Table 3: *Sales per Firm, by Type of Company (2016, thousand USD)*

Ownership:	Domestic	Domestic	Foreign	Foreign
Exporter:	No	Yes	No	Yes
P1	0.00	0.01	0.03	0.04
P5	0.04	0.08	1.27	6.68
P10	0.14	0.83	5.10	63.62
P25	1.22	43.11	25.49	638.72
P50	9.68	1,143.19	128.91	3,727.18
P75	42.85	6,927.24	681.87	13,851.68
P90	175.42	19,201.83	2,523.94	37,986.85
P95	475.79	34,648.03	5,617.04	47,770.90
P99	2,714.49	106,230.13	21,353.69	119,328.70
Mean	219.42	7,786.97	1,457.22	13,607.57
Observations	123,033	3,947	476	228

Figure 1: Kernel Density: Sales per Firm, by Type of Company (2016, USD)

3
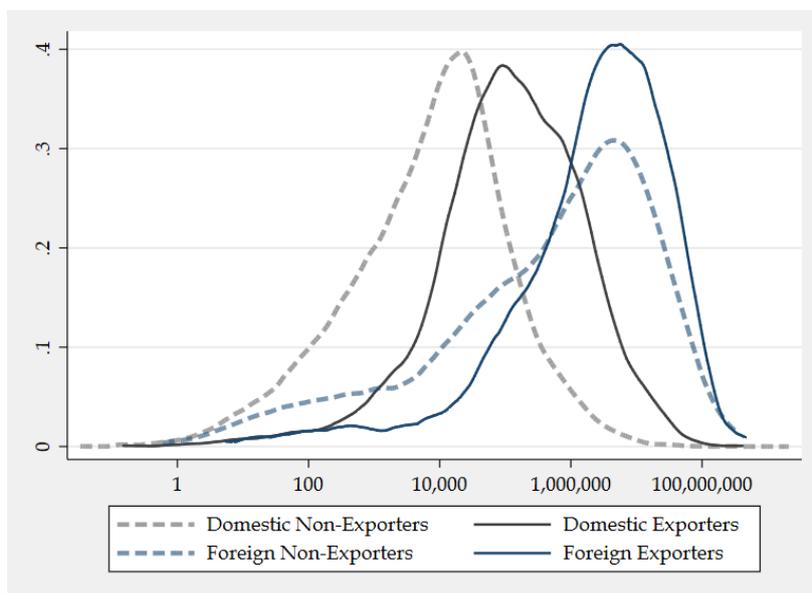
Figure 2: Kernel Density: Purchases per Firm, by Type of Company (2016, USD)
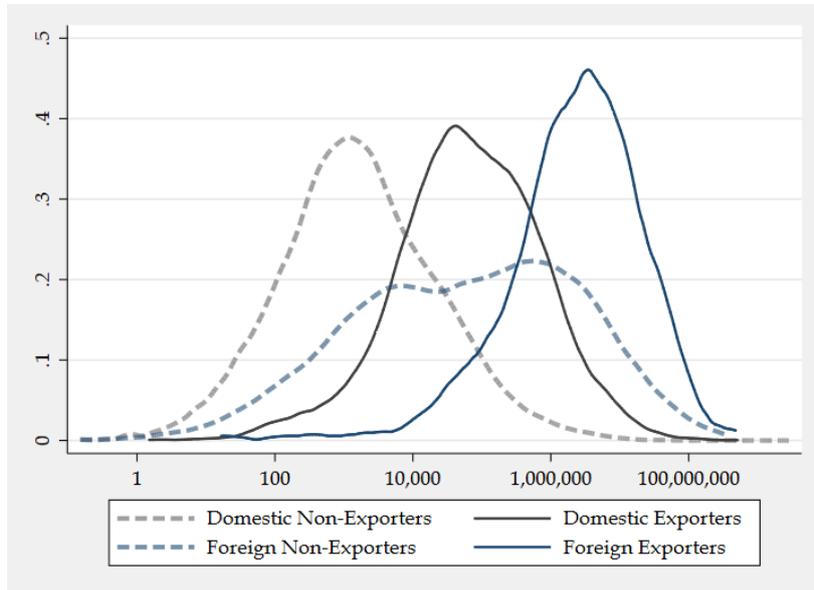
Figure 3: Kernel Density: Buyers per Firm, by Type of Company (2016, USD)

4
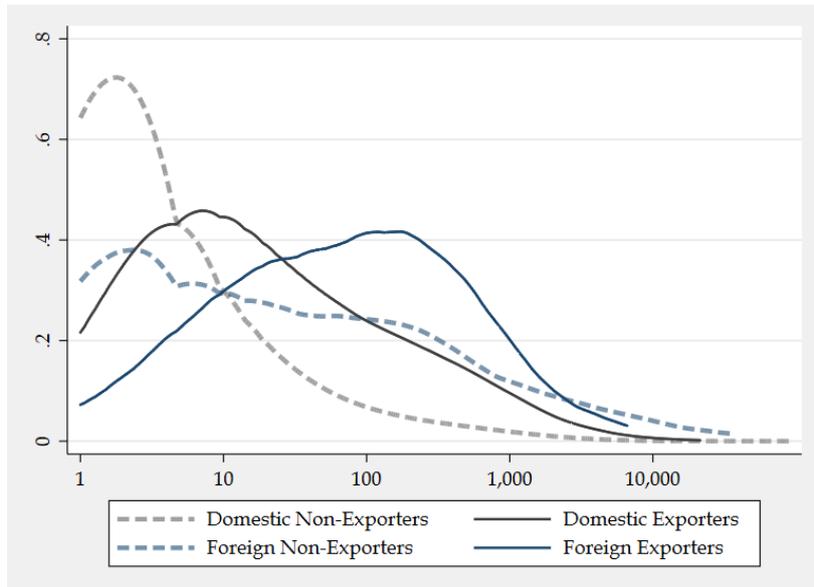
Table 4: *Number of Buyers per Firm, by Type of Company (2016)*

Ownership:	Domestic	Domestic	Foreign	Foreign
Exporter:	No	Yes	No	Yes
P1	1	1	1	1
P5	1	1	1	2
P10	1	1	2	5
P25	1	2	4	13
P50	2	14	12	64
P75	6	151.5	65	286.5
P90	25	864	332	631
P95	77	2750	637	1,319
P99	630	18,068	2,263	3,884
Average	33	611	150	304
Observations	123,033	3,947	476	228

Figure 4: Kernel Density: Suppliers per Firm, by Type of Company (2016, USD)
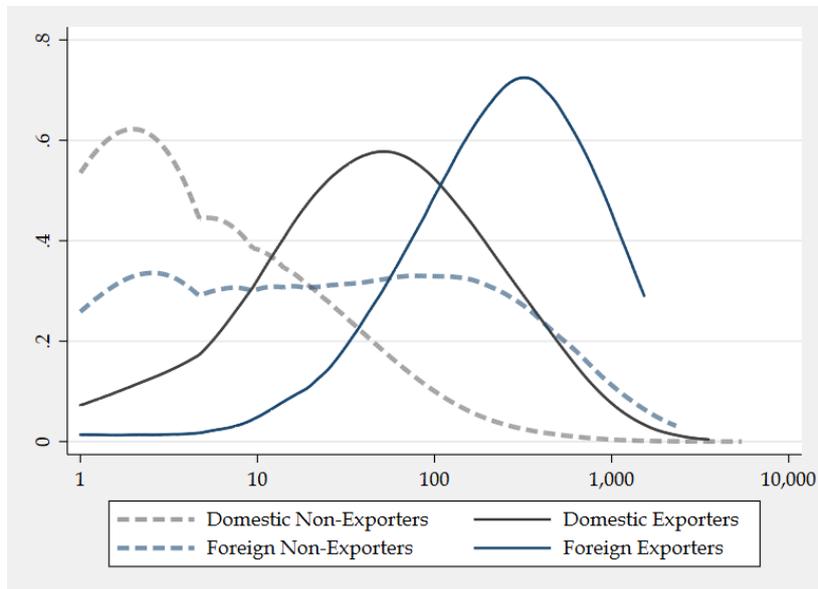
Table 5: *Number of Suppliers per Firm, by Type of Company (2016)*

Ownership:	Domestic	Domestic	Foreign	Foreign
Exporter:	No	Yes	No	Yes
P1	1	1	1	1
P5	1	2	1	32
P10	1	5	1	48
P25	1	19	3	119
P50	3	45	22	281
P75	11	125	123	557
P90	33	264	353	865
P95	58	383	516	1,007
P99	194	734	1,609	1,401
Average	15	105	124	374
Observations	293,520	4,561	877	245

Figure 5 shows the relationship between the number of suppliers and buyers through a graph of a polynomial regression of the second over the first. Companies with few buyers tend to have a much larger number of suppliers, for instance, for single-buyer firms we expect an average of 10 suppliers. However, given that for each additional buyer we expect only 0.10 new suppliers, firms with a large number of buyers tend to have a relatively smaller number of suppliers. For instance, a company with 10,000 customers has a predicted number of suppliers under 1,000.

Figure 5: *Expected Number of Suppliers according to the Number of Sellers*
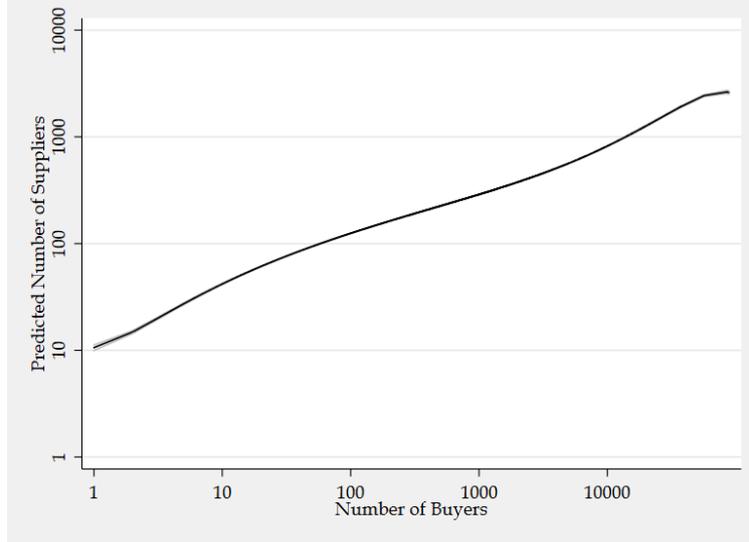
Fourth-degree polynomial regression, logarithmic scale.

4   Foreign Companies and Exporting Status

There is a total of 1540 foreign companies in Uruguay, of which 383 come from Argentina (25%), 206 from the United States (13%), 173 from Brazil (11%) and 140 from Spain (9%). Approximately half of those companies were established between 2000 and 2010 and one in four after 2010. Of those companies, 704 appear in the Form 2/181 as sellers in at least one transaction. Another additional 418 companies appear at least once as purchasers but do not register any transaction as buyers (due to the small scale of their operations). Of these total 1122 foreign firms, approximately one in five exports. Note that among domestic firms less than 4% export.

Table 6: *Foreign companies in Uruguay*

	2013	2014	2015	2016
Number of foreign companies according to Uruguay XXI	1450	1498	1527	1539
Number of foreign companies with registered sales	638	672	686	704
Number of foreign companies with registered purchases	1,100	1,168	1,159	1,122
Foreign companies as a % of all companies with registered sales	0.62%	0.55%	0.54%	0.55%
Foreign companies as a % of all companies with registered purchases	0.42%	0.40%	0.38%	0.37%

Out of the total reported sales, more than 17% are carried out by foreign sellers. Of those, approximately half are carried out by foreign exporters (8.6% of the total). Meanwhile, out of the domestic sales carried out by domestic firms less than a fifth is carried out by exporters (see Figure 6). Similar results are obtained

when segmenting by type of buyer: foreign companies are responsible for around 16% of the total purchases, of which half are accounted for by foreign exporters. Note that these figures do not refer to the total of sales but rather to those transactions for which we have information in the Form 2/181, which excludes those that take place between companies not belonging to the group CEDE (which are predominantly domestic).

Table 7: *Distribution of Total Sales by Type of Seller and Buyer*

Seller \ Buyer	Domestic Non-Exporter	Domestic Exporter	Foreign Non-Exporter	Foreign Exporter
Domestic Non-Exporter	49.7%	8.0%	5.0%	5.5%
Domestic Exporter	9.2%	2.1%	1.4%	1.4%
Foreign Non-Exporter	6.3%	0.9%	1.1%	0.6%
Foreign Exporter	5.9%	1.0%	0.7%	1.0%

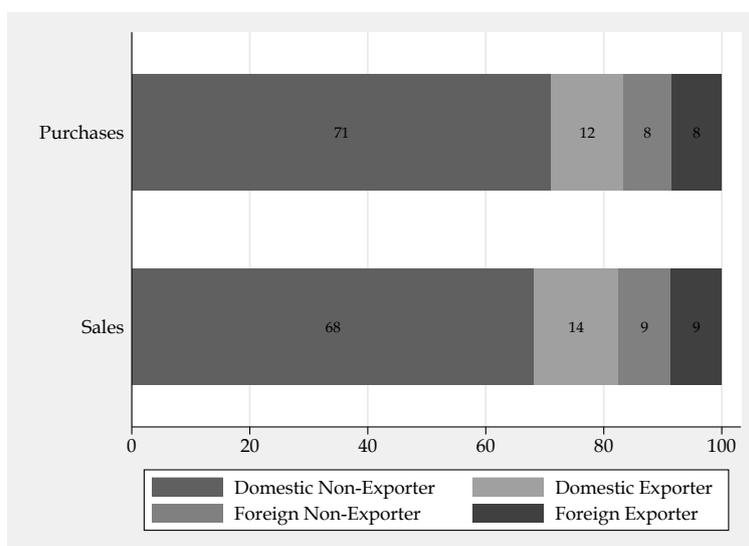Figure 6: *Distribution of Total Domestic Sales by Type of Firm (2013-2016)*

Table 7 shows the distribution of sales as a matrix of type of buyer and type of seller. Almost half of the total volume corresponds to operations carried out among domestic non-exporting firms. Sales of domestic non-exporters to foreign firms constitute a 10% of the total sales and are distributed evenly among foreign exporters and foreign firms that do not export. Figure 7, which shows the distribution of sales for each type of firm according to the nature of their buyer (domestic-foreign, exporting or not), shows that a very high share of the sales of foreign companies are targeted towards domestic firms that don't export. The distribution of sales by type of buyer are remarkably similarly across the four categories, although firms are slightly more prone to sell to others in their own group. For instance, 11% of the sales of foreign exporters are purchased by firms of the same category, a figure that halves for domestic non-exporters. Overall, we find that foreign companies are deeply integrated in the non-exporting domestic economy.

Tables 3 - 5 show the distribution of sales, number of buyers and number of suppliers by type of company. Within domestic enterprises, exporters are significantly larger, with tenfold median sales larger and a median number of suppliers (buyers) 15 (7) times larger. Foreign companies are significantly bigger than their domestic counterparts (average sales being over 30 times larger), but are also much less numerous. Even within foreign firms, non-exporters are about half the size than companies that export in terms of number of suppliers and buyers and total sales.

Selling to foreign companies could potentially be an initial step for domestic towards acquiring the necessary know-how to be able to start exporting. In order to explore the relationship between sales to

Figure 7: *Distribution of Sales by Type of Buyer (for each Category of Seller)*
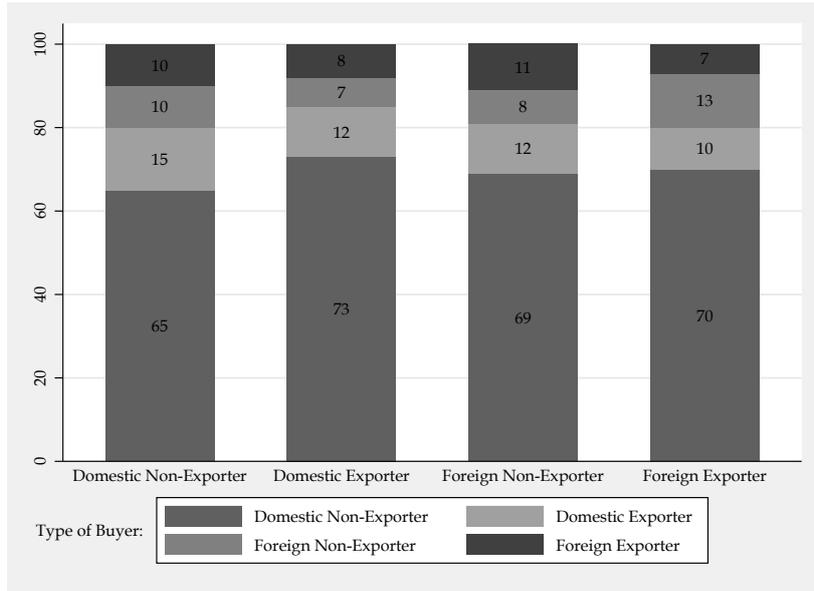
The different bars refer to each type of seller, while the different sections of the bar refer to the kind of buyer.

foreign firms and exporting status we first restrict our sample to non-exporters and calculate the share of those that start exporting in the following year (Table 8). The share of domestic firms that start exporting is 0.1% for companies that did not sell to foreign firms in the previous year, a figure that multiplies by 5 for domestic companies that were already selling to foreign firms in Uruguay. A similar increase is found for foreign firms according to whether or not they sell to other foreign companies.

Such increase, however, may be due to idiosyncratic factors at the firm level that simultaneously increase the likelihood of exporting and that of selling to foreign companies such as firm size or the type of product sold. It may be also be affected by sector-year or municipality-year specific trends such as local economic cycles. In order to control for such factors, Table 9 shows some basic regressions with firm, sector-year and destination-year fixed effects of the impact of selling to foreign companies in t over the probability to export in $t+1$ for companies that were not exporting in t. When firm-level fixed effects are introduced, we find a significant effect of 0.0007. Given that the *ex ante* probability that a domestic firms starts exporting is 0.001, selling to foreign companies is associated with a 70% increase in the likelihood to become an exporter in the subsequent year.

The information for the number of employees is available for the sellers in around 92% of the transactions and for the buyers in 70% of the cases (see Table A.1. in the Appendix). Given the change in the number of observations the analysis is repeated for this restricted sample. For such sample we find similar coefficients, but due to the sample reduction the standard errors increase and drive the p-values slightly above 0.1 for the specifications with more demanding fixed effects.

Table 8: *Share of companies that start exporting in the following year, by type of company*

	2013	2014	2015	Total
Domestic firm that does NOT sell to foreign firms	0.10%	0.10%	0.10%	0.10%
Domestic firms that sells to foreign firms	0.50%	0.50%	0.50%	0.50%
Foreign firm that does NOT sell to other foreign firms	0.00%	1.80%	2.70%	1.60%
Foreign firm that sells to other foreign firms	9.70%	6.60%	7.30%	7.80%

Sample: Set of firms that do not export in a given year t.

Table 9: *Selling to Foreign Firms and Probability to Start Exporting*

y: Exports in $t+1$	(1)	(2)	(3)	(4)	(5)	(6)
Sells to Foreign Firms in t	0.0040***	0.0053***	0.0007***	0.0008	0.0011**	0.0007
	(0.0002)	(0.0004)	(0.0002)	(0.0005)	(0.0004)	(0.0005)
Foreign Company	0.0529	0.0584***				
	(0.0070)	(0.0082)				
Year F.E.	Yes	Yes	Yes	Yes	No	No
Firm F.E.	No	No	Yes	Yes	Yes	Yes
Sector-Year F.E.	No	No	No	No	Yes	Yes
Region-Year F.E.	No	No	No	No	Yes	Yes
Control Variables	Yes	Yes	Yes	Yes	Yes	Yes
Sample	All	Restricted	All	Restricted	All	Restricted
Observations	532,346	151,581	532,346	151,581	179,948	141,314

Standard errors clustered at the firm level. Control variables: total sales, squared total sales and, for the restricted sample for which this information is available, number of employees working in the firm in that specific year.

Appendix

A. Data Appendix

A.1. Transactions with Firm-level Information Available for the Parties involved

Variable	Party	Transactions Matched	Share of the Total
Start Date	Seller	16,269,903	93.6%
	Buyer	12,792,212	73.6%
Sector	Seller	11,272,583	64.8%
	Buyer	11,272,583	64.8%
Region	Seller	11,272,583	64.8%
	Buyer	11,272,583	64.8%
Number of Employees	Seller	16,072,250	92.4%
	Buyer	12,171,433	70.0%
Number of Establishments	Seller	14,855,045	85.4%
	Buyer	8,252,282	47.5%

B. Additional Figures

Domestic sales per firm by year, thousand USD

	2013	2014	2015	2016
P1	0.01	0.01	0.00	0.00
P5	0.05	0.05	0.04	0.04
P10	0.19	0.14	0.16	0.15
P25	1.41	1.38	1.42	1.33
P50	8.86	11.28	11.06	10.50
P75	42.79	53.86	50.56	47.74
P90	197.88	247.42	229.00	215.52
P95	493.53	721.66	672.70	633.26
P99	2,951.78	5,010.19	4,474.37	4,205.65
Mean	306.96	363.58	342.81	309.80
Observations	103,949	123,754	127,509	127,684

Number of domestic buyers per Firm, by year

	2013	2014	2015	2016
P1	1	1	1	1
P5	1	1	1	1
P10	1	1	1	1
P25	1	1	1	1
P50	2	2	2	2
P75	5	6	7	7
P90	21	26	30	30
P95	62	78	95	97
P99	511	676	710	729
Media	30	36	38	39
Observations	103,949	123,754	127,509	127,684

Number of domestic suppliers per firm, by year

	2013	2014	2015	2016
P1	1	1	1	1
P5	1	1	1	1
P10	1	1	1	1
P25	1	1	1	1
P50	3	3	3	3
P75	9	11	11	12
P90	24	31	33	36
P95	43	57	60	64
P99	156	215	223	230
Mean	12	15	16	17
Observations	260,327	294,408	303,718	299,203