

Domestic Linkages and the Indirect Effect of Exporting: Evidence from Trade Promotion Policy*

Jerónimo Carballo
University of Colorado Boulder

Ignacio Marra de Artiñano
Inter-American Development Bank

Christian Volpe Martincus
Inter-American Development Bank and CESifo

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Abstract

It is already well-known that exporting firms tend to be larger and more productive than their non-exporting domestic peers. The extent to which the former and the latter are actually linked and the implications of these linkages are far lesser-known. In this paper, we show that firms that become exporters favor an expansion of their local suppliers in terms of sales, number of employees, and sales per employee. We use a unique dataset that combines data on domestic firm-to-firm transactions and firm-level characteristics, exports, and trade promotion assistance status. In order to accurately identify these indirect effects, we exploit the fact that trade promotion support is associated with a significant increase in the probability that a domestic firm starts exporting but can be considered otherwise unrelated with suppliers' performance.

Keywords: Exporting, Firm-to-firm Linkages, Sales, Employment, Trade Promotion

JEL-Codes: F10, F13, F14

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1. Introduction

A well-established empirical fact in the international trade literature is that exporting firms tend to be larger and more productive than their non-exporting domestic counterparts (see, e.g., Bernard and Jensen, 1997). Available evidence on to what extent the former and the latter are actually interconnected and the implications thereof is, in contrast, very limited. Data from Uruguay, the country on which this paper focuses, suggest that linkages between exporting and non-exporting firms are plentiful and economically important. The median exporting firm buys from more than 200 non-exporting peers and exporters jointly account for about almost a third of domestic purchases. The median non-exporting firm in our sample, in turn, sells to three exporters and, together, these firms without trade activities abroad but connected domestically with exporters are responsible for about two-thirds of total domestic sales and more than three quarters of total formal employment. In this paper, we examine whether and how firms' engaging in exporting affects the total sales, number of employees, and sales per employee of their actual domestic non-exporting suppliers, thereby contributing to fill in the aforementioned gap in the literature.

In so doing, we use a unique administrative dataset from Uruguay for the period 2013-2016. This dataset combines three different databases: (i) tax databases including Value Added Tax (VAT) records on firm-to-firm and total domestic sales; (ii) a customs database covering all firms' export and import transactions; and (iii) an additional administrative database encompassing information on firms' sector of activity, number of employees, and their trade promotion assistance status.

In order to identify the effect of linking up with (i.e., selling to) exporters on domestic firms' sales and employment, we first apply a difference-in-differences approach, whereby we control for differences across firms and their sectors through firm and sector-year fixed effects and time-varying lagged firm-level covariates. While these controls go a long way in absorbing relevant confounding factors, potential endogeneity cannot be entirely ruled out. We therefore also resort to an instrumental variable strategy. More precisely, we instrument linkages with exporting firms with linkages with firms receiving assistance from the country's trade promotion agency. In one of the variants, we impose a predetermined linkage structure. Specifically, we use the one year-lagged (instead of the contemporaneous) set of firm-to-firm connections, so that identification comes exclusively from changes in existing partners' export (trade promotion assistance) status. This involves two main identifying assumptions: (1) this assistance is significantly correlated with firms' probability to export after conditioning for relevant covariates -which we explicitly show below-; and (2) it does not directly affect the sales or employment of the suppliers of firms receiving trade promotion sup-

port but through its effects on the latter's performance in general and export activities in particular. In this regard, it is worth mentioning that there is no other obvious channel through which such support to a given firm can affect third firms contemporaneously.

The difference-in-differences and the instrumental variable estimates suggest that both total sales and number of employees expand significantly for domestic non-exporting firms that start selling to exporters or that were initially selling to firms that later become exporters. Effects are more pronounced for smaller firms, for firms that are upstream relative to the exporter, and for firms linked to larger exporters.

Our paper contributes to three main strands of the literature. First, a number of papers have examined the effects of linkages with exporters on other domestic firms' export activities and overall performance (see, e.g., Aitken et al., 1997; Álvarez and López, 2008; Koenig et al., 2009; and Hu and Tan, 2016). These papers proxy firm-to-firm linkages either through firms' geographical co-location or their sector buying and selling relationships based on national input-output tables. These proxies make two implicit assumptions: that all firms located in the same region have identical connections with exporting counterparts, and that the linkages (and the intensity thereof) are the same for every firm operating in a given specific sector. We build up on these papers by providing evidence on these external effects using accurate and comprehensive data on actual firm-to-firm linkages and a novel identification strategy.

Second, our paper relates to the emerging literature on networks and international trade (see Bernard and Moxnes, 2018 for a review). These papers use actual firm-to-firm data to estimate the effects of linkages (primarily with multinational firms) on domestic firms' productivity and sales (see, e.g., Alfaro-Ureña et al. 2019a), labor market outcomes (see, e.g., Alfaro-Ureña et al. 2019b), and export market entry (see, e.g., Carballo et al. 2019); and explore how trade and financial shocks are transmitted through the economy (see, e.g., Huneus, 2018; Tintelnot et al., 2018; Boehm et al., 2019; Demir et al. 2019; Kikkawa et al., 2019).¹ We add to these papers by investigating how exporting generates indirect effects that benefit local suppliers.

Third, a series of papers have assessed the direct impact of trade promotion programs on the intensive and extensive margins of assisted firms' exports and thereby on overall performance (see, e.g., Volpe Martincus and Carballo, 2008, 2010; Cadot et al., 2015; van Biesebroeck et al., 2016; and Broocks and Van Biesebroeck, 2017; and Munch

¹ Other papers in this nascent literature include Bernard et al. (2019), who study the effects of search costs on the formation of buyer-supplier relationships and thereby on firms' performance; Miyauki (2019) who investigates the role of frictions and increasing returns to scale in matching for input trade as a source of agglomeration economies; Bernard et al (2019), who analyze the the determinants of firms' size heterogeneity; Carrillo et al. (2019) who estimate the effects of public procurement on firms' growth; and Furusawa et al. (2017), who look at the consequences of firms' offshoring decisions for a country's production network.

and Schaur, 2018). We extend this literature by showing that, in addition to these direct effects, trade promotion also has important indirect effects on non-exporting, non-assisted domestic firms' economic outcomes.

The remainder of the paper is organized as follows. Section 2 introduces the dataset and presents descriptive evidence. Section 3 explains the empirical approach. Section 4 discusses the estimation results, and Section 5 concludes.

2. Data and Descriptive Statistics

Our empirical analysis makes use of various administrative databases from Uruguay over the period 2013-2016 that have been kindly provided by Uruguay's Ministry of Economic Affairs, the tax agency DGI (*Dirección Nacional Impositiva* - National Tax Directorate), the customs administration DNA (*Dirección Nacional de Aduanas* - National Customs Directorate), and the national export and investment promotion organization URUGUAY XXI.

First, we use firm-level data from the tax agency on date of creation, sector of activity, total domestic sales, and number of employees that enable us to characterize the entire population of firms in the economy.² Second, we combine these data with the universe of export and import transactions from the customs agency, which allows us to accurately determine firms' export and import statuses over time and measure their trade activities when these are carried out. Third and crucially, we complement this information with firm-to-firm data on domestic sales as computed from monthly Value Added Tax records (reported in Form 2/81).³ Fourth and finally, we have access to annual lists of firms assisted by the national trade and investment promotion agency URUGUAY XXI. Table 1 reports both the shares of specific groups of firms, i.e., exporting firms, non-exporting, firms selling to exporting counterparts, firms that do not sell to exporting counterparts, and firms receiving trade promotion assistance from URUGUAY XXI, in different economy-wide sales, buyers, purchases, suppliers, number of employees, and number of importers (top panel) along with the respective median values (bottom panel) for 2016.

² We restrict the sample to those firms that register sales in every year of the period under consideration.

³ This form has to be completed by firms whose total VAT tax liability exceeds a given threshold or that perform specific economic activities. This group includes a large number of firms (i.e., more than 13,000) that account for almost 80% of total sales, in general, and all exporters, importers, and firms established in a free trade zones ("*Zona Franca*"), in particular. These firms must report all purchases and sales in which they accrue a total tax above 4,000 Uruguayan pesos (approximately US\$ 140 USD) with a specific commercial partner in one or more operations over the period of one month. Firms must also report additional purchases and sales if those indicated above do not jointly make 90% of the respective totals. On average, total domestic sales recorded in the Form 2/181 are approximately US\$ 40 billion, which roughly amounts to 90% of Uruguay's GDP and 75% of Uruguay's total sales over the sample period.

Around 1,300 firms export, which amount to 2.4% of the total number of firms.⁴ These exporting firms jointly account for almost 30% of aggregate domestic sales and for 16% of the formal employment in the economy. Importantly, they are responsible for around 30% of aggregate domestic purchases and, together, they have more than one million different linkages with domestic firms.⁵

Exporting firms are significantly larger and have substantially broader networks than their non-exporting counterparts. In particular, their median domestic sales are approximately 20 times larger. A similar relationship holds for their relative domestic purchases. The median exporter sources from eight times more suppliers than non-exporters (247 vs. 31). New exporting firms, that is, firms that export for the first time in the year in question, are roughly half the size of the median exporting firm, but still substantially larger than the median non-exporting peer, both in terms of both purchases and number of suppliers.

The connections between exporting and non-exporting firms can be clearly seen in Figure 1. This figure presents the network of suppliers for exporting and non-exporting firms that operate in the food manufacturing sector, which accounts for over 40% of Uruguay's aggregate foreign sales and is accordingly the country's main export sector. The graph reveals a thick network of domestic non-exporting firms in the periphery of the network supplying a core of exporting peers. Often, the only economically meaningful link of a firm is to a large exporter and, thus, sets of small non-exporting firms tend to cluster around each one of large exporters.

Overall, half of all firms in the economy sell to at least one exporter. The companies that sell to exporters are jointly responsible for most of the economic activity -around 90% of both domestic sales and purchases in the country-. The median firm in this category has total sales more than two times larger than the median sales of their counterparts that do not sell to exporters. Kernel density estimates in Figure 2 consistently show that the distribution of the sales of the former is located to the right of that of the latter.⁶

⁴ From 2013 to 2016, an average of 130 firms were assisted every year by the agency with different export promotion programs.

⁵ As a benchmark, it is useful to compare our network with that of Bernard et al. (2019), which use VAT data from Belgium. The Belgian network has roughly twice as many firms as the Uruguayan one and, as expected, the median firm has significantly larger total sales (over one million USD compared with approximately 140,000). However, the main stylized facts from Bernard et al. (2019) also hold in our network: (i) the distribution of sales and buyers-supplier exhibits high dispersion and skewness; (ii) firms with more customers have higher sales but lower sales per customer; and (iii) there is negative degree assortativity among sellers and buyers —i.e., firms with plenty of connections tend to be linked to relatively worse connected ones— (see Appendix A1).

⁶ A Kolmogorov-Smirnov test of equality of distribution suggests that the distribution of the sales of firms that sell to exporters stochastically dominates that of their peers that do not sell to exporters.

These differences in sales can potentially be explained by various alternative confounding factors different from the linkages themselves. In the next section we describe the formal empirical strategy we use to identify the indirect impact of exporting on linked domestic firms' sales and number of employees.

3. Empirical Approach

We aim at estimating the impact of firms' exporting on the performance of their non-exporting suppliers. To do so, we explicitly exploit the structure of the country's production network as determined based on the firm-to-firm data from the VAT forms. Furthermore, we restrict the reference sample to firms that had never exported before and account for firm- and sector-level confounding factors through observed time-varying covariates and appropriate fixed effects. Formally, we use the following baseline specification to estimate the main relationship of interest:

$$\ln X_{fst} = \beta \mathbb{I}(\text{L_E})_{fst} + \sum_{j=1}^J \kappa^j X_{fst-1}^j + \rho_{fs} + \delta_{st} + v_{fst} \quad (1)$$

where f denotes firm, s corresponds to sector, and t indicates year. The dependent variable $\ln X_{fst}$ stands for (the natural logarithm of) total domestic sales, total number of employees, or sales per employee of firm f in year t . The main explanatory variable is $\mathbb{I}(\text{L_E})_{fst}$, which is a binary indicator that takes the value of one if firm f from sector s sells to at least one exporter in year t and zero otherwise. Formally, $\mathbb{I}(\text{L_E})_{fst} = 1 \iff \sum_{g=1}^G \zeta_{(fs,gr)t} \iota_{grt} > 0$, where g indexes all firms different from f , r indexes their respective sectors, ζ is a binary indicator of linkage status between firms f and g and ι is a binary indicator of firm g 's export status. We also consider two variants of this indicator. First, we focus on new exporters. Hence, the binary variable takes the value of one if the firm sells to at least one peer that had never exported before t but starts exporting in t , i.e., in this case, ι is a binary indicator of firm g 's status as new exporter.⁷ Second, we additionally lag firms' linkages. Thus, the binary variable takes the value of one if the firm sells to a new exporter and the link between both firms was already present in the previous year, i.e., $\mathbb{I}(\text{L_E})_{fst} = 1 \iff \sum_{g=1}^G \zeta_{(fs,gr)t-1} \iota_{grt} > 0$. Our parameter of interest is, accordingly, β . X_{fst-1} is a vector of time-varying firm-level covariates lagged one period, which encompasses two sets of variables. Firstly, we use a set of control variables related to the network of the firms: the number of buyers, the number of suppliers and binary indicators that takes value one if firm f buys from exporters, sells from importers or buys from importers, respectively. We also include a set of variables

⁷ In order to establish whether a firm is or not a new exporter we use transaction level data starting in 2000.

that capture size and importing status of the firm including the (natural logarithm of the) number of employees (total domestic sales) and a binary indicator that takes the value of one if firm f is an importer and zero otherwise.⁸ Finally, ρ_{fs} and δ_{st} are sets of firm-sector and sector-year fixed effects, respectively, that control for time-invariant firm-level and time-varying sector-level factors that can influence both firm's sales and linkage status over our sample period and v is the error term.⁹

While these sets of fixed effects and explicit covariates are likely to substantially reduce relevant potential endogeneity biases, they could, arguably, not eliminate them entirely. We therefore also resort to an instrumental variable strategy whereby we take advantage of firm-level data on trade promotion assistance from URUGUAY XXI along with the production network structure. More precisely, we instrument linkages with exporters with linkages with firms receiving such an assistance. The first stage equation is accordingly as follows:

$$\mathbb{I}(\text{L_E})_{fst} = \phi \mathbb{I}(\text{L_TPA})_{fst} + \sum_{j=1}^J \omega^j \chi_{fst-1}^j + \psi_{fs} + \tau_{st} + \mu_{fst} \quad (2)$$

where $\mathbb{I}(\text{L_TPA})_{fst}$ is a binary indicator that takes the value of one if firm f from sector s sells to at least one firm that receives trade promotion assistance in year t and zero otherwise (defined similarly to $\mathbb{I}(\text{L_E})_{fst}$ above); ψ_{fs} and τ_{st} are sets of firm-sector and sector-year fixed effects, respectively; and μ is the error term.

To be a valid instrument, selling to firms receiving trade promotion assistance should predict selling to exporting firms, but it should be otherwise uncorrelated with domestic firms' total sales. This involves two conditions. First, linkages with trade promotion recipients must be correlated with linkages with exporters once other relevant variables have been netted out. This condition can be expected to hold, as support from URUGUAY XXI is likely to increase firms' probability to export. To show that this is the case, we use the following empirical linear probability model:

$$\mathbb{I}(\text{E})_{fst} = \alpha \mathbb{I}(\text{TPA})_{fst} + \sum_{k=1}^K \gamma^k \chi_{fst-1}^k + \lambda_{fs} + \theta_{st} + \varepsilon_{fst} \quad (3)$$

where $\mathbb{I}(\text{E})_{fst}$ is a binary indicator that takes the value of one if firm f that operates in sector s exports in year t and zero otherwise; $\mathbb{I}(\text{TPA})_{fst}$ is a binary indicator that takes

⁸ It is important to stress that we use crossed dependent and lagged control variables. In other words, we do not include lagged dependent variables as covariates along our firm fixed effects since this would lead to inconsistency.

⁹ We are also estimating a variant in which, instead of being a binary indicator, ζ is the share of firm f 's sales to firm g in their total sales, including one-year lag and the initial shares (i.e., those corresponding to 2013).

the value of one if firm f receives trade promotion assistance in year t and zero otherwise; as before, X_{fst-1} is the aforementioned vector of time-varying firm-level covariates lagged one period; λ_{fs} and θ_{st} are sets of firm-sector and sector-year fixed effects, respectively, that account for systematic differences across firms and average tariffs, domestic and international transport costs, and sector-specific policies (e.g., Uruguay's forestry regime) that can affect both export and trade promotion assistance statuses over our sample period; and ε is the error term.

Second, linkages with firms supported with trade promotion programs must be uncorrelated with the error term after conditioning on all other relevant explanatory variables. In other words, it must be exogenous, which requires properly controlling for factors that influence firms' sales and are correlated with selling to assisted firms. The firm(-sector) and sector-year fixed effects and firm-level variables can be considered to precisely control for these factors, especially when preexisting (i.e., lagged one year) linkages are used. Hence, given these linkages, this restriction is likely to be fulfilled since our set of fixed effects along with the firm-level covariates can be expected to account for other channels through which supplying to firms participating in trade promotion activities could directly affect firms' total domestic sales.

The previous equations assume that the effect of linkages with exporters on domestic firms' sales is homogeneous across firms. However, this effect may differ both across them. Thus, for instance, it may be larger when firms themselves are smaller because the value of additional links or deepening of existing links is proportionally larger for these firms. Hence, we also generalize these equations to explore the existence of heterogeneous effects across these dimensions.

In all cases, standard errors are clustered by firm for inference purposes, thus allowing for an unrestricted covariance structure over time within firms, which may differ across them.

4. Estimation Results

Tables 2 to 4 present OLS and instrumental variable estimates of alternative specifications of Equation (1) for total domestic sales, number of employees, and sales per employee, respectively, along with the respective first stage estimates (i.e., Equation (2)) and F test statistics for the latter, as obtained both on the full sample (Columns 1-3), the sub-sample composed of those firms that already had linkages with exporting peers before the year in question (Columns 4-6), and the sub-sample of composed of those firms without linkages with exporting peers before the year in question (Columns 7-9).

In these different specifications the main explanatory variable is defined as follows: (i) *selling to exporters*: it takes the value of one if the firm sells to an exporting counterpart

in the year under consideration and zero otherwise (Rows 1, 4, and 7); (ii) *selling to new exporters*: it takes the value of one if the firm sells to at least to a counterpart that exports for the first time in the year under consideration and zero otherwise (Rows 2, 5, and 8); and (iii) *selling to new exporters within preexisting linkages*: it takes the value of one if the firm already sold to at least a counterpart in the previous year that starts to export in the year under consideration and zero otherwise (Rows 3, 6, and 9).

All variants include firm and sector-year fixed effects and time-varying firm-level lagged covariates, namely, an indicator of purchasing from exporters, indicators of linkages with importers, the number of forward and backward linkages and an indicator of own import status. In the case where total sales is our outcome, we also control for lagged number of employees, and in the case where number of employees is our outcome, we included total sales.¹⁰

These estimates suggest that, after controlling for these variables, firms that sell to exporting peers register larger domestic sales. In particular, according to the OLS estimates, linking up with an exporter is associated with an increase of 3.1% in total sales within the country (see Column 1 in the top panel of Table 2). This increase decreases to 1.1% when the connection is with a firm that ventures abroad for the first time (see Column 2 in the top panel of Table 2). This is consistent with the fact that the latter are significantly smaller than their more established counterparts (see Table 1). A back-of-the envelope calculation suggests that, for the average firm that was not previously linked with an exporter, selling to one such firm for the first time increases total sales by approximately 27,000 dollars.

Firms that start selling to exporters also increase the number of employees, albeit by a more modest 0.8% (see Table 3). In line with the results for total sales, the increase is halved when the linkage is established with a new exporter. As expected from the smaller increase in the number of employees, sales per employee increase by over 2% (see Table 4).

In these previous estimations, both linkages and partners' export statuses are allowed to vary on an annual basis. Next, we take firms' linkage structure as given by fixing it in the previous year and explore the effects of changes in the export status of the set of partners. While it certainly does not preclude it, this helps ameliorate concerns related to the potential self-selection of firms into specific sets of partners. In this case, the estimated impact of the link with an exporter is 0.7% (see Column 3 in the top panel of Table 1). Estimates in the second panel reveal that this estimated impact varies significantly depending on whether firms have or not previous experience with

¹⁰In a series of robustness check exercises, we exclude different sets of these covariates. Estimation results are similar to those reported in the main text and are available from the authors upon request.

exporters. More specifically, such an impact is larger for firms that sold to exporting peers in the past. In other words, when firms start exporting for the first time, they only seem to deepen their preexisting connections with firms that already have experience supplying to other exporters. The impact for firms that do not have experience selling to exporters thus comes from the extensive margin of linkages, that is, from selling for the first time to exporters -with which they were not linked before they became exporters-.

The respective instrumental variables estimates are reported in the bottom panel of Table 2. In this regard, it is worth noting, first, that linkages with firms that receive trade promotion assistance are highly correlated with linkages with exporters after conditioning for fixed effects and time-varying firm-level covariates. The robust first stage F-statistic is accordingly well above 10 in all estimations. Second and importantly, as shown in Table A2 in the Appendix, trade promotion support has a positive and significant effect on the probability that a firm exports.

The instrumental variables estimates also indicate that linkages with exporters positively affect firms' domestic sales, the number of employees, and sales per employee. More precisely, sales increase approximately 20% when linking up with exporters in general and new exporters in particular, the number of employees increases by 8% and sales per employee by roughly 12% (see Columns 1-5 in the bottom panel of Tables 2, 3 and 4). When using *both* preexisting linkages *and* the conditional exogenous variation in partners' export statuses coming from trade promotion assistance to attenuate potential endogeneity biases derived from possible self-selection, the estimated effect over sales is around 40%.¹¹

We then proceed to explore whether the effects differ across the firm size distribution. Quantile fixed effect estimates consistently suggest that linkages with exporters have a more pronounced impact on firms at the lower end of the distribution of firms' size in terms of domestic sales and of sales per employee (Figure 3).¹² Patterns are less clear for the number of employees.

Next, we examine the implications of the nature and intensity of the linkages themselves. Estimates of the modified version of Equation (1) which allows for such heterogeneous effects indicate that these effects are larger when the firms link with larger exporters (that is, exporters whose total exports are above the median). Moreover, as one would expect, the effect appears to increase with the intensity of these linkages. More specifically, they are significantly larger when firms sell to more than one exporter (see

¹¹The instrumental variable estimates are substantially larger than the OLS counterparts. This can be related to the fact that firms that receive trade promotion assistance tend to have fewer but more significant connections (see Table 1). This is work in progress and we are currently exploring this possibility using specific subsets of firms.

¹²See Machado and Santos Silva (2019).

Table 5).¹³

Finally, we explore whether the impact varies depending on the sectoral nature of the linkages. In particular, we first differentiate between horizontal linkages —i.e., those with firms in the same sector— and vertical linkages.¹⁴ Estimates suggest the impacts are larger when linkages are vertical. Thus, spillovers appear to be more significant for firms operating in sectors other than that of the exporting firms. Second, we distinguish between primary and manufacturing firms, and services firms. In this regard, it should be noted that, due to data limitations, our analysis only considers goods exports. Thus, it could plausibly be thought that the impact of linking with an exporter is restricted to firms that are in goods sectors. However, our estimations results indicate that this is not the case. Indirect effects seem to be equally important for domestic non-exporting firms in both goods and services sectors (see Table 6).

5. Concluding Remarks

In this paper we examine whether and how linkages with exporters affect the performance of domestic firms' in terms of their sales, number of employees, and sales per employee. To do so, we carry out OLS and instrumental variable estimations on a unique dataset from Uruguay over the period 2013-2016 that includes data on firms' attributes for the population of active formal firms in the economy, the universe of their goods export and import transactions, and their domestic firm-to-firm linkages.

Overall, our estimation results provide new evidence of indirect impacts of exporting on domestic firms. More specifically, they highlight that firms' internationalization tend to favor the expansion of local suppliers, being specially important for smaller firms. The impact increases with the size of the exporter and the intensity of the linkage. Our estimates have important policy implications. In particular, export promotion programs could have significant spillover effects beyond improving export outcomes of supported firms. Such indirect effects are not typically considered but should be factored in when assessing the cost-effectiveness of trade promotion initiatives.

¹³ We also explore alternative measures of link intensity. The impact is larger when firms link with exporters that sell their products in more destination countries than the median and have a longer exporting tenure (see Appendix A3).

¹⁴ Firms are considered to belong to the same sector when they share the same 2-digits ISIC Rev 4 sector. Results are similar when using a narrower definition of horizontal linkages, namely, firms that are affiliated to the same 4-digit ISIC Rev 4 sector. These results are available from the authors upon request.

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Table 1
Descriptive Statistics

Aggregates by Firm Category							
Firm Category	Number of Firms	Total Sales (billion \$)	B2B Purchases (billion \$)	Firm-Pairs (1000s)	Suppliers (1000s)	Employees (1000s)	Importers
All Firms	52,299	85.4	40.2	5,299.9	288.1	635.80	7,452
Non-Exporting Firms	97.6%	71.1%	71.4%	86.5%	91.9%	83.54%	86.0%
Exporting Firms	2.4%	28.9%	28.6%	13.5%	54.1%	16.5%	14.0%
New Exporting Firms	0.4%	1.3%	1.1%	1.7%	13.7%	1.0%	2.3%
Firms that Receive Trade Promotion Assistance	0.3%	0.2%	0.2%	0.2%	4.9%	0.3%	0.6%
Firms that Sell to Exporting Peers	50.6%	77.7%	90.5%	95.8%	98.0%	84.0%	76.1%
Firms that Sell to Exporting Peers for the First Time	3.1%	1.1%	1.0%	0.5%	1.9%	1.4%	2.2%
Firms that Sell to New Exporting Peers	22.4%	59.7%	68.9%	85.2%	5.0%	58.0%	48.6%
Firms that Sell to Peers that Receive TPA	15.4%	51.2%	59.3%	76.0%	91.1%	49.9%	36.7%

Median Firm by Firm Category							
Firm Category	Total Sales (1000 \$)	Number of Buyers		B2B Purchases (1000 \$)	Number of Suppliers		Employees
		All	Exporting		All	Exporting	
All Firms	139.6	9	1	41.8	32	4	4
Non-Exporting Firms	135.8	8	1	39.8	31	4	4
Exporting Firms	2,587.6	104	11	910.8	247	30	21
New Exporting Firms	1,109.7	80	8	386.5	148	16	11
Firms that Receive Trade Promotion Assistance	465.9	21	4	70.9	59	7	8
Firms that Sell to Exporting Peers	225.3	19	3	85.2	51	7	7
Firms that Sell to Exporting Peers for the First Time	114.3	4	1	33.2	28	4	4
Firms that Sell to New Exporting Peers	448.5	70	9	208.1	92	12	10
Firms that Sell to Peers that Receive TPA	593.0	33	6	293.9	115	14	12

Source: Authors' calculations based on data from Uruguay's DGI, DNA, and URUGUAY XXI.

The table is divided into two panels. The top panel "Aggregates by Firm Category" shows aggregate descriptive statistics for a series of variables, along with the respective shares that a given firm category represents of all firms in the sample. The variables are the total number of firms, the value of their total sales, the aggregate number of buyers, the total value of firm-to-firm (B2B) purchases, the aggregate number of suppliers, the aggregate number of employees and the total number of exporters. Note that for firm categories the figures represented are the share of the total of all firms. The bottom panel "Median Firm by Firm Category" shows the value of the median of a specific variable for the firms within a given category. The variables included are total sales, the number of buyers, the number of buyers that are exporting firms, the total firm-to-firm (B2B) purchases, the number of suppliers, the number of suppliers that are exporting firms and the number of employees.

Table 2
Impact of Linkages with Exporters on Domestic Firms' Total Sales

OLS									
	All Firms			Prior Linkages			No Prior Linkages		
Linkage (t) * Exporter (t)	0.031***			0.032***			0.028***		
	(0.002)			(0.003)			(0.005)		
Linkage (t) * New Exporter (t)		0.011***			0.010***			0.013*	
		(0.002)			(0.002)			(0.007)	
Linkage (t-1) * New Exporter (t)			0.006***			0.006***			-0.010
			(0.002)			(0.002)			(0.010)
IV									
	All Firms			Prior Linkages			No Prior Linkages		
Linkage (t) * Exporter (t)	0.203***			0.241***			0.118***		
	(0.031)			(0.042)			(0.035)		
Linkage (t) * New Exporter (t)		0.214***			0.202**			0.689**	
		(0.039)			(0.044)			(0.298)	
Linkage (t-1) * New Exporter (t)			0.448***			0.376***			-3.553
			(0.115)			(0.109)			(2.913)
First Stage									
Linkage with Assisted Firms	0.063***	0.060***	0.027***	0.047***	0.052***	0.028***	0.303***	0.052***	-0.010
	(0.003)	(0.005)	(0.005)	(0.003)	(0.006)	(0.006)	(0.026)	(0.016)	(0.008)
Robust F Statistic	466.4	109.3	27.05	325.1	80.35	23.59	132.9	10.29	1.617
Firm Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Sector-Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm-Level Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm-Level Linkage Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	190,628	190,628	190,628	85,772	85,772	85,772	104,856	104,856	104,856

Source: Authors' calculations based on data from Uruguay's DGI, DNA, and URUGUAY XXI.

The table reports OLS and IV estimates of Equation (1) along with the first stage coefficients and specification tests for the latter. The dependent variable is *total sales in logarithmic terms*. There are three different samples and three different main explanatory variables. The first sample (*All Firms*) includes all firms, the second one (*Prior Linkages*) includes only firms that had been linked with exporters before *t* and the third one (*No Prior Linkages*) includes only firms that had not been linked with exporters before *t*. The first explanatory variable (*Linkage (t) * Exporter (t)*) is a binary variable that takes value one if the firm *i* sells to at least one exporting firm in *t*. The second explanatory variable (*Linkage (t) * New Exporter (t)*) is a binary variable that takes value one if the firm *i* sells to at least one exporting firm in *t* that had never exported before *t*. The third explanatory variable (*Linkage (t-1) * New Exporter (t)*) is a binary variable that takes value one if the firm *i* sells to at least one new exporter in *t* with which it was already linked in *t-1*. All specifications include the following controls: lagged number of employees, lagged importing status, the lagged number of buyers and the lagged number of suppliers, as well as a set of binary variables that take value one, respectively, if the firm buys from exporters, sells to importers, or buys from importers. All specifications include firm and sector-year fixed effects. In the Instrumental Variable specifications, the main explanatory variables is instrumented with a binary variable (*Linkage with Firm Receiving TPA*) which takes value one if firm *i* was selling to at least one firm receiving trade promotion assistance (TPA) in *t*. Standard errors are clustered by firm. The robust F Statistic refers to the robust Kleibergen-Paap statistic.

Table 3
Impact of Linkages with Exporters on Domestic Firms' Number of Employees

OLS									
	All Firms			Prior Linkages			No Prior Linkages		
Linkage (t) * Exporter (t)	0.008***			0.009***			0.005*		
	(0.001)			(0.002)			(0.002)		
Linkage (t) * New Exporter (t)		0.004***			0.003***			0.001	
		(0.001)			(0.001)			(0.004)	
Linkage (t-1) * New Exporter (t)			0.003***			0.003***			-0.004
			(0.001)			(0.001)			(0.005)
IV									
	All Firms			Prior Linkages			No Prior Linkages		
Linkage (t) * Exporter (t)	0.083***			0.109***			0.045***		
	(0.017)			(0.025)			(0.018)		
Linkage (t) * New Exporter (t)		0.092***			0.101***			0.261*	
		(0.021)			(0.024)			(0.132)	
Linkage (t-1) * New Exporter (t)			0.194***			0.188***			-1.302
			(0.054)			(0.056)			(1.161)
First Stage									
Linkage with Assisted Firms	0.063***	0.060***	0.027***	0.047***	0.052***	0.028***	0.303***	0.052***	-0.010
	(0.003)	(0.005)	(0.005)	(0.003)	(0.006)	(0.006)	(0.026)	(0.016)	(0.008)
Robust F Statistic	466.4	109.3	27.05	325.1	80.35	23.59	132.9	10.29	1.617
Firm Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Sector-Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm-Level Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm-Level Link Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	190,628	190,628	190,628	85,772	85,772	85,772	104,856	104,856	104,856

Source: Authors' calculations based on data from Uruguay's DGI, DNA, and URUGUAY XXI.

The table reports OLS and IV estimates of Equation (1) along with the first stage coefficients and specification tests for the latter. The dependent variable is *total number of employees* in logarithmic terms. There are three different samples and three different main explanatory variables. The first sample (*All Firms*) includes all firms, the second one (*Prior Linkages*) includes only firms that had been linked with exporters before t and the third one (*No Prior Linkages*) includes only firms that had not been linked with exporters before t . The first explanatory variable (*Linkage (t) * Exporter (t)*) is a binary variable that takes value one if the firm i sells to at least one exporting firm in t . The second explanatory variable (*Linkage (t) * New Exporter (t)*) is a binary variable that takes value one if the firm i sells to at least one exporting firm in t that had never exported before t . The third explanatory variable (*Linkage (t-1) * New Exporter (t)*) is a binary variable that takes value one if the firm i sells to at least one new exporter in t with which it was already linked in $t-1$. All specifications include the following controls: lagged total sales, lagged importing status, the lagged number of buyers and the lagged number of suppliers, as well as a set of binary variables that take value one, respectively, if the firm buys from exporters, sells to importers, or buys from importers. All specifications include firm and sector-year fixed effects. In the Instrumental Variable specifications, the main explanatory variables is instrumented with a binary variable (*Linkage with Firm Receiving TPA*) which takes value one if firm i was selling to at least one firm receiving trade promotion assistance (TPA) in t . Standard errors are clustered by firm. The robust F Statistic refers to the robust Kleibergen-Paap statistic.

Table 4
Impact of Linkages with Exporters on Domestic Firms' Sales per Employee

OLS									
	All Firms			Prior Linkages			No Prior Linkages		
Linkage (t) * Exporter (t)	0.024***			0.025***			0.024***		
	(0.002)			(0.003)			(0.005)		
Linkage (t) * New Exporter (t)		0.007***			0.007***			0.014*	
		(0.002)			(0.002)			(0.007)	
Linkage (t-1) * New Exporter (t)			0.004*			0.003*			-0.005
			(0.002)			(0.002)			(0.010)
IV									
	All Firms			Prior Linkages			No Prior Linkages		
Linkage (t) * Exporter (t)	0.115***			0.125***			0.072**		
	(0.031)			(0.047)			(0.034)		
Linkage (t) * New Exporter (t)		0.121***			0.102***			0.421*	
		(0.036)			(0.040)			(0.242)	
Linkage (t-1) * New Exporter (t)			0.253***			0.191***			-2.162
			(0.087)			(0.081)			(1.987)
First Stage									
Linkage with Assisted Firms	0.063***	0.060***	0.027***	0.047***	0.052***	0.028***	0.303***	0.052***	-0.010
	(0.003)	(0.005)	(0.005)	(0.003)	(0.006)	(0.006)	(0.026)	(0.016)	(0.008)
Robust F Statistic	466.4	109.3	27.05	325.1	80.35	23.59	132.9	10.29	1.617
Firm Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Sector-Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm-Level Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm-Level Link Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	190,628	190,628	190,628	85,772	85,772	85,772	104,856	104,856	104,856

Source: Authors' calculations based on data from Uruguay's DGI, DNA, and URUGUAY XXI.

The table reports OLS and IV estimates of Equation (1) along with the first stage coefficients and specification tests for the latter. The dependent variable is *total sales per employee* in logarithmic terms. There are three different samples and three different main explanatory variables. The first sample (*All Firms*) includes all firms, the second one (*Prior Linkages*) includes only firms that had been linked with exporters before *t* and the third one (*No Prior Linkages*) includes only firms that had not been linked with exporters before *t*. The first explanatory variable (*Linkage (t) * Exporter (t)*) is a binary variable that takes value one if the firm *i* sells to at least one exporting firm in *t*. The second explanatory variable (*Linkage (t) * New Exporter (t)*) is a binary variable that takes value one if the firm *i* sells to at least one exporting firm in *t* that had never exported before *t*. The third explanatory variable (*Linkage (t-1) * New Exporter (t)*) is a binary variable that takes value one if the firm *i* sells to at least one new exporter in *t* with which it was already linked in *t-1*. All specifications include the following controls: the lagged importing status, the lagged number of buyers and the lagged number of suppliers, as well as a set of binary variables that take value one, respectively, if the firm buys from exporters, sells to importers, or buys from importers. All specifications include firm and sector-year fixed effects. In the Instrumental Variable specifications, the main explanatory variables is instrumented with a binary variable (*Linkage with Firm Receiving TPA*) which takes value one if firm *i* was selling to at least one firm receiving trade promotion assistance (TPA) in *t*. Standard errors are clustered by firm. The robust F Statistic refers to the robust Kleibergen-Paap statistic.

Table 5
Impact of Linkages with Exporters on Domestic Firms' Sales, Number of Employees, and Sales per Employee:
Heterogeneity by Exporter Size and Linkage Intensity

Total Sales						
	All Firms		Prior Linkages		No Prior Linkages	
Linkage (t) * Exporter (t) * Exports Above Median	0.026***		0.024***		0.029***	
	(0.003)		(0.003)		(0.012)	
Linkage (t) * Exporter (t) * Exports Below Median	0.017***		0.016***		0.025	
	(0.002)		(0.002)		(0.017)	
Linkage (t) * Exporter (t) * One Exporter		0.021**		0.020***		0.022***
		(0.003)		(0.003)		(0.005)
Linkage (t) * Exporter (t) * More than One Exporter		0.050***		0.050***		0.044***
		(0.003)		(0.004)		(0.009)
Employees						
	All Firms		Prior Linkages		No Prior Linkages	
Linkage (t) * Exporter (t) * Exports Above Median	0.010***		0.010***		0.015**	
	(0.001)		(0.001)		(0.006)	
Linkage (t) * Exporter (t) * Exports Below Median	0.004***		0.003**		0.004	
	(0.001)		(0.001)		(0.009)	
Linkage (t) * Exporter (t) * One Exporter		0.005***		0.005***		0.001
		(0.001)		(0.002)		(0.003)
Linkage (t) * Exporter (t) * More than One Exporter		0.011***		0.011***		0.020***
		(0.001)		(0.002)		(0.004)
Sales by Employee						
	All Firms		Prior Linkages		No Prior Linkages	
Linkage (t) * Exporter (t) * Exports Above Median	0.016***		0.014***		0.015	
	(0.003)		(0.003)		(0.011)	
Linkage (t) * Exporter (t) * Exports Below Median	0.014***		0.013***		0.022	
	(0.002)		(0.002)		(0.017)	
Linkage (t) * Exporter (t) * One Exporter		0.016***		0.015***		0.015
		(0.003)		(0.003)		(0.011)
Linkage (t) * Exporter (t) * More than One Exporter		0.039***		0.039***		0.023
		(0.003)		(0.004)		(0.017)
Firm Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Sector-Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Firm-Level Controls	Yes	Yes	Yes	Yes	Yes	Yes
Firm-Level Link Controls	Yes	Yes	Yes	Yes	Yes	Yes
Observations	190,628	190,628	85,772	85,772	104,856	104,856

Source: Authors' calculations based on data from Uruguay's DGI, DNA, and URUGUAY XXI.

The table is divided into three panels: in the top one the dependent variable is the total sales in logarithmic terms, in the middle one the dependent variable is the total number of employees and in the bottom one the dependent variable is sales by employee in logarithmic terms. The table has three different samples. The first sample (*All Firms*) includes all firms, the second one (*Prior Linkages*) includes only firms that had been linked with exporters before t and the third one (*No Prior Linkages*) includes only firms that had not been linked with exporters before t . In all cases the main explanatory variable (*Linkage (t) * Exporter (t)*) is a binary variable that takes value one if firm i sells to at least one exporter in t . For each sample there are two sets of results: one in which the main variable is interacted with a binary variable that takes value one if the exporter has total exports above the median for all exporters in t (*Exporta Above/Below Median*) and another one in which the main variable is interacted with a binary variable that takes value one if the firm is simultaneously linked with more than one exporter (*One Exporter/More than One Exporter*). All specifications include the following controls: the lagged importing status, the lagged number of buyers and the lagged number of suppliers, as well as a set of binary variables that take value one, respectively, if the firm buys from exporters, sells to importers, or buys from importers. The specifications for total sales also include as a control lagged number of employees, whereas the specifications for the number of employees also include as a control lagged total sales. All specifications include firm and sector-year fixed effects. Standard errors are clustered by firm.

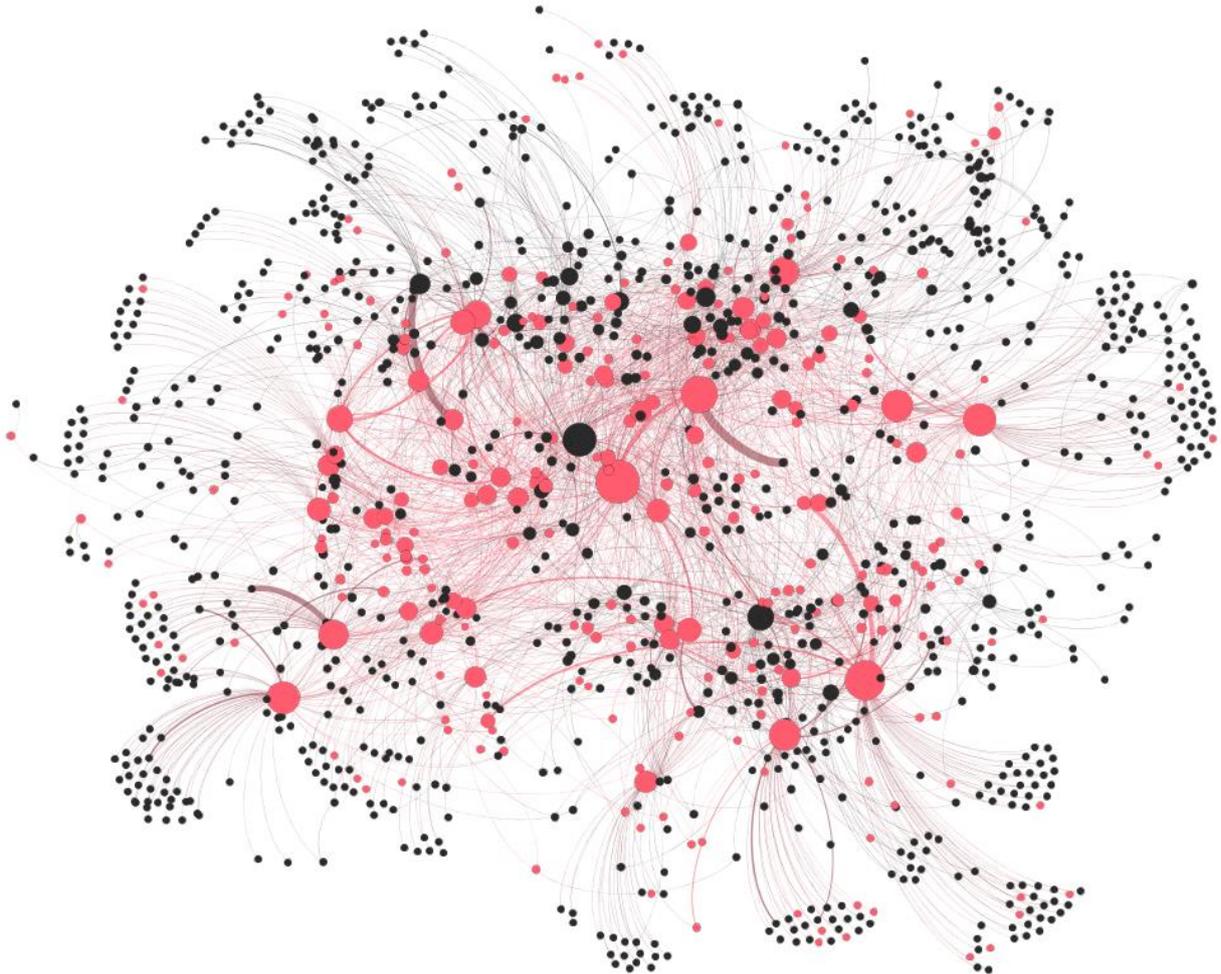
Table 6
Impact of Linkages with Exporters on Domestic Firms' Sales, Number of Employees, and Sales per Employee:
Heterogeneity across Sectors

Total Sales						
	All Firms		Prior Linkages		No Prior Linkages	
Linkage (t) * Exporter (t) * Horizontal Linkage	0.022***		0.023***		0.023*	
	(0.003)		(0.003)		(0.01)	
Linkage (t) * Exporter (t) * Vertical Linkage	0.030***		0.030***		0.030***	
	(0.002)		(0.003)		(0.005)	
Linkage (t) * Exporter (t) * Primary or Manufacturing		0.038***		0.037***		0.023*
		(0.007)		(0.007)		(0.013)
Linkage (t) * Exporter (t) * Services		0.030***		0.032***		0.029***
		(0.003)		(0.004)		(0.005)
Employees						
	All Firms		Prior Linkages		No Prior Linkages	
Linkage (t) * Exporter (t) * Horizontal Linkage	0.006***		0.008***		0.000	
	(0.001)		(0.001)		(0.006)	
Linkage (t) * Exporter (t) * Vertical Linkage	0.007***		0.008***		0.006**	
	(0.001)		(0.002)		(0.002)	
Linkage (t) * Exporter (t) * Primary or Manufacturing		0.007*		0.008***		0.005
		(0.002)		(0.003)		(0.006)
Linkage (t) * Exporter (t) * Services		0.009***		0.008***		0.005*
		(0.002)		(0.001)		(0.003)
Sales by Employee						
	All Firms		Prior Linkages		No Prior Linkages	
Linkage (t) * Exporter (t) * Horizontal Linkage	0.015***		0.015***		0.024*	
	(0.002)		(0.003)		(0.013)	
Linkage (t) * Exporter (t) * Vertical Linkage	0.023***		0.023***		0.022***	
	(0.002)		(0.003)		(0.005)	
Linkage (t) * Exporter (t) * Primary or Manufacturing		0.031***		0.029***		0.019
		(0.007)		(0.009)		(0.013)
Linkage (t) * Exporter (t) * Services		0.021***		0.025***		0.024***
		(0.003)		(0.004)		(0.005)
Firm Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Sector-Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Firm-Level Controls	Yes	Yes	Yes	Yes	Yes	Yes
Firm-Level Link Controls	Yes	Yes	Yes	Yes	Yes	Yes
Observations	190,628	190,628	85,772	85,772	104,856	104,856

Source: Authors' calculations based on data from Uruguay's DGI, DNA, and URUGUAY XXI.

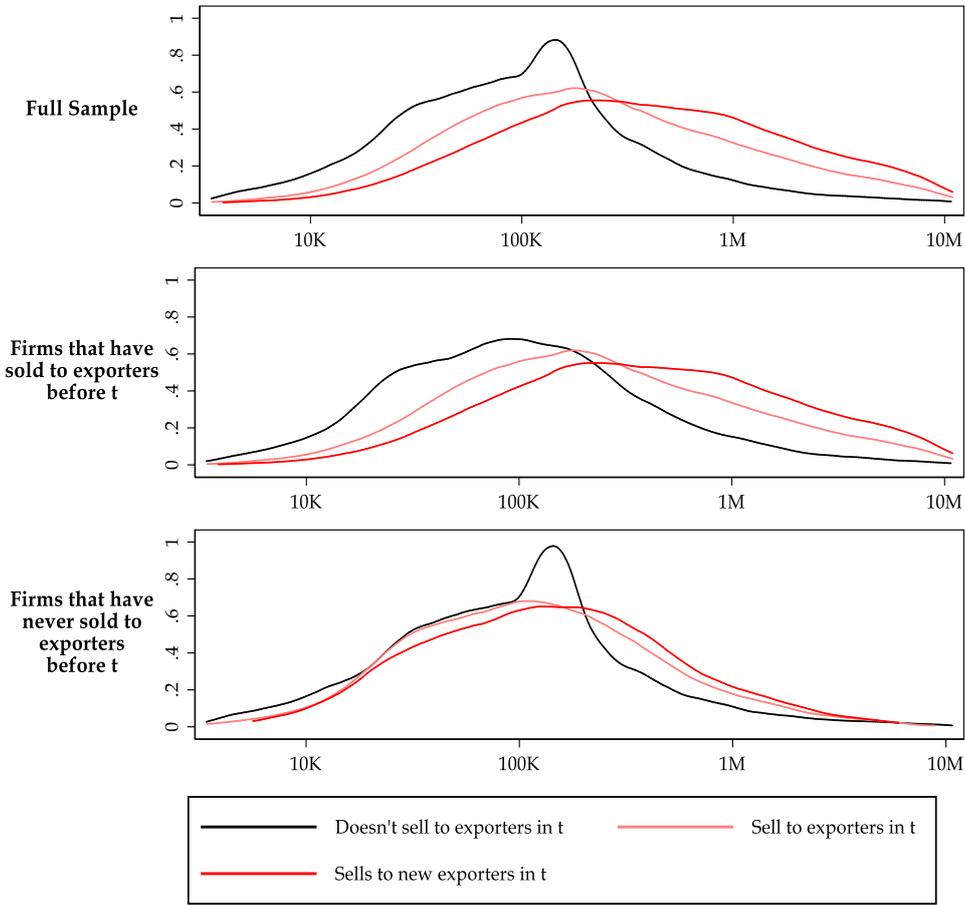
The table is divided into three panels: in the top one the dependent variable is the total sales in logarithmic terms, in the middle one the dependent variable is the total number of employees and in the bottom one the dependent variable is sales by employee in logarithmic terms. The table has three different samples. The first sample (*All Firms*) includes all firms, the second one (*Prior Linkages*) includes only firms that had been linked with exporters before t and the third one (*No Prior Linkages*) includes only firms that had not been linked with exporters before t . In all cases the main explanatory variable ($Linkage(t) * Exporter(t)$) is a binary variable that takes value one if firm i sells to at least one exporter in t . For each sample there are two sets of results: one in which the main variable is interacted with a binary variable that takes value one if firm is in primary or manufacturing sectors (*Primary or Manufacturing/Services*) and another one in which the main variable is interacted with a binary variable that takes value one if the exporter with which the firm links is in the same sector (*Horizontal/Vertical*). All specifications include the following controls: the lagged importing status, the lagged number of buyers and the lagged number of suppliers, as well as a set of binary variables that take value one, respectively, if the firm buys from exporters, sells to importers, or buys from importers. The specifications for total sales also include as a control lagged number of employees, whereas the specifications for the number of employees also include as a control lagged total sales. All specifications include firm and sector-year fixed effects. Standard errors are clustered by firm.

Figure 1
Network of Suppliers of Uruguayan Firms in the Food Manufacturing Sector



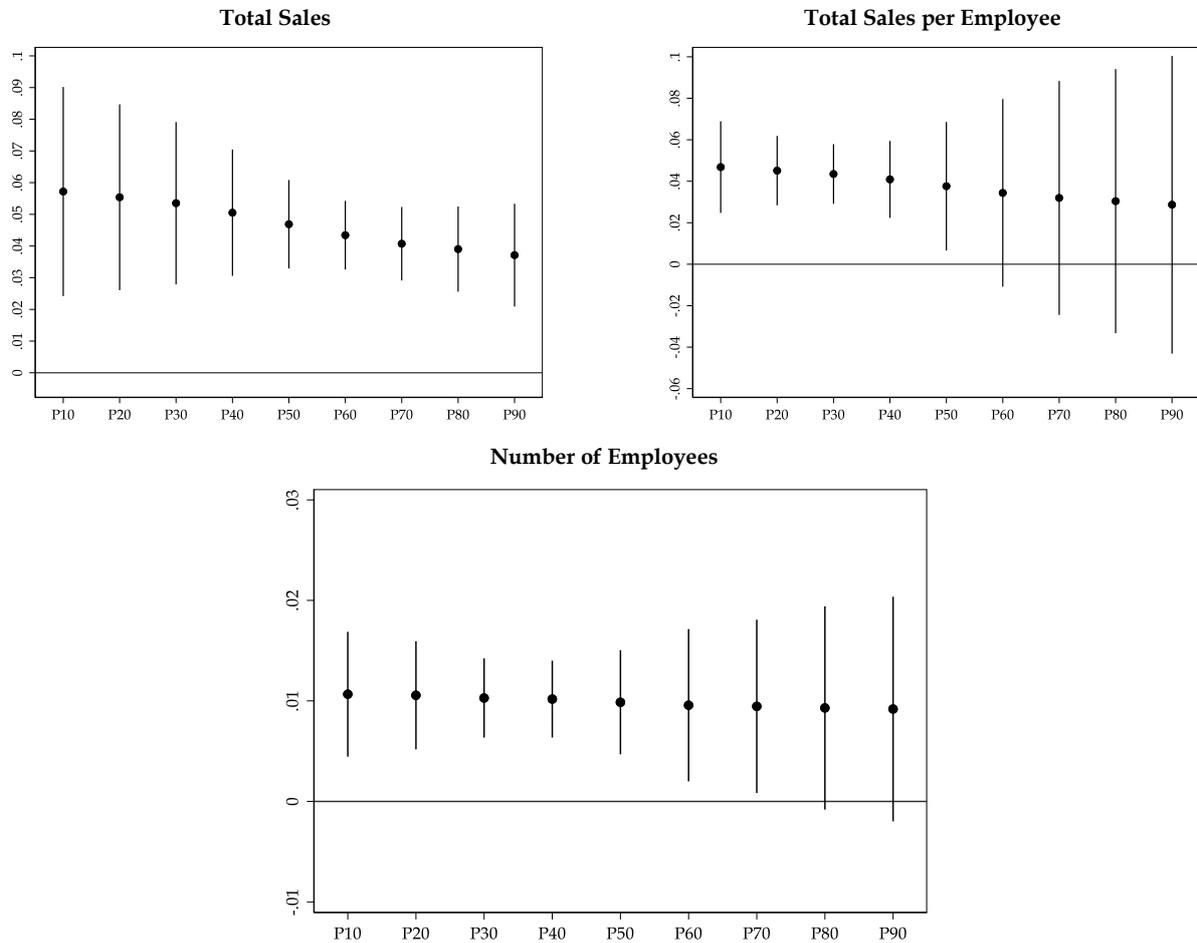
Source: Authors' calculations based on data from Uruguay's DGI, DNA, and URUGUAY XXI. Each edge shows yearly firm-to-firm sales to firms in the food manufacturing sector (ISIC Rev 4 code 10) in Uruguay in the year 2016. All firm-to-firm sales above \$50,000 USD in 2016 are depicted. Red nodes correspond to exporting firms, black nodes correspond to non-exporting firms. Edges are black if the receiving firm is an exporter and pink if the receiving firm is not an exporter. Node size is logarithmically scaled by the total number of connections in the network (indegrees plus outdegrees). Edge size is logarithmically scaled by transaction value.

Figure 2
Distribution of Sales Depending on Whether Firms Sell to Exporters or Not and by Sample



Source: Authors' calculations based on data from Uruguay's DGI, DNA, and URUGUAY XXI. The three panels represent the distribution of sales (in USD and in a logarithmic scale) for three different samples: the full sample, that of firms that have sold to exporters before t and that of firms that have never sold to exporters before t. For each sample, the figures represent the Kernel density of total sales for firms according to their linkages with exporters in t: firms that don't sell to any exporters in t, firms that sell to at least one exporter in t and firms that sell to at least one new exporter in t.

Figure 3
Quantile Regressions of the Impact of Linkages with Exporters



Source: Authors' calculations based on data from Uruguay's DGI, DNA, and URUGUAY XXI. The figures represent quantile fixed effects regressions of Equation (1) following Machado and Santos Silva (2019), which estimates regression quantiles via conditional means. The dependent variables are, respectively, total sales, number of employees and sales per employees (in logarithmic terms in all cases). The quantiles estimated are percentiles 10 through 90 in increments of 10. In all cases the main explanatory variable is $Linkage(t) * Exporter(t)$, a binary variable that takes value one if firm i sells to at least one exporter in t . The sample is the sample of all firms. All specifications include as controls the lagged importing status and a binary variable that takes value one if the firm buys from exporters (that is, if there are forward linkages with exporters). All specifications include the following controls: the lagged importing status, the lagged number of buyers and the lagged number of suppliers, as well as a set of binary variables that take value one, respectively, if the firm buys from exporters, sells to importers, or buys from importers. The specifications for total sales also include as a control lagged number of employees, whereas the specifications for the number of employees also include as a control lagged total sales. All specifications include firm fixed effects. Standard errors are clustered by firm.

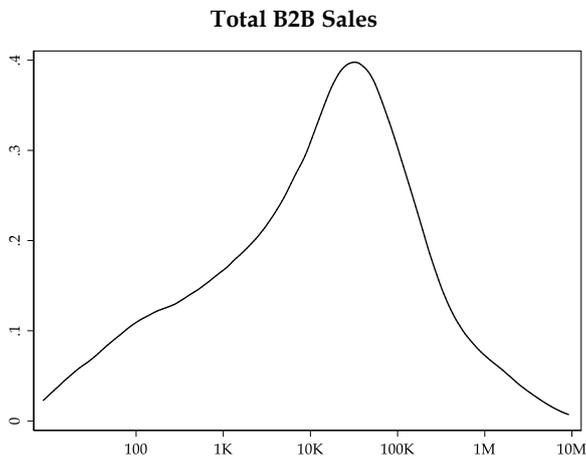
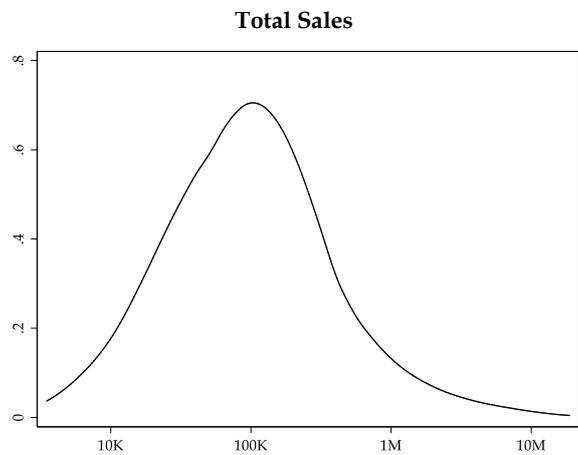
Appendix

A1 Comparison of the Uruguayan and Belgian B2B networks

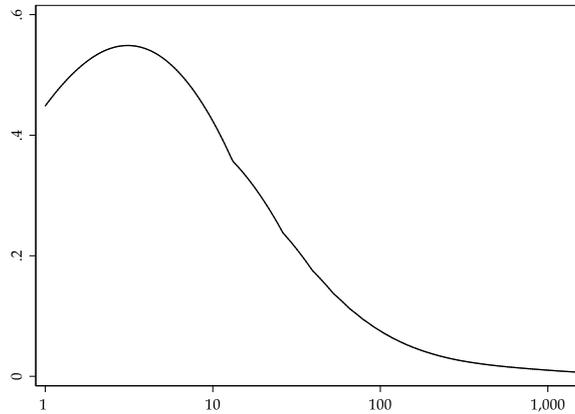
Country	Belgium	Uruguay
Number of Firms Included	94,334	52,299
Median Total Sales (1000 USD)	1,058.9	139.6
Median Number of Buyers	26	9
Median Number of Suppliers	53	32

Note: The Belgian network is based on Bernard et al. (2019)

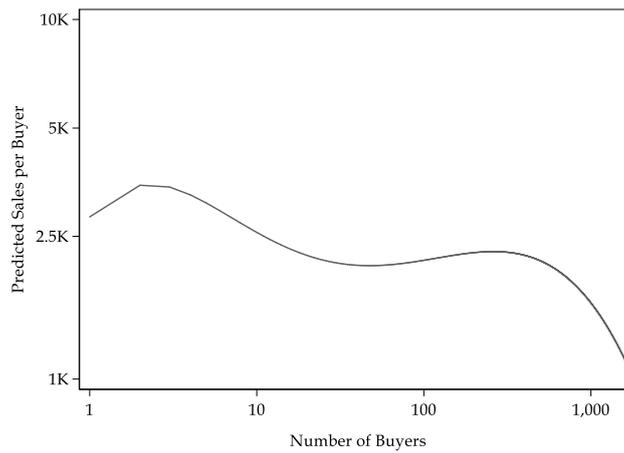
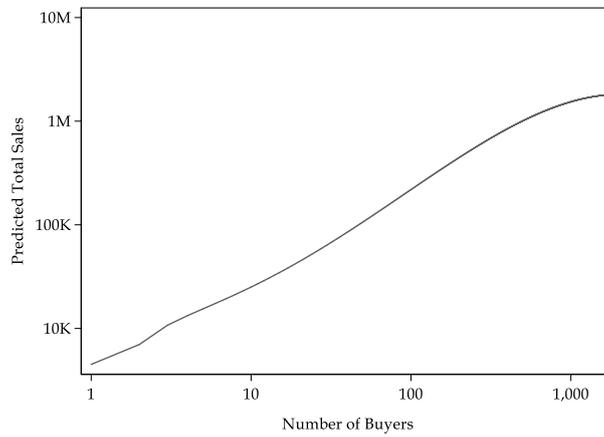
Stylized Fact I: “The distributions of firms’ total sales, buyer-supplier connections and buyer-supplier bilateral sales exhibit high dispersion and skewness.”



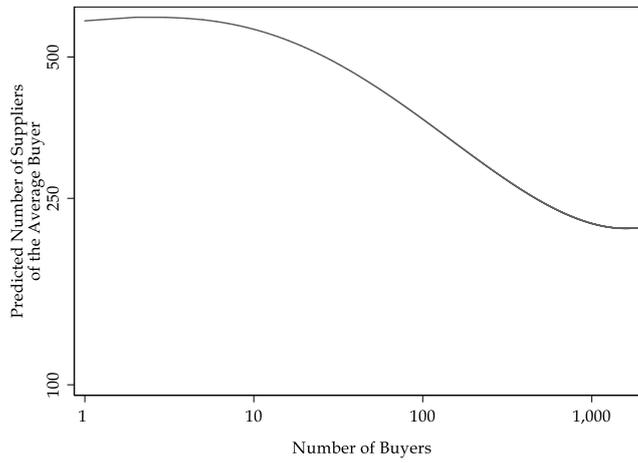
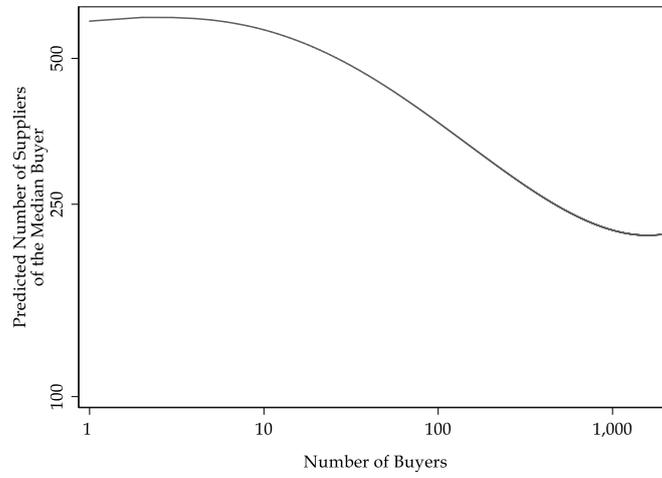
Number of Buyers



Stylized Fact II: “Firms with more customers have higher sales but lower sales per customer”.



Stylized Fact III: “There is negative degree assortativity among sellers and buyers”.



Source: Authors' calculations based on data from Uruguay's DGI, DNA, and URUGUAY XXI.

Table A2
Export Promotion and Exporting Status

Receives TPA	0.043** (0.017)
Firm Fixed Effects	Yes
Sector-Year Fixed Effects	Yes
Firm-Level Controls	Yes
Firm-Level Link Controls	Yes
Observations	185,381

Source: Authors' calculations based on data from Uruguay's DGI, DNA, and URUGUAY XXI.

Table A3
Alternative Link Intensity Heterogeneity

	All Firms		Prior Linkages		No Prior Linkages	
	Total Sales					
Linkage (t) * Exporter Tenure above Median	0.033***		0.032***		0.030***	
	(0.002)		(0.003)		(0.006)	
Linkage (t) * Exporter Tenure below Median	0.018***		0.015***		0.026***	
	(0.002)		(0.002)		(0.017)	
Linkage (t) * Exports to More Countries than Median		0.028***		0.027***		0.021**
		(0.003)		(0.003)		(0.012)
Linkage (t) * Exports to Less Countries than Median		0.016***		0.013***		0.038**
		(0.002)		(0.002)		(0.017)
	Number of Employees					
Linkage (t) * Exporter Tenure above Median	0.008***		0.008***		0.007**	
	(0.001)		(0.001)		(0.003)	
Linkage (t) * Exporter Tenure below Median	0.004***		0.003***		0.003	
	(0.001)		(0.001)		(0.003)	
Linkage (t) * Exports to More Countries than Median		0.010***		0.010***		0.011*
		(0.001)		(0.001)		(0.006)
Linkage (t) * Exports to Less Countries than Median		0.005***		0.005***		0.010
		(0.001)		(0.001)		(0.009)
	Sales per Employee					
Linkage (t) * Exporter Tenure above Median	0.025***		0.025***		0.024***	
	(0.002)		(0.002)		(0.006)	
Linkage (t) * Exporter Tenure below Median	0.014***		0.012***		0.023**	
	(0.002)		(0.002)		(0.006)	
Linkage (t) * Exports to More Countries than Median		0.019***		0.018***		0.030*
		(0.003)		(0.003)		(0.016)
Linkage (t) * Exports to Less Countries than Median		0.011***		0.009***		0.011
		(0.002)		(0.002)		(0.012)
Firm Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Sector-Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Firm-Level Controls	Yes	Yes	Yes	Yes	Yes	Yes
Firm-Level Link Controls	Yes	Yes	Yes	Yes	Yes	Yes
Observations	190,628	190,628	85,772	190,628	104,856	190,628

Source: Authors' calculations based on data from Uruguay's DGI, DNA, and URUGUAY XXI.

Table A4
Back-of-the-Envelope Calculation
Spillover Size

	Total Sales	Employees	Sales per Employee
Average before Starting to Sell to Exporters	870,912.58	5.92	147113.61
Estimated Coefficient	3.09%	0.81%	2.24%
Average Estimated Increase	26,911.20	0.05	3295.34

Source: Authors' calculations based on data from Uruguay's DGI, DNA, and URUGUAY XXI.

Linking with an exporter is associated with an increase in sales of almost 29,000 USD and a small but statistically significant increase in the number of employees of 0.51% (0.03).