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Abstract: How do firms' sales interact across markets? Are foreign and domestic sales complements or substitutes? Using a large French firm-level database that combines balance-sheet and product-destination-specific export information over the period 1995-2001, we study the interconnections between exports and domestic sales. We identify exogenous shocks that affect the firms' demand on foreign markets to instrument yearly variations in exports. We use alternatively as instruments product-destination specific imports or tariffs changes, and large foreign shocks such as financial crises or civil wars. Our results show that exogenous variations in foreign sales are positively associated with domestic sales, even after controlling for changes in domestic demand. A 10% exogenous increase in exports generates a 1.5 to 3% increase in domestic sales in the short-term. This result is robust to various estimation techniques, instruments, controls, and sub-samples. It is also supported by the natural experiment of the Asian crisis in the late 1990's. We discuss various channels that may explain this complementarity.

Keywords: Export dynamics, domestic sales, markets, liquidity
JEL classification: F10, F44, L20

Résumé: Les ventes des entreprises sur différents marchés sont-elles liées entre elles ? Comment les ventes sur le territoire national réagissent-elles aux variations de ventes sur leurs marchés d'exportation ? Pour répondre à ces questions relatives à l'interconnexion des marchés d'une firme, cette étude fait appel à une base de données d'entreprises combinant des informations sur le chiffre d'affaire à l'export, et sur le chiffre d'affaire réalisé en France, par des entreprises implantées sur le territoire national pour la période 1995-2001. La méthodologie utilisée conduit à "instrumenter" les ventes sur les marchés d'exportation d'une firme par des chocs qui lui sont exogènes. Ces instruments incluent la demande d'importations sur chaque destination et produit, les droits de douanes imposés par produit sur chaque destination, les crises financières intervenues sur les marchés de la firme ou encore les guerres civiles. Les résultats des estimations indiquent que les variations exogènes des ventes à l'exportation d'une firme conduisent à une variation de ses ventes domestiques dans la même direction. Ce résultat reste valide lorsque l'estimation contrôle pour la possible corrélation des chocs de demande entre la France et les marchés d'exportation de la firme. Une hausse exogène de 10% des ventes à l'exportation tend à accroître les ventes domestiques de la firme de l'ordre de 1,5% à 3% la même année. Ce résultat est robuste à un grand nombre de tests alternatifs détaillés dans l'article. La dernière partie de l'article discute des mécanismes qui pourraient engendrer cette complémentarité entre ventes domestiques et ventes à l'exportation des firmes.

Mots clé : dynamique d'exportation des firmes, ventes domestiques, liquidité
Classification JEL : F10, F44, L20

1 Introduction

The sales of a firm are distributed across several markets, each of these markets being identified by a specific location and a particular product. Empirical evidence shows that large, productive firms explore more markets and have larger average sales. How sales between these different markets interplay, beyond the simple correlation of market-specific shocks, remains however unclear, though it may be an important determinant of firm-level dynamics and have important implications for the transmission of foreign shocks to the domestic economy.

This paper provides an empirical investigation of this question through the lens of the relationship between French firms' exports and domestic sales. As sales decisions across markets are likely to be simultaneously determined, we develop a strategy that identifies variations in the foreign demand addressed to the firms to predict exogenous changes in exports, and their effect on the firms' domestic sales. The different dimensions of our data allows us to build instruments that capture the demand specifically addressed to a given firm in the foreign markets (destinations and products) it serves, while controlling for the conditions it faces in the domestic market.

Our empirical analysis relies on a large firm-level dataset containing both firm-level trade data from the French Customs and balance-sheet information over the period 1995-2001, at a yearly frequency. In particular, the balance-sheet data contains domestic and foreign sales, our main variables of interest. The customs data contains firm-level exports and imports by product and destination. This information is used to identify variations in the demand addressed to firms in both foreign and domestic markets. We build several instruments. In our baseline estimates, we use the sum of imports in the products-destinations served by the firms, weighted by the share of each product-destination in the firm's total exports.[1] Importantly, we also consider a number of alternative instruments, including firm-specific tariff changes and exposure to large foreign shocks, such as financial crises or civil wars.

We find that a 10% exogenous increase in exports generates a 1.5 to 3% increase in domestic sales in the short-run, depending on the specification. This complementarity is robust to various estimation techniques, combinations of instruments, sub-samples, and inclusions of additional controls. These variations in domestic sales are related to both factor accumulation and changes in total factor productivity. Our results are valid in cases where the foreign demand for firms'

[1] A product is defined at the HS6 level.

products is either increasing or decreasing, the effect being slightly larger in the latter case.

Why are firms' domestic sales positively related to exogenous changes in exports? In most international trade models (e.g. Melitz, 2003), domestic and foreign sales are only related through idiosyncratic firm productivity shocks. Exogenous shocks affecting a given location have no effect on sales in other markets. While the main purpose of is paper is mainly to provide a robust characterization of an empirical stylized fact, several theoretical mechanisms can be used to rationalize the existence of a relation between exports and domestic sales, mainly through cost linkages. Increasing export sales may come at the expense of domestic sales in the short run in the presence of capacity constraints, i.e. if the marginal cost is increasing with quantities. On the other hand, changes in exports driven by external demand shocks could also reduce marginal cost, for instance in cases where production exhibits increasing returns to scale, or if changes in export sales provide firms with cheap liquidity that can be used to finance domestic operation in the short-run, i.e. to pay suppliers, hire workers or make investments.

Our results do not preclude the possibility of capacity constraints in the short-run, but simply suggest that they do not dominate when changes in exports are driven by external demand shocks in the firms' markets, which are orthogonal to firms' characteristics. While the main objective of this paper is not to provide a definitive answer to the mechanism underlying our findings, we provide a number of results supporting the liquidity channel. First, we show that the positive effect of exogenous changes in exports on domestic sales is stronger for firms selling a larger part of their total sales internationally, and for small firms. Second, this complementarity is higher in sectors in which firms rely more on the use of short-run liquidity - due to higher working capital requirements -, and in sectors in which firms are less profitable and therefore financially more vulnerable.

Our results have direct consequences for the effect of international trade on the synchronization of international business cycles. Common wisdom generally attributes the strong correlation between openness and the synchronization of business cycles to a simple mechanism: as economies become more open, exports and imports represent a larger share of firms' total sales or input purchases.[2] This makes firms more sensitive to variations in foreign demand, which tends

[2]Theoretically, the fact that international trade causes tighter business cycle synchronization is ambiguous. If trade openness leads to greater specialization, and cycles are predominantly sector-specific, trade openness may actually decrease business cycle correlation. However, empirical works have found strong evidence that trade openness amplifies international business cycles correlation. See, among many others, Frankel and Rose (1998) or Baxter and Kouparitsas (2005).

to propagate shocks. Our results imply that foreign business cycles may be transmitted to domestic markets through the complementarity between firms' domestic and foreign sales.

Our results have implications regarding the transmission of foreign trade policy, exchange rate shocks or financial crises to the domestic economy. In the case of the 1997-98 Asian crisis, we indeed show that firms that were more exposed to the destinations that experienced the crisis suffered a larger drop in domestic sales during the event. More generally, our results support the idea that changes in exports in one market, due to changes in market-specific demand conditions, tend to affect sales in other markets in the same direction. This transmission of firm performance across markets is not explained by business cycles' synchronization.

A very recent, yet flourishing, body of literature has emphasized the role of cost linkages in explaining how exports affect the volatility of firms' sales (Vannoorenberghe, 2012, Soderbery, 2012, Nguyen and Schaur, 2011, Blum *et al.*, 2011, Ahn and McQuoid, 2012).[3] The general idea of these papers is that firms may substitute sales away from a given market when growth opportunities appear in other markets, if their production function exhibits convex marginal costs. The fact that firms' exports (or export status) are negatively correlated with their domestic sales is consistent with this mechanism. Our results show that when changes in exports are driven by external demand shocks, which are exogenous to firms idiosyncratic shocks, domestic sales do vary in the same direction.

Finally, a number of recent empirical papers have tested the influence of foreign macroeconomic shocks on firms' activities through factor utilization and productivity. Of particular interest are the papers by Ekholm *et al.* (2012) and Hummels *et al.* (2010). Ekholm *et al.* (2012) showed that for Norway, firms that were more exposed to the appreciation of the Krona in the early 2000's (through higher competitive pressure at home or reduced competitiveness on foreign markets) restructured more. Hummels *et al.* (2010) showed that for Denmark, positive export shocks lead to an expansion of firms' employment and wages paid to all types of workers. Our results suggest that these gains are not only directly related to foreign shocks, but may also be the indirect consequence of the complementarity between export and domestic sales.[4]

[3]This recent literature follows a more ancient research documenting the relationship between exports and domestic production at the country level (Ball *et al.*, 1966, Dunlevy, 1980; Haynes and Stone, 1983; Zilberfarb, 1980). Most of these papers tested the "capacity pressure" hypothesis, using aggregate data, and produced mixed results.

[4]To a lesser extent, our paper also contributes to the vast literature interested in the effect of international trade on firm performance, which has been a major area of research since the late 1990's. Most papers focused on the link between exporting and productivity at the firm level, showing that the most productive firms self-

The next section presents the data and some descriptive statistics. Section 3 presents our empirical methodology. Section 4 reports our baseline results, a number of robustness checks, and an test of our results using the 1997-98 Asian crisis as a natural experiment. We discuss various potential channels of transmission in section 5. The last section concludes.

2 Data and stylized facts

2.1 Database

Our empirical analysis relies on two main datasets that report information at the firm level.

The first source is the balance sheet dataset BRN (Bénéfice Réels Normaux), which relies on fiscal declarations by domestic French firms. The BRN database is constructed from mandatory reports of French firms to the tax administration, which are in turn transmitted to INSEE (the French Statistical Institute). This dataset reports information including firms' total sales and export sales, employment, capital stock, value added, the industry, year, and balance-sheet variables. The data covers the period 1995-2001, for which we have information on both the total sales and export sales. This combined information is used to compute domestic sales. The BRN contains between 650,000 and 750,000 firms per year over the period, which is around 60% of the total number of French firms.[5] Importantly, this dataset is composed of both small and large firms, since no threshold applies on the number of employees. Eaton *et al.* (2004) and Eaton *et al.* (2011) provide a more detailed description of the database. Because we are interested in the relationship between export flows and domestic sales, we only keep firms that export at least once over the period 1995-2001. We also restrict our analysis to firms whose primary activity is manufacturing. This excludes in particular wholesalers. Finally, we clean the data by dropping the firms that have a share of exports over total sales above 90%[6], and the top and bottom percentile in terms of total average sales growth.

select on export markets. They provide only mixed evidence on the productivity gains generated by entry into foreign markets, however (early works include Bernard and Jensen, 1999 or Bernard and Wagner, 1998; for recent contributions see De Loecker, 2007, Van Biesebroeck, 2005, Park *et al.*, 2009). These results have led many authors to argue that trade liberalization may affect economic growth mainly through the process of resource reallocation across firms within sector, with little contribution of productivity gains within firms. Our results suggest that export performance may affect domestic performance in the short-term, either through factor accumulation or TFP gains.

[5]The BRN files contain all firm which sales at least 763 K euros (230 K euros for services).

[6]This drops firms located in France whose main activity is to sell goods abroad. Less than 1.8% of the observations are dropped. Note that our results are robust to the use of the full sample.

The second source of data used in this paper corresponds to the French customs data, which reports exports flows with firm, destination and product dimensions. Both the quantity (in tons) and value of each flow are reported. The product classification system is the European Union Combined Nomenclature at 8 digits (CN8). The customs database is quasi-exhaustive.[7] After merging the two sources, we are left with about 95% of French exports contained in the customs data each year.

Our strategy relies on the estimation of the effect of export sales on domestic sales. We use the firm-specific structure of exports (by destination *and* by product) to compute measures of the foreign demand addressed to each firm. We use either all products exported by the firms, or their main product. These variables are used as instruments for export sales in our empirical analysis. Their construction is further detailed in the next section. We also build alternative instruments using the Asian crisis as a foreign demand shock, tariffs, or civil wars.

2.2 Descriptive statistics

This section provides some descriptive statistics about the characteristics of the firms contained in our sample. Our final sample is an unbalanced panel containing 29,542 firms exporting at least once over the period 1995-2001. On average, around 21,000 firms report exports each year. Table 1 reports information for these firms regarding their number of employees, their domestic sales (in thousands of euros), their export sales (in thousands of euros), export share, which is measured as the ratio of export sales over total sales, and the log change of exports and domestic sales. The size of the firms contained in the data is very heterogeneous: it starts with a single employee for the smallest firm, whereas the largest has almost 82,000 employees.

The distribution of export share confirms that most of firms' sales correspond to business operations on the domestic market: half of firms in the sample export 13% or less of their total sales; 75% of firms export at most a third of their total sales. Hence, this empirical pattern confirms that firms' sales are mostly concentrated on the domestic market, whereas exports are concentrated on a small number of firms that have a large degree of internationalization. Finally, both export and domestic sales exhibit, on average, a positive growth (3% and 4% respectively), with foreign sales being significantly more volatile than domestic sales.

[7] Only some small shipments are excluded from this data collection. Inside the European Union (EU), firms are required to report their shipments by product and destination country only if their annual trade value exceeds the threshold of 150,000 euros. For exports outside the EU all flows are recorded, unless their value is smaller than 1000 euros or one ton. Those thresholds only eliminate a very small proportion of total exports.

Table 1: Descriptive statistics: firm size, sales and export share

	Mean	1st Quartile	Median	3rd Quartile	S.D.
Number of employees	114.9	12.0	32.0	76.0	619.4
Domestic sales	1.1e+05	7375.0	19442.6	55133.2	8.9e+05
Export Sales	57520.2	632.0	2794.0	13291.0	9.3e+05
Export Share	0.22	0.04	0.13	0.33	0.22
Δ ln Domestic sales	0.03	-0.07	0.03	0.14	0.27
Δ ln Export Sales	0.06	-0.21	0.04	0.31	0.90

Note: Source: authors' computation from BRN data. Export and domestic sales are expressed in thousands of euros. Export share corresponds to exports/total sales.

Table 2: Export share by firm-size class

Size class	Mean export Share
$<$ 20 employees	0.21
20 - 50 employees	0.19
50 - 100 employees	0.22
100 - 200 employees	0.25
200 - 500 employees	0.29
$>$ 500 employees	0.33
All categories	**0.22**

Source: authors' computation from BRN data. Export share corresponds to exports/total sales.

We now provide simple descriptive statistics regarding the relationship between firms' size and export share. Using the number of employees, six classes of firms' size are defined in Table 2. For each category, we report the average export share. Overall, these mean values are larger than the median presented in the previous table. However, the numbers that are displayed confirm that larger firms have a higher export share. On average, firms with 500 or more employees export a third of their total sales, whereas small firms export around 21% of their total sales. We will show that the positive effect of exogenous changes in exports on domestic sales is stronger in firms characterized by a high export share.

3 Empirical methodology

Endogeneity issues. Our main objective is to identify the effect of changes in export sales on domestic sales. In general, we want to estimate a specification taking the following form:

$$\ln Y_{it} = \alpha + \beta \ln X_{it} + \mu_i + \lambda_{kt} + \varepsilon_{it} \tag{1}$$

where X_{it} and Y_{it} are respectively the exports and domestic sales of firm i during year t. μ_i denotes firm-specific unobserved characteristics, and λ_{kt} represents sector $\times$ year dummies capturing sector-specific business cycle.[8] The latter captures in particular business cycle conditions and changes in input prices.[9] Our coefficient of interest is β, the coefficient on export sales X_{it}: a negative sign would imply substitutability between export and domestic sales, while a positive sign would suggest complementarity. Most international trade models would predict that $\beta = 0$, meaning that firm sales across markets are unrelated.

Endogeneity is obviously a major concern in this specification, and our coefficient of interest β might be biased for various reasons. The first potential bias comes from the correlation of demands shocks across markets. As explained in the next subsection, the different dimensions of our data allow us to build instruments capturing the demand specifically addressed to a firm in the foreign markets it serves (using sector and product information), *while controlling for the demand it faces in the home market.*

A second type of bias could arise due to firm-specific shocks. The direction of the bias is in general unclear. Idiosyncratic TFP shocks are generally expected to affect domestic and foreign sales in the same direction. Idiosyncratic shocks related to firm capacity could possibly generate complementarity or substitution across markets (for instance, any type of disruption in the supply chain could reduce production, and would affect sales in all markets. In that situation, sales could be reduced in all markets, or inventories could be reallocated across markets due to differences in profitability). Finally, firms may sell products in domestic and foreign markets at different stages of their life cycle, which would generate substitution between domestic and foreign sales.

As we are interested in the effect of exogenous changes in exports on firms' domestic sales, the

[8] A sector is defined at the 2 digit (NES classification) level.

[9] Alternatively, we will use in some specifications for comparison purposes, the number of firms that operate in the same industry (ln Number of firms$_{kt}$) and the industry domestic sales (ln Industry domestic sales$_{kt}$) when year dummies are used instead of sector-year dummies.

identification of this link requires instruments that are independent from firm-specific shocks, controlling for business cycle correlation across markets. Our strategy uses demand shocks addressed to each firm (using destination and product specialization), which are unaffected by firm characteristics. In the robustness analysis, we check that our results are not affected by the self-selection of firms in international markets.

Main Instruments. Our main instrument is constructed using information about the foreign demand addressed to the firm using product and destination information. Specifically, we compute the sum of foreign imports in the products-destinations served by the firm in year t (using country-level imports by product from the BACI data), weighted by the average share of each product-destination in the firm's total exports over the period (using the firm-level exports data). Weights are computed using the average share of the product-destination in the firm's total exports over the 1995-2001 period.[10] A product is defined at the 6-digit (HS6) level. More precisely, we define:

$$FD_{it} = \sum_{j,p} \omega_{ijp} M_{j,p,t} \tag{2}$$

where ω_{ijp} is the average share of each product p and destination j in firm i's exports over the period, and is time-invariant. $M_{j,p,t}$ is the total value of imports for product p and destination j in year t. All of the time-variation of the FD_{it} variable therefore comes from the country-level imports by product, not from the firm-level weights. This variable is expected to impact the firm's exports, but not domestic sales, unless foreign demand for the firm's products is correlated with the domestic demand of these products. To ensure that our results are not driven by this international business cycle correlation, we explicitly control in our baseline specification for the domestic equivalent of our instrument. It is defined as the domestic demand addressed to the firm (DD_{it}). This mirror variable is the sum of the world imports from France for all products exported by firm i (from the BACI data), weighted by the share of each product in the firm's exports (using the firm-level exports data that reflect product-specialization of firms):

$$DD_{it} = \sum_{p} \omega_{ip} M_{FR,p,t} \tag{3}$$

[10] As mentioned below, we have checked the robustness of our results with weights computed at the beginning of the period. See subsection "Alternative Instruments".

Therefore, this variable provides a firm-specific measure of domestic demand addressed to the firm. Alternatively, we compute the foreign demand and domestic demand variables using sales for the "core" product of the firm on each destination: FD_{it}^{core} and DD_{it}^{core}, respectively. The core product of the firm is defined at the HS4-digit level as the product with the highest value of export over the entire period. The detailed computation of these variables is provided in the data appendix.

Alternative instruments. Testing for overidentifying restrictions requires at least two instruments, as we have one endogenous regressor. To assess the exogeneity of our baseline instruments, and to show that our results are unchanged when using other measures of foreign demand, we construct a number of alternative instruments. First, we build a measure of firm-specific tariffs faced by French exporters, which depend on the destinations they serve and products they export. It is constructed essentially in the same way as FD_{it} above, but using tariffs instead of imports. Tariffs are arguably more exogenous because they are less correlated with domestic conditions. However, this instrument is weaker as tariff variations are limited over the period. Second, we make use of the occurrence of large (negative) shocks, such as civil wars or the 1997-98 Asian crisis, to show that our results hold whatever the source of variations in foreign demand. More details about the computations of these variables are provided later in the paper, as well as in the data appendix.

Are these various instruments accounting for the two endogeneity biases mentioned above? One issue might be that our baseline instrument (FD_{it}) is correlated with domestic demand conditions, and that we do not control appropriately for these through the inclusion of DD_{it}. We will show that this is unlikely to be the case. First, because the estimates of the coefficient on DD_{it} are systematically positive and significant as expected, and that the omission of this term tends to bias upward the β coefficient when using FD_{it} as instrument, which was also expected. Second, because using our alternative instruments such as tariffs, civil wars or the Asian crisis, which are clearly (especially the last two ones) unlikely to be correlated with domestic business cycles, leads to very similar results. Third, because our results hold equally for countries in which business cycles are correlated with the French ones, and for the others.[11]

A second issue might be that our instruments reflect firm characteristics which might jointly

[11]Including or not the domestic sales variable DD_{it} does not affect the coefficients on the export sales variable when the latter is instrumented by tariffs or civil wars; this clearly suggests that these variables are uncorrelated with domestic business cycle.

determine sales across different markets (in the same direction or not). Our baseline instruments contain two parts: (i) a foreign shock (imports, tariffs, civil wars, financial crises) which is unlikely to be correlated with firm-specific characteristics; (ii) weights which are potentially correlated with firm-specific characteristics. Here endogeneity concerns might remain, for the following reason. Eaton, Kortum and Kramarz (2011), among others, have shown that firms with higher productivity self-select into the most difficult markets. If these are markets which on average grow faster, then our baseline instrument might be correlated with firm productivity. Our estimations include firm-fixed effects which account for the average growth in the foreign markets served by the firm. What remains is the issue of the weights: the weights in our baseline specification are averages over the period. This might be problematic if, say, because of good productivity shocks a given year, the firm decides to export more to the faster-growing markets: this would mean that our instrument is positively correlated with productivity. But this can be remedied by constructing the weights at the beginning of the period: we will show that the results are actually very similar in this case, and the only reason we choose the average weight is to improve the strength of the instruments and therefore the efficiency of the estimation. Note also that in unreported regressions we got rid of the weights by only summing imports of the destinations-products served by the firm during the first year it exported. The results were very similar. We have also dropped the destination-specific dimension from the weights altogether (therefore computed initial weights by product) and again, the results were qualitatively similar.

Baseline specification. We include DD_{it} explicitly in equation (1). The following equation assesses the effect of exogenous changes in exports (through variations in the instruments presented above in a first stage) on domestic sales, controlling for domestic demand:

$$\ln Y_{it} = \alpha + \beta \ln \widehat{X}_{it} + \gamma DD_{it} + \mu_i + \lambda_{kt} + \varepsilon_{it} \tag{4}$$

Where $\ln \widehat{X}_{it}$ is the predicted value of log exports, coming from the first stage. We expect γ to be positive. We estimate specification (4) by two-stage-least-squares (2SLS). Note that our results are unchanged when the two-way relationship between export and domestic sales is jointly estimated using 3SLS, allowing for residual correlation across equations.[12] Finally, in all estimations, standard errors are robust to heteroscedasticity and clustered at the sectoral

[12]Results are available upon request. In general, we do not estimate jointly the two-way relationship between foreign and domestic sales as we do not have - apart from DD_{it} - enough instruments for domestic sales to be able to study comprehensively the effect of domestic sales on exports.

(2-digit) level using Froot (1989) correction.

Using alternative instruments allows us to perform Hansen's J-test of overidentifying restrictions. Insignificant test statistics indicate that the orthogonality of the instruments and the error term cannot be rejected; thus, our choice of instruments is appropriate on that ground. As shown later, the overidentifying restrictions cannot be rejected. Finally, we performed the Durbin-Wu-Hausman test for exogeneity of regressors. Unsurprisingly, the null hypothesis of exogeneity is rejected in most cases.[13] This clearly shows that we need to use IV methodologies to identify exogenous variations of exports. In all estimations, we report the F-stat form of the Kleibergen-Paap statistic, the heteroskedastic and clustering robust version of the Cragg-Donald statistic suggested by Stock and Yogo (2005) as a test for weak instruments. Most statistics are comfortably above the critical values, confirming that our instruments are strong predictors of export sales.

4 Main Results

4.1 Baseline regressions

Export-Domestic sales correlation. We start with a simple estimation of Equation (4) by OLS where the firms' domestic sales are explained by export sales and a set of controls for the domestic market conditions, firm fixed-effects and year dummies (alternatively with sector $\times$ year dummies). This specification offers a benchmark estimation of the relationship between domestic and foreign sales, which can be compared to our preferred estimations (presented in the following tables) where export sales are instrumented by foreign market demand.

Table 3 presents the results of the estimation in levels (column 1 and 2) and in first differences (columns 3 to 6). Domestic market conditions are controlled for by using a measure of the domestic demand addressed to the firm (ln Domestic demand$_{it}$ as defined by (3)), and, when the sector $\times$ year dummies are not included, the number of firms that operate in the same industry (ln Number of firms$_{kt}$) and the industry domestic sales (ln Industry domestic sales$_{kt}$). The results show that the correlation between domestic and foreign sales is slightly positive or negative depending on whether we use a fixed effects or a first differences estimator.[14] Moreover,

[13] Detailed results of these tests available upon request.

[14] The results of columns (3) to (6) are consistent with Vannoorenberghe (2012) and Ahn and McQuoid (2012) who also finds that domestic sales growth is negatively correlated with export sales growth.

Table 3: Export and domestic sales: correlation

	(1)	(2)	(3)	(4)	(5)	(6)
Dep. Var.	ln Dom. sales		Δ ln Dom. sales			
ln Export sales$_{it}$	0.011^{b}	0.011^{b}				
	(0.004)	(0.004)				
ln Domestic demand$_{it}$	0.132^{a}	0.139^{a}				
	(0.025)	(0.021)				
ln Number of firms$_{kt}$	0.368^{a}					
	(0.111)					
ln Industry domestic sales$_{kt}$	0.147^{a}					
	(0.055)					
Δ ln Export sales$_{it}$			-0.012^{a}	-0.013^{a}	-0.017^{a}	-0.018^{a}
			(0.003)	(0.003)	(0.003)	(0.003)
Δ ln Domestic demand$_{it}$			0.125^{a}	0.114^{a}	0.123^{a}	0.107^{a}
			(0.019)	(0.018)	(0.027)	(0.026)
Δ ln Number of firms$_{kt}$			0.164^{c}		-0.084	
			(0.088)		(0.068)	
Δ ln Industry domestic sales$_{kt}$			0.076^{a}		0.056^{a}	
			(0.026)		(0.020)	
Observations	146702	146702	110721	110721	110721	110721
Firm FE	Yes	Yes	No	No	Yes	Yes
Year dummies	Yes	No	Yes	No	Yes	No
Sector $\times$ year dummies	No	Yes	No	Yes	No	Yes

Robust Standard errors, clustered by industry, in parentheses. ^{c} significant at 10%; ^{b} significant at 5%; ^{a} significant at 1%.

variations of the domestic demand for products in which the firm is specialized are positively related to the firm's domestic sales. The effect of the number of domestic firms operating in the same industry is positive when significant, as the effect of industry domestic sales.

While this estimation provides an interesting correlation between the two variables, it however does not allow us to infer anything about the causal effect of an exogenous change in exports on domestic sales. In the rest of the paper, we shall use the aforementioned instruments to estimate the effect of an exogenous change in exports on domestic sales, originated by a variation of foreign demand.

Instrumental variables estimations: baseline estimations. We present in Table 4 the results of the 2SLS estimations, in which foreign sales are instrumented by measures of foreign demand addressed to the firm. In the first four columns, all variables are expressed in levels

and export sales are instrumented using foreign demand in firms' markets (FD_{it}, as defined in equation (2)). Column (1) includes year dummies and controls for additional variables that identify sector-specific domestic business cycle: the industry domestic sales and the number of domestic firms operating in the same industry. In columns (2) to (4), sector×year dummies are included instead. Estimation (3) which controls for the domestic demand addressed to the firm due to product-specialization is our preferred specification. Column (4) uses the foreign demand for the core (HS4) product exported by the firm (FD_{it}^{core} as defined above) as the instrument for exports.

The estimation results contrast with those presented in Table 3. Changes in firm exports, as predicted by external changes in foreign demand, are positively related with the variations of the domestic sales by the firm. This result is stable when we introduce industry×year dummies to better control for sector-specific shocks that may affect firm-level sales simultaneously in the domestic and export markets (column (2) to (6)). Controlling for the domestic demand addressed to products exported by firms tends to reduce the estimated β coefficient as expected, but it remains positive and very significant. Similarly, using as an alternative instrument the foreign demand addressed to the core product of the firm, while still controlling for the domestic demand addressed to the core product, leaves our estimate of the β coefficient unchanged (column (4)). In all cases, the strength of our instruments is confirmed by the Kleibergen-Paap statistics.

Columns (5) and (6) in Table 4 report the estimation results of the relationship between domestic and foreign sales, when all variables are expressed in first differences. Both estimations include sector×year dummies, and estimation (6) also contains firm fixed effects. These alternative specifications confirm that an increase in export sales, consecutive to an improvement in foreign demand conditions, raises domestic sales. [15] Overall, results from columns (1) to (6) suggest that a 10% exogenous increase in exports generates between 1.5 and 3.5% increase in domestic sales.

As shown in Table 11 in the appendix, these results are robust to the use of alternative weights in the computation of the instruments. In Table 11, columns (1) to (3), we use weights computed the first year the firm exports. In columns (4) to (6), we use the first two years. In all cases, the instruments are somewhat weaker than in our baseline estimates, which leads to

[15] These results also demonstrate that our estimates are not influenced by non-stationarity in the data that we use. In particular, estimates in first-difference with firm fixed effects in column (6) corrects implicitly for potential firm-specific trend.

Table 4: Baseline results

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Estimator	2SLS						2SLS	
Dep. Var.	ln dom. sales				Δ ln dom. sales		ln dom. sales	
Split							% exports inside EU	
Sample							Low	High
ln Export sales$_{it}$	0.146^{a}	0.220^{a}	0.159^{a}	0.239^{a}			0.199^{a}	0.129^{a}
	(0.033)	(0.028)	(0.029)	(0.041)			(0.044)	(0.033)
ln Number of firms$_{kt}$	0.315^{a}							
	(0.083)							
ln Indus. dom. sales$_{kt}$	0.122^{a}							
	(0.046)							
ln Domestic demand$_{it}$	0.099^{a}		0.105^{a}				0.105^{a}	0.103^{a}
	(0.023)		(0.021)				(0.036)	(0.016)
ln Dom. dem. core prod.$_{it}$				0.084^{a}				
				(0.018)				
Δ ln Export sales$_{it}$					0.232^{a}	0.341^{a}		
					(0.048)	(0.089)		
Δ ln Domestic demand$_{it}$					0.084^{a}	0.073^{a}		
					(0.013)	(0.014)		
Observations	146702	146702	146702	146702	110721	105135	67702	73516
Firm FE	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes
Year dummies	Yes	No	No	No	No	No	No	No
Sector $\times$ year dummies	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Kleibergen-Paap stat.	95.1	95.5	94.8	47.3	36.2	14.1	65.5	64.1

Robust Standard errors, clustered by industry, in parentheses. ^{c} significant at 10%; ^{b} significant at 5%; ^{a} significant at 1%. All estimations but (3) (first differences) include firm fixed effects. The critical value for the weak instruments test is based on a 10% 2SLS bias at the 5% significance level, which is 16.4 is all estimations. The instruments are the following. In columns (1), (2),(3), (5), (6), (7), (8): foreign demand in HS6 products exported by the firm (FD_{it} in the main text) - instruments taken in first difference in columns (5) and (6); in column (4): foreign demand for the core (HS4) product exported by the firm (FD_{it}^{core} in the main text).

more noisy estimates, but in all columns the effect of exogenous changes in export sales remains positive and significant.[16] Note that this is also the case when dropping from the estimations the years used for the computation of the weights (columns (2) and (5)). Our results though remain unaffected by the use of the initial weights in the construction of the instruments. This clearly suggest that we are not capturing changes in firm characteristics, but rather exogenous changes in foreign demand condition.[17]

Overall, these results obtained when we instrument for firm-level exports suggest that the OLS estimates of the β coefficient (in Table 3) are biased downward. In all specifications where firm-level exports are explained by variations of the foreign demand (Table 4), and therefore not affected by firm-level idiosyncratic shocks, we find that the β coefficient is positive: exogenous changes in firm-level exports are positively related to variations of firms domestic sales.

Business cycle correlation. Despite the fact that we explicitly control for firm-specific domestic demand in all specifications, one could still argue that the positive β coefficient that we estimate is explained by international business cycles synchronization that our controls fail to capture entirely. If this is the case, we would expect the complementarity between exports and domestic sales to be higher for firms exporting to countries in which business cycles are more synchronized with the French one. This would be the case, for instance, for French firms mainly exporting to EU destinations or more generally, to countries exhibiting a high business cycle correlation with France.

Columns (7) and (8) of Table 4 present estimates which control explicitly for these phenomena. We estimate the specification of column (3) on two different sub-samples, which include the firms exporting more or less inside the EU (i.e. firms for which the share of exports inside EU-15 is above or below the median of the sample), respectively: if the correlation between foreign and domestic business cycles was driving our results, the coefficient on exports should be higher for firms more exposed to the EU market, as business cycles are expected to be more synchronized. Our results are robust, whatever the sample considered. The positive effect of exports on domestic sales is found to be significantly higher for firms exporting more *outside*

[16]The Kleibergen-Paap statistic is reduced in estimations using weights in the beginning of the period for the construction of instruments, compared to estimation results reported in Table 4. This is all the more the case when we use our alternative instruments (e.g. tariffs) or when we test the channels of transmission.

[17]As mentioned earlier, in unreported regressions we got rid of the weights by only summing trade on the destinations served by the firm during the first year it exported. The results were very similar. We have also dropped the destination-specific dimension from the weights altogether (therefore computed initial weights by product) and again, the results were qualitatively similar. All these robustness checks are available upon request.

EU-15. This clearly suggests that business cycle correlation is unlikely to bias our results.

Alternative instruments. A more direct way to assess the reliability of our empirical methodology is to use additional instruments. This allows us to test for over-identifying restrictions and to show that the precise type of exogenous foreign shocks considered does not matter for the results. We construct two sets of alternative instruments.

As a first alternative instrument, we compute firm-specific tariffs, based on the products and destinations served by the firm. This instrument is computed exactly in the same way as FD_{it} in equation (2), but instead uses the multilateral (MFN) tariffs of destination j for (HS6) product p instead of imports. All instruments are described in full details in the data appendix. This instrument is arguably more exogenous, but also weaker as tariff changes over the period are limited. As a second alternative instrument, we compute variables reflecting the firm's exposure to civil wars in its destination countries. We define two variables: (i) a dummy variable that equals 1 if at least one of the destinations to which the firm exported in $t-1$ experiences a civil war in year t; and (ii) a variable representing the exposure to civil wars which equals the number of wars in the destinations served by the firm, weighted by the share of exports in these destinations in $t-1$.

Table 5: Alternative instruments

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Estimator	2SLS							
Dep. Var.	ln domestic sales							
ln Export sales$_{it}$	0.176^{a}	0.167^{a}	0.213^{b}	0.227^{b}	0.138^{b}	0.134^{b}	0.162^{a}	0.164^{a}
	(0.032)	(0.027)	(0.107)	(0.105)	(0.057)	(0.055)	(0.058)	(0.057)
ln Domestic demand$_{it}$	0.112^{a}	0.103^{a}		0.116^{a}		0.110^{a}		0.114^{a}
	(0.025)	(0.019)		(0.028)		(0.021)		(0.023)
Observations	122141	116344	89178	89178	116344	116344	98154	98154
Sector × year dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Instruments	FD_{it}+Tariffs	FD_{it}+CW	Tariffs		Civil War		Tar.+CW	
Hansen P-value	0.80	0.83	0.22	0.19	0.92	0.91	0.99	0.97
Kleibergen-Paap stat.	55.2	54.0	4.0	4.1	17.7	17.9	9.4	9.6

Robust Standard errors, clustered by industry, in parentheses. ^{c} significant at 10%; ^{b} significant at 5%; ^{a} significant at 1%. All estimations include firm fixed effects. The critical value for the weak instruments test is based on a 10% 2SLS bias at the 5% significance level, which is 19.9 in all estimations. See main text and appendix for a more detailed description of the instruments.

Table 5 contains the results. In addition to our baseline instrument, tariffs (column (1))

and exposure to civil war (column (2)) are used as additional instruments for exports. The Hansen tests of overidentifying restrictions cannot reject the exogeneity of our instruments in both cases, and the coefficients on exports sales are largely unaffected. Note that the number of observations is lower because we removed from the sample the firms that export only to countries in which there is no tariff variation over the period (this includes in particular EU countries) or for which information on the occurrence of civil wars is missing.

Estimations in columns (3) to (8) use our alternative instruments alone. We include both firm-specific tariff and its lag in columns (3) and (4) to test for overidentifying restrictions. Columns (5) and (6) contain the results using both the binary and the continuous proxies for firm-specific exposure to civil wars as instruments. Column (7) and (8) use both contemporaneous tariffs and exposure to civil wars as instruments. In all estimations, the Hansen test does not reject the orthogonality of our instruments, and the coefficient on export sales is always positive and significant at least at the 5% level. The coefficients are found to be quantitatively larger than before in columns (3) and (4), but our estimates are also less accurate. These results suggest that, whatever the (exogenous) shock affecting the firms' foreign sales, exogenous variations of exports are positively related to the variation of domestic sales. Interestingly, the results obtained using civil wars in columns (5) to (8) are very similar to our benchmark results from Table 4: a 10% decrease in exports generates an additional 1.3% to 1.6% decrease in domestic sales.

Note that all our instruments have the expected effect on exports, as shown in the Table 10 in the appendix, which reports the first stage coefficients. Finally, our results are unchanged when we restrict our sample to the firms that are present during the entire period (Table 12 in the appendix): the coefficient on export sales becomes statistically insignificant only when we use tariffs alone as an instrument, which is explained by the weakness of the instrument in this case. Therefore, firms close to bankruptcy, which could decrease simultaneously both exports and domestic sales, do not drive our results.

4.2 More robustness

Export diversification. One could argue that our results are partly driven by some firms that rely heavily on sales in a particular destination. On the other hand, more diversified exporters may be less affected by a shock in foreign markets. Table 6 show that our results hold for

all categories of exporters, even the most diversified ones. As shown in columns (1) and (2), the difference in the response of single versus multiple-destination exporters is not huge. In columns (3) and (4) our sample is split according to the average number of destinations reached by the firm over the period. The coefficient on export sales is significant at the 1% level in all specifications. Our results are therefore not driven by firms whose exports are concentrated in a single or few foreign markets.[18]

Table 6: Export and domestic sales: Export diversification

	(1)	(2)	(3)	(4)
Estimator		2SLS		
Split		# destinations		
Sample	Multiple	Single	Low	High
Dep. Var.		ln domestic sales		
ln Export sales$_{it}$	0.153^{a}	0.187^{a}	0.152^{a}	0.178^{a}
	(0.030)	(0.072)	(0.041)	(0.033)
ln Domestic demand$_{it}$	0.116^{a}	0.067^{b}	0.087^{a}	0.118^{a}
	(0.023)	(0.029)	(0.020)	(0.029)
Observations	115956	30746	73348	73354
Sector × year dummies	Yes	Yes	Yes	Yes
Kleibergen-Paap stat.	93.5	21.7	42.4	118.1

Robust Standard errors, clustered by industry, in parentheses. ^{c} significant at 10%; ^{b} significant at 5%; ^{a} significant at 1%. All estimations include firm fixed effects. The critical value for the weak instruments test is based on a 10% 2SLS bias at the 5% significance level, which is 16.4 is all estimations. The instrument in all specifications is foreign demand in HS6 products exported by the firm (FD_{it} in the main text). High / low: higher / lower than sample median.

Imports. Recent papers have shown that offshoring may exacerbate international business cycle correlation.[19] Another potential bias may arise in our estimations if firms export and import products from the same destination. The positive effect of foreign shocks on domestic sales could in this case be partly due to better or cheaper access to foreign inputs. Our firm-level customs data also contain information on firm-product-country specific imports, so that we can explicitly control for this channel in our estimations. We therefore include the firms' imports as a control variable in our estimation. This variable is either simply included as a control in the second stage equation or instrumented using the foreign supply addressed to the firm according to its product structure of imports (FS_{it}): foreign exports by country-product are weighted

[18]This is also confirmed when we split the sample according to measure of geographical concentration (e.g. Herfindahl index) of exports at the firm level.

[19]See Bergin *et al.* (2009) and Burstein *et al.* (2008).

by the share of each country-product pair in each firm's imports (see data appendix for more details).

Table 7: Robustness: imports

	(1)	(2)	(3)	(4)	(5)
Dep. Var.			ln domestic sales		
ln Export sales$_{it}$	0.159^{a}	0.102^{a}	0.217^{a}	0.210^{a}	0.210^{a}
	(0.029)	(0.031)	(0.042)	(0.044)	(0.052)
ln Domestic demand$_{it}$	0.105^{a}	0.087^{a}			
	(0.021)	(0.021)			
ln Imports$_{it}$		0.077^{a}	0.059^{a}	0.054^{b}	0.063^{a}
		(0.017)	(0.017)	(0.024)	(0.025)
ln Dom. demand main prod.$_{it}$			0.066^{a}	0.076^{a}	0.087^{a}
			(0.019)	(0.018)	(0.021)
Observations	146702	146702	146702	116344	94573
Sector × year dummies	Yes	Yes	Yes	Yes	Yes
Instruments	FD_{it}	FD_{it}	FD_{it}^{core}	FD_{it}^{core} + Tar.	FD_{it}^{core} + CW
Hansen p-value	-	-	-	0.19	0.56
Kleibergen-Paap stat. / S-Y Crit. val. (10%)	94.9/16.4	15.4/7.0	15.6/7.0	5.5/7.6	10.6/7.6

Robust Standard errors, clustered by industry, in parentheses. ^{c} significant at 10%; ^{b} significant at 5%; ^{a} significant at 1%. 2SLS estimations. The critical values for the weak instruments test are based on a 10% 2SLS bias at the 5% significance level. The instruments are the following: in columns (2) to (5), foreign supply in HS6 products imported by the firm (BC_{it}^{M} in the main data appendix); in columns (1) and (2) foreign demand in HS6 products exported by the firm (FD_{it} in the main text); in column (3) to (5) foreign demand for the core (HS4) product exported by the firm (FD_{it}^{core} in the main text); in column (4), firm-specific tariff; in column (5), exposure to civil wars. See appendix for more details.

Table 7 reports the estimation results that control specifically for firms' predicted imports. Columns (1) to (5) differ in terms of the instruments used for export sales: foreign demand in the HS6 product exported by the firm (columns 1 and 2), foreign demand for the core (HS4) product exported by the firm (column 3), firm-specific tariffs (column 4) or exposure to civil war (column 5). Imports are instrumented in all estimations but column (1). In these augmented specifications, the effect of export decreases slightly in column (2), but remains positive and significant at the 1% level in all specifications. The coefficient estimate of exports varies between 0.1 and 0.2, quantitatively close to our baseline results.

4.3 A quasi-natural experiment: the 1997-1998 Asian crisis

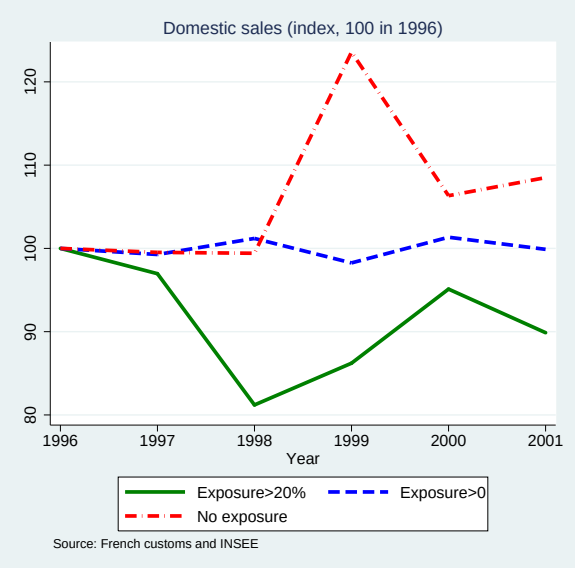
A direct implication of our results is that negative external demand shocks, such as those implied by financial crises, are transmitted to domestic sales through trade. The time period

for which our data is available allows us to directly assess the effect of a particular event, the 1997-1998 crisis in South-East Asia, on French firms' domestic sales. Both the banking and currency crises that several Asian countries experienced generated a large negative demand shock for French firms serving these destinations.

Figure 1 below shows the total domestic sales for different categories of French firms defined according to their exposure to countries that were the most affected by the crisis. "Exposure" is defined as the average share of total exports before the crisis (in 1995 and 1996) in the following destinations: Thailand, the Philippines, South Korea, Malaysia, and Indonesia. Panel (a) contains all the firms, while panel (b) considers the firms present in our sample over the whole 1995-2001 period. In both cases, the difference between the firms that were not exposed (i.e. did not export to these countries prior to the crisis) and the others is striking. The trend of domestic sales is either less positive for all firms with a positive exposure, or negative for firms with an exposure larger than 20%.

Figure 1: Domestic sales of French firms and exposure to the 1997-1998 Asian crisis

(a) All firms



(b) Firms present all years

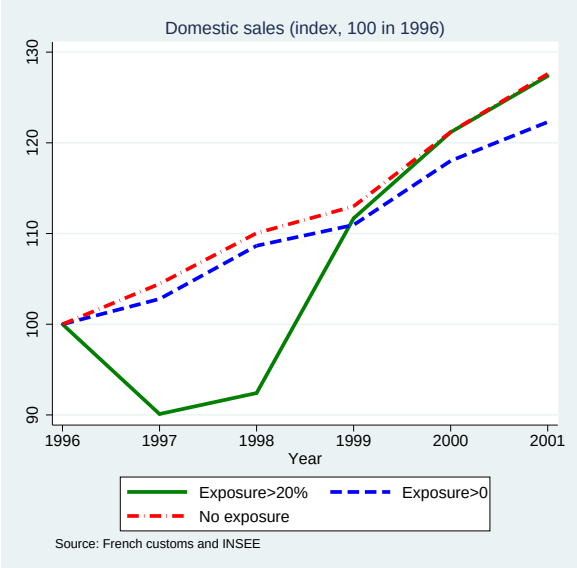


Table 8 reports estimates of the effect of the Asian crisis on French firms' domestic sales. We regress the log of domestic sales on an interaction term between a dummy variable which identifies the years of the crisis (Asian crisis$_{97-01}$, which equals 1 from 1997 on), and a dummy variable that equals 1 if the firms exported to the crisis countries before the start of the event and were consequently exposed to the shock (exposed$_i$). As already suggested by Figure 1, we

find that the crisis had a significantly more negative impact on domestic sales for firms that were exposed to the crisis countries (column 1). Domestic sales are found to be 3.5% lower for those firms. Controlling for domestic demand hardly affect this point estimate (column 2). In column (3), we show that we are not picking up the effect of a supply chain disruption: the effect is similar when excluding the firms which imported from these Asian countries before the crisis. In column (4), the estimation is performed on a sample of firms that are present through the entire time period of 1995-2001. Our results are robust to this alternative specification. In columns (5) and (6), the interaction term between the Asian crisis and firms' exposure before 1997 is used directly as an instrument for exports in the 2SLS estimation of the domestic sales equation ((1)). These results confirm our previous findings: the coefficient of the exports variable is positive and significant when the Asian Crisis_{97-01}*Exposed_i variable is used as instrument for exports, alone (column 5) or together with firm-specific tariffs (column (6)). The Hansen test indicates that we cannot reject the exogeneity of our instruments.[20]

Table 8: Effect of the Asian crisis on French firms domestic sales

	(1)	(2)	(3)	(4)	(5)	(6)
Sample	All	All	No imp.	Firms present	All	All
Sample			from Asia	all years		
Dep. Var.: ln Domestic sales						
Asian crisis_{97-01}*Exposed_i	-0.035^a	-0.036^a	-0.040^a	-0.039^a		
	(0.011)	(0.011)	(0.011)	(0.013)		
ln Export sales_{it}					0.731^b	0.435^a
					(0.335)	(0.143)
ln Domestic demand_{it}		0.142^a				
		(0.019)				
Observations	146702	146702	133774	66591	146702	122141
Dummies				Sector×Year		
Estimation	FE	FE	FE	FE	2SLS	2SLS
Instruments					Crisis	Crisis + Tariffs
Hansen p-value						0.46
Kleibergen-Paap stat. / S-Y Crit. val. (10%)				11.9/16.4	20.5/19.9	

Robust Standard errors, clustered by industry, in parentheses. ^{c} significant at 10%; ^{b} significant at 5%; ^{a} significant at 1%. OLS estimations in columns (1) and (2) and 2SLS estimations in columns (3) and (4). All estimations include firm fixed effects. Export sales instrumented by Asian crisis_{97-01} × Exposed_i in column (3), and by Asian crisis_{97-01} × Exposed_i *and* firm-specific tariffs in column (4). See data appendix for more details.

[20]The larger coefficients on export sales in columns (5) and (6) of Table 8 may suggest that negative foreign shocks are more likely to be transmitted to domestic sales than positive ones. The symmetry of the complementarity is discussed in Appendix C. Indeed, we do find in most cases that the effect of negative export variations is significantly larger than the effect of positive changes.

5 Channels of transmission

How can we explain the export-domestic sales complementarity in the short run? As mentioned earlier, in most international trade models, aggregate or idiosyncratic productivity shocks, together with local demand conditions, determines simultaneously the level of sales in each market. Exogenous changes in demand conditions in a given market have no effect on the level of sales in other markets: the β coefficient that we estimate should not be significantly different from zero. Our estimates of β are however systematically positive and significant, suggesting a complementarity between exports and domestic sales when the variation of exports in a given year is driven by changes in foreign demand conditions.

Several factors may explain why we observe a positive impact of exports on domestic sales. Before turning to these, first note that we are looking at contemporaneous effects. In the medium- to long-term, a rise in exports may increase the scale of domestic production through efficiency gains - the so-called learning-by-exporting hypothesis.[21] However, in the short-run, this is unlikely to explain our findings.

While economic theory does not point to a unique mechanism that would explain the complementarity we find in the data, domestic sales and exports may be connected through the existence of cost or capacity linkages. In general, a unique production process involves labor, equipments, and inputs for the production of a single good that will be sold in different markets. An exogenous increase in exports might enhance domestic sales if it improves firm capacity or its productive efficiency.[22]

Liquidity constraints. In the short-term, firms need liquidity to fulfill working capital requirements. That is, any firm needs liquidity to purchase capital, buy intermediates, or hire additional workers so as to increase their sales in a market. In the presence of financial constraints, this requires using internal liquidity rather than external borrowing.[23] Exogenous changes in export sales are directly related to the profitability of the firm, its short-run liquidity, and therefore its capacity to hire additional workers, invest in new equipments, or purchase

[21] See Wagner (2007) for a survey, and the studies by Bernard and Jensen (1999), De Loecker (2007) and Park *et al.* (2010).

[22] The results displayed in Table 14 in the appendix indeed show that both TFP and factor accumulation seems to be affected by foreign shocks through exports.

[23] Hubbard (1998) shows that firms' investments are closely linked to their financial health, which they interpret as the presence of credit constraints that lead firms to self-finance an important share of their investments. For France, Berthou and Hugot (2011) use a survey of French firms in 2008 and show that among exporters, 52% of the productive investment is self-financed.

inputs.

Note that this channel does not exclude the presence of capacity constraints in the short run. For a given level of aggregate domestic and foreign demand addressed to the firm, increasing domestic sales might come at the expense of sales in other markets if the marginal cost is increasing. This may be the case if firms structurally face financial or capacity constraints (Ahn and McQuoid, 2012). In the case of an external shock, however, an exogenous increase of exports may actually reduce the marginal cost, for example by providing cheap money to the firm that reduces the cost of financing and helps to relax the liquidity constraint.

We explore this transmission channel in more details in Table 9. First, we expect the export-domestic sales complementarity to be magnified for firms exporting a larger part of their total sales, as in this case the liquidity shock is larger. Similarly, as the dependence on short-term liquidity may be especially important for small firms, we should expect the effect to decrease with firm size. In column (1), we interact the export sales variable with the initial export to total sales ratio of the firm. This allows us to determine how the export-domestic sales relation is affected by firm exposure to foreign demand shocks. The interaction variable is itself instrumented by the interaction between our baseline instrument and the initial export to total sales ratio of the firm. We indeed find that exposure to foreign shocks tends to magnify the positive exports-domestic sales relationship, which confirms our baseline result. In column 2, the export sales variable is interacted with the initial size of the firm.[24] The coefficient of the interaction variable is negative and significant, i.e. smaller firms tend to benefit more from an exogenous increase in their exports than larger firms. The domestic sales of small firms are therefore more sensitive to variations in exports revenues, which may possibly come from tighter short-term liquidity needs.

A more direct way to assess the relevance of the liquidity mechanism is to use sectoral heterogeneity in terms of dependence upon short-run liquidity. More precisely, we follow a methodology akin to Rajan and Zingales (1998) and construct sector-specific indicators of profitability and of dependence upon short-term liquidity. A low level of profitability within a sector implies a weak capacity of firms to self-finance their investments at a low cost. In other sectors, firms might have higher working capital requirements. In each case, we expect that firms operating in less profitable sectors, or those operating in sectors with a higher need for

[24]Note that we demeaned the size variable in this column so that the coefficient on the non interacted export sales variable represents the effect for the firm with the average size in our sample.

short-term capital, are more sensitive to exogenous variations of the cash flow or exports.

As Rajan and Zingales (1998), our identification strategy is based on sectoral heterogeneity, which is not affected by individual firm characteristics. The first indicator we use is a sector-specific measure of working capital requirement (WCR_k), defined as the average working capital requirement over cash flow. This indicator represents the need of the sector in terms of short-run liquidity; a high value of WCR implies that firms in the considered sector have a higher need for short-term liquidity. Heterogeneity across sectors in terms of WCR can be explained by differences in the production or distribution processes, which can affect the frequency of earnings and payments. The second indicator is the sector-specific price-cost margin (PCM_k) that is, sales net of expenditures on labor and materials (gross operating profit) over value added. It can be interpreted as a sectoral indicator of profitability: firms belonging to sectors with a high value of PCM are therefore expected to have lower needs of short-term liquidity.[25]

In column (3) of Table 9, we interact the export sales variable with a dummy which equals 1 if the firm belongs to a sector which is above the sample median for WCR_k. The difference across sectors is striking: a 10% exogenous increase in foreign sales generates around 2.1% increase in sales at home for firms belonging to sectors with high working capital requirements, but only 0.9% for the others. The difference is significant at the 5% level. Figure 2.a shows the size of the effect for four groups of firms defined according to the quartiles of WCR ratio. 10% confidence intervals are depicted in grey around the estimated effect. The pattern is clear: the higher the need for short-run liquidity, the higher the effect of exogenous changes in exports on domestic sales. We repeat these exercises with the PCM indicator in column (4) of Table 9 and in Figure 2.b. Again, for firms belonging to the sectors with the lowest price-cost margins, and that are arguably more sensitive to changes in their cash flow, a given exogenous change in exports implies a larger response of domestic sales. This result is confirmed by the Panel (b) of Figure 2, which displays once again the effect for four groups of firms defined according to the quartile of PCM ratio. The pattern shown with the quartile decomposition in 2.b is symmetric to the one shown in 2.a: the higher the profitability of the sector, the smaller the effect of exogenous changes in exports on domestic sales.

[25] A sector is defined at the 3-digit (NES 114) level, although our results are qualitatively unchanged when using a broader (2-digit) classification. The working capital requirement ratio (WCR_k) is computed as the average working capital requirement divided by the average cash flow of the sector. The sector-level price-cost margin (PCM_k) is constructed by taking the average gross operating profit over value added by sector. All variables are from the BRN database.

Table 9: Channels of transmission

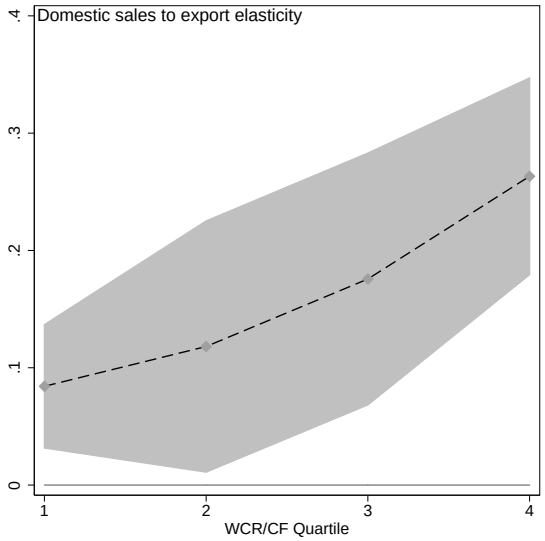
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Dep. Var.	ln Domestic sales							
ln Export sales$_{it}$	0.032	0.173^{a}	0.093^{a}	0.218^{a}	0.210^{a}	0.136^{a}	0.138^{a}	0.093^{b}
	(0.022)	(0.033)	(0.032)	(0.040)	(0.041)	(0.032)	(0.035)	(0.041)
ln export sales$_{it}$× export ratio$_{i0}$	0.591^{a}							
	(0.134)							
ln export sales$_{it}$× ln size$_{i0}$		-0.049^{a}						
		(0.013)						
ln export sales$_{it}$× high WCR$_{k}$			0.122^{b}					
			(0.052)					
ln export sales$_{it}$× high PCM$_{k}$				-0.109^{b}				
				(0.047)				
ln export sales$_{it}$× high AT$_{k}$					-0.095^{c}			
					(0.050)			
ln export sales$_{it}$× high ED$_{k}$						0.063		
						(0.057)		
ln export sales$_{it}$× high RS$_{k}$							0.031	
							(0.053)	
ln export sales$_{it}$× high stock/sales$_{k}$								0.120^{c}
								(0.067)
ln Domestic demand$_{it}$	0.110^{a}	0.106^{a}	0.095^{a}	0.095^{a}	0.105^{a}	0.107^{a}	0.095^{a}	0.094^{a}
	(0.021)	(0.021)	(0.020)	(0.021)	(0.021)	(0.021)	(0.020)	(0.021)
Observations	146702	146702	146702	146702	146702	146702	146702	142718
Kleibergen-Paap stat.	54.6	37.9	37.3	25.0	24.5	22.8	19.2	24.9

Robust Standard errors, clustered by industry, in parentheses. ^{c} significant at 10%; ^{b} significant at 5%; ^{a} significant at 1%. 2SLS estimations. All estimations include firm fixed effects and sector×year dummies, that are defined at the same level as the sector-specific variable interacted with export sales (see main text). The instrument used for exports is the foreign demand in HS6 products exported by the firm as defined in the main text. Size is demeaned in column (2). "High´´ means above the sample median. WCR: is the sector specific working capital requirement over cash flow ratio. PCM: price cost margin. AT: Asset tangibility and ED: external financial dependence (both from Braun (2003)). RS: returns to scale. Stock/Sales come from Vannoorenberghe (2012). The critical value for the weak instruments test is based on a 10% 2SLS bias at the 5% significance level, which is 7.0 is all estimations.

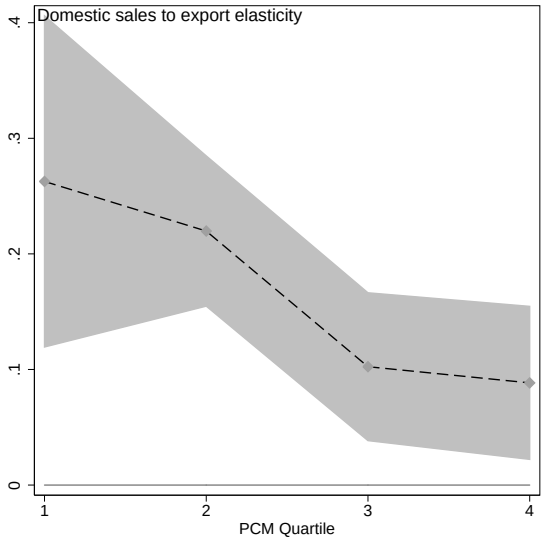
Columns (5) and (6) of Table 9 perform a similar exercise with more standard indicators of financial vulnerability, namely the sectoral asset tangibility (AT_k) and external financial dependence (ED_k). A typology of financially vulnerable sectors has been provided in earlier works (Rajan and Zingales, 1998 and Braun, 2003): firms operating in sectors with fewer tangible and a larger dependence upon external finance are more likely to be affected by financial constraints. As before, interacted terms with predicted exports are used; sectoral data for external dependence and asset tangibility comes from Braun (2003). The difference across

Figure 2: Domestic sales and exports: the role of liquidity

(a) Working Capital Requirement ratio



(b) Price Cost Margins



sectors is in line with expectations, but is only statistically significant (at the 10% level) for asset tangibility. This was to be expected as these indicators are proxies for financial constraints but do not specifically focus on short-run liquidity needs.

Increasing returns. The complementarity between exports and domestic sales may reflect the presence of increasing returns in the sector where the firm is operating: if the firm's production technology exhibits increasing returns, a positive demand shock on the foreign market will increase the production scale and decrease average cost. This increase of firm's efficiency should promote sales at home if it is - at least partially - reflected in the price of goods sold in the domestic market. This mechanism will be observed if the products sold by the firm in two different markets are produced using the same inputs. For instance, increasing sales in foreign markets may help to pay the maintenance cost of production facilities, which is shared by all markets. Note that this implies that the complementarity between sales in different markets mainly come from adjustments in the firm's TFP, not from factor accumulation. The results shown in Table 14 in the appendix are inconsistent with this: both TFP and factor accumulation seems to be affected by foreign shocks through exports.

The increasing returns channel can be tested by looking at the differences across sectors in terms of economies of scale. Namely, we estimate a production function by 3-digit sector

(NES 114). Whenever the sum of the labor and capital coefficients is larger than 1, we classify the sector as an increasing returns sector (decreasing returns otherwise). The result, shown in column (7) of Table 9, does not validate the increasing returns channel: the coefficient has the positive expected sign (exports have a more positive impact on domestic sales in the sectors that exhibit increasing returns), but is small and statistically insignificant. This channel is therefore unlikely to explain our results.

Capacity constraints. While our estimations point to a positive relationship between exogenous variations of exports and changes in domestic sales, this linkage may still be affected by the existence of capacity constraints. For instance, increased export revenues may help firms to buy additional inputs and pay suppliers, but total sales will increase significantly only if the firm is able to adjust its labor and total production, or use stored production. As mentioned in introduction, a number of recent papers (Vannoorenberghe, 2012, Nguyen and Schaur, 2011, Soderbery, 2012, Blum *et al.*, 2011, Ahn and McQuoid, 2012) emphasize the fact that the presence of capacity constraints or convex costs may generate substitutability between sales across destinations.

In general, we should expect the complementarity between sales across markets to be stronger in firms facing low capacity constraints. We test this prediction using sector-specific data on average stock over sales ratio from Vannoorenberghe (2012).[26] Column (8) includes an interaction term between export sales and a dummy which equals 1 for firms belonging to sectors in which inventories are high (above the sample median). The results are consistent with Vannoorenberghe (2012): in sectors where inventories are large, i.e., where firms are less likely to face capacity constraints, the complementarity is stronger (although this difference is significant only at the 10% level). However, the coefficient on export sales remains positive and significant in both types of sectors.

6 Conclusions

Using a large firm-level database on French firms combining balance-sheet and destination-specific export information over the period 1995-2001, this paper shows that firms' domestic

[26]Our dataset does not contain information on capacity utilization. We are very grateful to Gonzague Vannoorenberghe who accepted to share this data. The index is computed from Amadeus data on French firms over the period 1998-2007. For more information please refer to Vannoorenberghe (2012).

and export sales are complementary when exports are predicted by exogenous changes in foreign demand. A change in foreign demand conditions, which is associated with an increase in the foreign demand of the products sold abroad by the exporter, raises domestic sales. This implies that shocks on foreign markets can be channeled into the domestic business cycle through the complementarity between firms' domestic and foreign sales.

These results are confirmed by a number of robustness checks, in which we assess the validity of the empirical analysis through different specifications. We use alternatively as instruments for export sales the the foreign imports for the product range exported by the firm, or for its core product, tariff changes, or large foreign shocks such as civil wars. We take into account the possibility that domestic and foreign macroeconomic conditions may be correlated. We also control for the possibility that the result might be driven by the correlation between exports and imports for each firm. Our results are valid in cases where the foreign demand for firms' products is increasing or decreasing. Finally, our analysis is supported by the natural experiment of the Asian crisis in the late 1990's. Estimation results show that firms that were more exposed to this crisis through their exports suffered a decrease of their domestic sales as compared to firms of the control group.

Overall, this relation between domestic and foreign sales is at odds with theoretical models in international trade where domestic and foreign sales are only connected through exogenous productivity, as in Melitz (2003). Our results rather suggest that exogenous shocks on the foreign business cycle will reflect in the domestic business cycle through the relationship between domestic and foreign sales. This result has many implications, for instance, in terms of the exchange rate policy or trade policy transmission to the domestic economy.

The precise channel of transmission, however, remains an avenue for future research. We provide evidence in the last section that dependence on short-run liquidity, through working capital requirement, may be a relevant explanation. This channel is also consistent with the fact that our result is found to be stronger for small firms than for large ones. However, other channels may be relevant, including demand side mechanisms. Future research should probably attempt to determine the channel of transmission that is prevalent in explaining this export-domestic sales complementarity.

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A Instruments: first stages

Table 10: First stage estimations

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Dep. Var.	ln export sales						
Instruments							
FD_{it}	0.372^{a}						
	(0.038)						
FD_{it}^{core}		0.239^{a}					
		(0.041)					
τ_{it}^{X}			-0.009^{b}				
			(0.004)				
War_{it}^{X}				-0.283^{a}			
				(0.051)			
$Crisis_{it}^{X}$					-0.050^{a}		
					(0.014)		
FD_{it}^{init}						0.115^{a}	0.166^{a}
						(0.021)	(0.030)
Observations	146702	146702	89302	116344	146702	112836	83563

Robust Standard errors, clustered by industry, in parentheses. ^{c} significant at 10%; ^{b} significant at 5%; ^{a} significant at 1%. 2SLS estimations. First stage estimates of Table 4: columns (3) and (4); Table 5: columns (3) and (5); and Table 8: column (4). Columns (6) and (7): Table 11, columns (2) and (5) (weights computed in the first year the firm exports in column (6), the first two years in column (7)). All estimations include firm fixed effects and sector × year dummies. See the data appendix for more details on the computation of the instruments.

B Instruments: Robustness

Table 11: Baseline results, robustness with different weights

	(1)	(2)	(3)	(4)	(5)	(6)
Estimator				2SLS		
Dep. Var.	ln dom. sales		Δ ln dom. sales	ln dom. sales		Δ ln dom. sales
Sample	All	excl. 1^{st} year	All	All	excl. $1^{st}/2^{nd}$ years	All
ln Export sales$_{it}$	0.250^a	0.262^a		0.176^a	0.319^a	
	(0.058)	(0.050)		(0.027)	(0.060)	
ln Domestic demand$_{it}$	0.068^a	0.065^a		0.092^a	0.073^a	
	(0.014)	(0.014)		(0.015)	(0.016)	
Δ ln Export sales$_{it}$			0.209^a			0.194^a
			(0.066)			(0.051)
Δ ln Domestic demand$_{it}$			0.056^a			0.070^a
			(0.008)			(0.010)
Observations	146379	112836	110496	146645	83563	110684
Firm FE	Yes	Yes	No	Yes	Yes	No
Sector $\times$ year dummies	No	Yes	Yes	Yes	Yes	Yes
Kleibergen-Paap stat.	29.3	29.9	31.1	58.2	30.6	41.3

Robust Standard errors, clustered by industry, in parentheses. ^{c} significant at 10%; ^{b} significant at 5%; ^{a} significant at 1%. All estimations but (3) and (6) (first differences) include firm fixed effects. The critical value for the weak instruments test is based on a 10% 2SLS bias at the 5% significance level, which is 16.4 is all estimations. The instruments are the following. In columns (1) to (3): foreign demand in HS6 products exported by the firm with weights computed the first year the firm exports - instruments taken in first difference in column (3); in column (4) to (6): foreign demand in HS6 products exported by the firm with weights computed the first two years the firm exports - instruments taken in first difference in column (3) and (6).

Table 12: Instrumentation: robustness (firms present in all years)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Estimator	2SLS							
Dep. Var.	ln domestic sales							
ln Export sales$_{it}$	0.142^{a}	0.147^{a}	0.335	0.361	0.234^{b}	0.230^{b}	0.359^{a}	0.364^{a}
	(0.038)	(0.030)	(0.225)	(0.225)	(0.095)	(0.094)	(0.108)	(0.110)
ln Domestic demand$_{it}$	0.134^{a}	0.102^{a}		0.077^{c}		0.085^{a}		0.076^{a}
	(0.027)	(0.019)		(0.046)		(0.025)		(0.026)
Observations	59227	57078	50766	50766	57078	57078	50766	50766
Sector × year dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Instruments	FD_{it}+Tariffs	FD_{it}+CW	Tariffs		Civil War		Tar.+CW	
Hansen P-value	0.28	0.15	0.18	0.18	0.30	0.30	0.51	0.48
Kleibergen-Paap stat.	62.4	60.2	2.7	2.8	5.9	6.1	3.5	3.8

Robust Standard errors, clustered by industry, in parentheses. ^{c} significant at 10%; ^{b} significant at 5%; ^{a} significant at 1%. All estimations include firm fixed effects. The critical value for the weak instruments test is based on a 10% 2SLS bias at the 5% significance level, which is 19.9 in all estimations. See main text and appendix for a more detailed description of the instruments.

C Asymmetry

In this section we try to determine whether our effect is symmetric, i.e., whether our results are identical for both positive and negative shocks on export sales. The positive coefficient on export sales may indeed capture the fact that domestic sales decrease when exports decrease (as it was the case during the Asian crisis, as shown Table 8), but not necessarily that increases in exports generate increases in domestic sales.

We check the symmetry of the effect of exports on domestic sales by using first difference estimations and splitting the exports variable into positive and negative exports variations at the firm-level. Instruments are consistently modified versions of the ones previously presented. Results are provided in Table (13). The difference between columns (1), (2) and (3) is the way in which the weights are computed for the instruments (average over the period in column (1), the first year the firm exports in column (2), the two first years the firm exports in column (3)). In all cases, the effect of negative export variations is found to be larger than the effect of a positive export variation on domestic sales growth. The effect difference is statistically significant in columns (2) and (3). Overall, these results confirm our previous findings that exogenous changes in exports drive domestic sales in the same direction.

Table 13: Asymmetry

	(1)	(2)	(3)
Dep. Var.:	Δ ln Dom. sales		
Negative Δ ln Export sales$_{it}$	0.248^a	0.254^a	0.242^a
	(0.059)	(0.077)	(0.064)
Positive Δln Export sales$_{it}$	0.220^a	0.163^a	0.160^a
	(0.053)	(0.060)	(0.055)
Δ ln Domestic demand_it	0.083^a	0.056^a	0.070^a
	(0.013)	(0.009)	(0.010)
Observations	110721	110496	110684
Estimation	2SLS	2SLS	2SLS
Kleibergen-Paap stat. / S-Y Crit. val. (10%)	18.7/7.0	16.2/7.0	20.6/7.0

Robust Standard errors, clustered by industry, in parentheses. ^{c} significant at 10%; ^{b} significant at 5%; ^{a} significant at 1%. All estimations include firm fixed effects and sector×year dummies. Critical values for the weak instruments test are based on a 10% 2SLS bias at the 5% significance level. Instrument used is FD_{it}, with the average weights in column (1), weights computed during the first year the firm exports in column (2), and weights computed during the first two years the firm exports in column (3).

D Factor accumulation vs. TFP gains

The positive effect of foreign shocks on domestic sales can either be channeled through more factor accumulation or TFP variations. Whether one is more affected that the other may help us understand the precise channels of transmission. In Table 14 we estimate the effect of exogenous export variations on capital and labor (columns (2) and (3)) and on TFP[27] (column (4)). Column (1) replicates our baseline results. Column (5) simply shows the result of a regression of domestic sales on capital, labor and TFP. The total effect of exports on domestic sales is the sum of the coefficients on exports from columns (2) to (4), weighted by the impact of each factor on domestic sales shown in column (5). Our results suggest that the shocks affecting export sales both affect factor accumulation and TFP, with a higher effect on TFP. Accounting for the effect of each component on the firms' domestic sales, factor accumulation and TFP variations are found to explain one and two thirds of the overall effect, respectively.

[27]TFP is computed sector by sector using Olley and Pakes (1996) methodology.

Table 14: Decomposition of the effect

Estimator	(1)	(2)	(3)	(4)	(5)
			2SLS		
Dep. var.	ln Dom. Sales	ln # Workers	ln K stock	ln TFP	ln Dom. Sales
ln Export sales$_{it}$	0.159^a	0.129^a	0.148^a	0.212^a	
	(0.029)	(0.022)	(0.024)	(0.027)	
ln Domestic demand$_{it}$	0.105^a	0.013	0.020	0.095^a	
	(0.021)	(0.017)	(0.017)	(0.018)	
ln # workers$_{it}$					0.664^a
					(0.026)
ln K stock$_{it}$					0.189^a
					(0.012)
ln TFP$_{it}$					0.753^a
					(0.031)
Observations	146702	146702	146702	146702	146702
Estimation	2SLS	2SLS	2SLS	2SLS	FE
Kleibergen-Paap stat. / S-Y Crit. val. (10%)	94.9/16.4	94.9/16.4	94.9/16.4	94.9/16.4	-

Robust Standard errors, clustered by industry, in parentheses. ^{c} significant at 10%; ^{b} significant at 5%; ^{a} significant at 1%. All estimations include firm fixed effects and sector × year dummies. Critical values for the weak instruments test are based on a 10% 2SLS bias at the 5% significance level. Weights are computed using the firm's average share of exports in total sales of the firm in year t. The instrument is the foreign demand in HS6 products exported by the firm and in sector k.

E Data Appendix

The sample is an unbalanced panel of yearly firm-level data over the period 1995-2001. Indexes i, j, k, p and t represent the firm, the destination served, the sector the firm belongs to, the product exported and the time unit (year), respectively. We provide a complete description of the main variables below.

E.1 Main interest variables

Foreign and Domestic sales (X_{it} and Y_{it}). The BRN contains direct information on total sales and export sales. Domestic sales are therefore computed as the difference between total and export sales.

Inputs. Capital stock and the number of employees are from the BRN. Firm specific imports, by product and destination, are taken the French customs.

TFP. TFP is computed using the Olley and Pakes (1996) methodology and is estimated sector by sector, therefore allowing for different input coefficients across sectors. Capital is deflated

using a gross fixed asset deflator from the OECD economic outlook database and value added using a sectoral deflator from the EU-Klems data.

E.2 Instruments and controls for domestic demand

Foreign and domestic demands addressed to the firms. Our preferred instrument is the sum of foreign imports in the product-destination served by the firm in year t, weighted by the share of each product-destination in the firm's total export over the period. A product is defined at the 6-digit (HS6) level. Import data comes from BACI (CEPII). Denoting ω_{ijp} the average share of each product p and destination j in firm i's exports over the period, and $M_{jp,t}$ the imports of destination j of product p during year t, this variable is computed as:

$$FD_{it} = \sum_{j,p} \omega_{ijp} M_{jp,t} \tag{5}$$

The mirror of this variable for domestic demand is:

$$DD_{it} = \sum_{p} \omega_{ip} M_{FR,p,t} \tag{6}$$

where $M_{FR,p,t}$ denotes the French imports of product p during year t. Alternatively, we use similar instruments and controls focusing on the firm's core product, defined as the HS-4 product with the highest average value of exports over the period. ω_{ij}^{core} is the weight of destination j in firm's i core product exports. We compute:

$$FD_{it}^{core} = \sum_{j} \omega_{ij}^{core} M_{j,t}^{core} \tag{7}$$

And the mirror of this variable is DD_{it}^{core}, ie the French imports for each firm i core product in t.

Firm-specific tariffs. We use information on tariff to construct alternative instruments for export sales. Firm-specific tariffs are computed as:

$$\tau_{it}^{X} = \sum_{j,p} \omega_{ijp} t_{jp,t} \tag{8}$$

where $t_{jp,t}$ represents the MFN tariff of destination j in product p. The data comes from

the ITC. Similar results are obtained with bound tariffs.

Exposure to civil wars. We construct two variables reflecting the exposure of a given firm i to a civil war in country j. The first is a dummy variable that equals 1 if at least one the destinations to which the firm exported in $t-1$ experiences a civil war in year t. The second equals the sum of the number of civil wars the destination served by the firm, weighted by the share of exports in these destinations in $t-1$:

$$War_{it}^{X} = \sum_{j} \frac{X_{ij,t-1}}{X_{i,t-1}} CW_{j,t} \tag{9}$$

where $CW_{j,t}$ is a dummy that equals 1 if the destination j experienced a civil war in t. The data on civil wars comes from the Correlates of War (CoW).

Instruments for imports. We create instruments for firm-level imports using a similar variable as for exports. Firms' imports are instrumented using the foreign supplied addressed to the firm, FS_{it}. More precisely, we compute the sum of the foreign exports in the product-destination from which the firm imports goods during year t, X_{jpt}, weighted by the share of each product-destination in the firm's total imports over the period η_{ijp}. A product is defined at the 6-digit (HS6) level, η_{ijp}. Export data comes from BACI (CEPII). This variable is computed as:

$$FS_{it} = \sum_{j,p} \eta_{ijp} X_{jp,t} \tag{10}$$

Exposure to the 1997-1998 Asian crisis. We construct a variable similar to the one proposed for civil wars:

$$Crisis_{it}^{X} = \sum_{j^*} exp_{it} Crisis_{j,t} \tag{11}$$

where $Crisis_{j,t}$ is a dummy variable that equals 1 after 1997 for the five Asian countries that were hit the most by the Asian crisis (Thailand, Korea, Philippines, Indonesia, Malaysia) and exp_{it} is a dummy variable that equals 1 if the firm exported to one of these countries in 1995 or 1996.

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