Heterogeneous export spillovers to Chinese domestic firms: the role of the difficulty to enter the destination market

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Abstract

In this study, we explore how the intensity of foreign export spillovers in China varies depending on the difficulty of entry into export markets, as measured by different proxies such as ICRG institutional quality measures or proxies for the toughness of administrative procedures related to imports in a given country. We find that the presence of surrounding foreign exporting firms helps domestic ones to start exporting, especially when destination countries are difficult. Disentangling which dimension of access difficulty actually drives the results is however more complicated. While on average exposure to foreign exporters is associated with a 10% increase of the probability that domestic firms from the same province start exporting the year after, the figure is around 30 to 50% higher when the targeted destination country is identified as difficult. Our results are consistent with the idea that exposure to foreign exporters helps to reduce the fixed cost of creating new trade linkages. Our finding hence suggests that the increasing presence of foreign exporting firms in China might contribute to the diversification of Chinese domestic firms' exports towards more difficult and previously inaccessible destinations.

JEL classification: F1, R12, L25

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1- Introduction

Recent studies have focused on the role of foreign firms in the surge of Chinese exports over the past 20 years. From a pure quantitative point of view, the analysis of Chinese statistical yearbooks shows that the share of foreign firms in total Chinese exports has grown from 26% in 1992 to 57% in 2007. From a more qualitative perspective, it is clear that Chinese exports have upgraded in the past few years. Rodrik (2006) finds that the sophistication of Chinese exports is disproportionately high, three times higher actually than the level predicted by Chinese average income per capita. Schott (2008) shows that the overlap between Chinese exports and exports from OECD countries is high and growing over time. A consensus has emerged on the fact that foreign firms played an important part in this evolution. Amiti and Freund (2010) show for example that once processing trade is excluded, the skill content of Chinese exports remains unchanged. Since processing trade activities are mainly conducted by foreign firms, this suggests that no upgrading occurs for domestic exports. Xu and Lu (2009) show that FDI has a positive impact on Chinese export upgrading when it emanates from fully foreign-owned firms from OECD. They also find export sophistication within an industry to be positively related to the share of processing trade realized by foreign firms, and negatively related to the share of processing exports realized by domestic firms.

These results suggest that foreign firms account for most of the quantitative and qualitative growth of Chinese exports. However, they might also exert an indirect impact on domestic ones through export spillovers. Very few theoretical studies exist on export spillovers. Krautheim (2010) builds a model in which the fixed export cost decreases in the number of firms already exporting to a given destination. The rationale for this assumption is information spillovers or cost mutualization. Exporting firms might diffuse specific information on foreign consumers' tastes or on export administrative procedures that might help domestic firms located in the same neighborhood to enter into export markets. Exporting firms might also mutualize some costs linked to the participation to international fares or to the transport of their commodities, which will reduce the individual cost to conquer new markets. It might also be the case that foreign firms, by exporting to some countries where domestic firms do not export, show to the

latter firms that some business opportunities exist in those specific markets. However, conflicting results exist in the empirical literature on the topic: Aitken et al. (1997) find a positive impact of export activities conducted by multinationals on the export status of Mexican domestic firms. Kneller and Pisu (2007) confirm this result on UK data. Evidence is much less clear for Barrios et al. (2003) on Spanish firms, while Ruane and Sutherland (2005) find a negative impact of foreign exports on entry of Irish domestic firms into export markets.

Recent studies are more encouraging for the specific case of China. Swenson (2008) finds a positive impact of foreign exports on the creation of new trade linkages by Chinese domestic firms, and Chen and Swenson (2010) show that foreign exports increase the unit value and the durability of new transactions created by domestic firms. Mayneris and Poncet (2011) investigate the nature and the specificity of these spillovers. They show that foreign export spillovers are product and destination specific: the probability that Chinese domestic firms start exporting a given product to a given country responds positively to the presence of foreign firms in the same province exporting, the year before, the same product to the same country. Foreign export activities considered at a more general level (same product/other countries, other countries/same product or other products/other countries) are much weaker or insignificant.[1] They moreover find that these export spillovers derive mainly from ordinary trade activities and are driven by both the presence of foreign exporters and the extent of their export activities, measured by the value of their exports.

In this paper, we strongly build on Mayneris and Poncet (2011) to explore another dimension of foreign export spillovers in China. We investigate the possible heterogeneity of export spillovers depending on the difficulty of entry on foreign markets. All destination countries are not equally easy to enter on. In particular, administrative documents to fill in, corruption, political or economic uncertainty, might necessitate more specific knowledge from potential exporters; this will increase the fixed export cost, which has been shown to determine firm-level decision to enter into export markets (Melitz, 2003). Crozet et al. (2008) develop for example a theoretical

[1] Koenig et al. (2010a) obtain a similar result on export spillovers in France, even though in this latter case the authors do not distinguish between foreign and domestic firms.

model in which insecurity on foreign markets acts as a random additional sunk cost, which disrupts the usual selection of firms on foreign markets based on productivity. Araujo et al. (2011) investigate the role of institutional quality of the destination markets on firm-level export dynamics. In their model, firms learn from their own experience on destination markets, this learning effect being more important for more difficult countries. As a consequence, firms start exporting smaller quantities on risky markets, and conditioning on survival, the growth of firm-level exports decreases with the quality of institutions in the destination country.

In this work, we consider three dimensions of the access difficulty of a given destination market: the GDP per capita, which is itself linked to the institutional quality or degree of risk of a country. This second dimension is measured by the ICRG index that combines political, economic and financial risk measures (defined in detail below). A third dimension is related to the complexity of import procedures in a given country, measured by the number of days and the number of documents needed to deliver products in this country (measured in the Doing Business databases of the World Bank, see below). Thanks to these measures, we thus capture elements that are linked both to the general climate of business in a given country and to the specific procedures required for imports. They are good proxies to account for sources of the differences in the fixed export costs across markets that have been pointed at in the theoretical literature cited above. However, we must also acknowledge the fact that these dimensions are empirically highly correlated. As shown at the end of this paper, isolating which one is the most important driving force of heterogeneous export spillovers is consequently difficult.

Preliminary statistics on the geographic presence of Chinese domestic firms stress the improvement of their capacity to reach difficult destinations. Between 1998 and 2007, the share of domestic export flows to the top decile countries in terms of average time required to import[2] rose from 8.5 to 12.3%. When focusing on domestic export starts, the share is not only higher but also increasing faster as it jumped from 11.3 to 17.9%, attesting to the enhanced capacity of Chinese domestic firms to penetrate difficult

[2] While the average world duration is 27 days, at least 44 days is required to clear the customs in the top decile countries. See section 2.1 for more details on this indicator. From the World Bank Doing Business databases.

markets over the past years. One can wonder whether the increasing presence of multinational[3] firms appears to influence this evolution in the orientation of China's integration with the world economy.

If we think of institutional quality or administrative duties as a fixed export cost, the marginal impact of export spillovers might be more important for more difficult countries. The diffusion of specific information will be more valuable in this case. Koenig et al. (2010b) investigate this issue on French firm-level data. They show that the probability of entry on a given market is positively impacted by the number of surrounding firms exporting the same product to the same country, especially for more difficult destinations. In this paper, we follow the same kind of analysis. We use data on Chinese exports by province, product, destination country and type of firms (foreign or domestic firms). We merge these data with indicators taken from the International Country Risk Guide and from the Doing Business databases edited by the World Bank. These indicators are informative on institutional quality and toughness of administrative procedures linked to imports in a given destination country. We are then able to investigate potential heterogeneity of export spillovers on the probability that Chinese domestic firms start exporting a given product to a given country, depending on the difficulty of entry on the considered export market. We actually find that foreign export spillovers are more important for more difficult markets, pointing at a possible role of foreign firms in the geographic diversification of Chinese domestic exports toward more risky markets.

We present the data we use and our empirical methodology in section 2. Section 3 discusses our results and section 4 concludes.

2- Data and empirical strategy

We study the impact of exposure to foreign exporters on the extensive margin of trade of Chinese domestic firms. In line with Koenig et al. (2010a and 2010b) and Mayneris and Poncet (2011), we explain why domestic firms from province *i* export product *k* to country *j* at time *t+1*, while they did not at time *t*. To do so, we use a gravity framework

[3] We use the terms "multinational" and "foreign" interchangeably throughout the paper.

applied to the decision to start exporting. We restrict our analysis to ordinary trade activities, both for the dependent and the spillover variables, since Mayneris and Poncet (2011) have shown that foreign export spillovers in China are mainly limited to this sphere of export activities.[4]

2.1 Data

We use customs data on Chinese exports by province, HS6 product, destination country and type of exporting firms (domestic and foreign[5]) for the period 1997-2007. We re-aggregate the data in terms of product activity at the HS4 level, which is a fairly detailed level. For example, the HS2 product category "clocks and watches and parts thereof" comprises 14 different 4-digit products, from wrist-watches in precious metal to time registers, passing by wrist-watches in base metal. We thus consider big product-lines, while working at a more detailed level in terms of nomenclature would have implied in some cases to deal with varieties of the same product.

Thanks to this information, we can build a database recording all domestic entries on foreign export markets at the province-product-destination country level. Our dependent variable takes the value 1 if domestic firms from a given province export a given product to a given country in *t+1,* while they did not in *t*. For a specific province, we consider as potential alternatives all product-country pairs for which we observe at least one positive export flow over the period. We focus on export starts and consequently eliminate from the sample observations corresponding to continuing and ceasing export flows. Since we have 10 years of observations, we can observe, over the period, multiple domestic starts for the same province-product-destination country triad. For example, the following sequence 00011001111 becomes in our sample .001..01..., "." denoting missing values. In the end, only triads with at least one export start remain in the sample. The estimation sample covers 220 countries and 1213 HS4 products.

[4] Ordinary trade activities refer to exports of products that are produced with local inputs mainly, while processing trade activities refer to trade flows of products that have been assembled in China but which components have been produced abroad and then imported.

[5] The data are separately reported by firm type, including foreign-owned enterprises, equity joint ventures and Sino-foreign joint ventures, collective enterprises, private enterprises and state-owned enterprises. We consider the first three categories as foreign and the three later as domestic.

Regarding data on institutional quality and on toughness of import procedures in destination countries, we use two databases. The first one is the International Risk Country Guide dataset (ICRG), edited since 1980 by an independent American institute, the PRS group. A composite index is computed, based on three sub-indices, measuring respectively the political, the economic and the financial risks of a country. The second data source is the Doing Business database elaborated by the World Bank. Several variables related to country-level regulations of economic activities are recorded in this database. We use in our empirical work two of them, the number of documents and the number of days that are needed to import in a given country the commodities transported by a standard cargo. The number of documents is calculated from the signature of the contract to the delivery of goods, while the time needed is calculated from the arrival of the cargo in the harbor. Both variables appear as good proxies for the toughness of procedures an exporter has to face to sell its goods to a given foreign country.

We provide some descriptive statistics on these indices of institutional quality and administrative procedure for the different trade partners of China in Appendix 1.

2.2 Estimated equation

We estimate a gravity equation on the decision to start exporting. More precisely, we assume that the probability that domestic firms from province *i* start exporting product *k* to country *j* at time *t+1* can be written as follows:

$$\text{Prob}(\text{domestic start}_{ikjt+1}) = \text{Prob}(\alpha \text{foreign spill.}_{ikjt} + \beta_1 Z_t + \beta_2 Z_{t-1} + \eta_{ikj} + \mu_t + \varepsilon_{ikjt+1} > 0)$$

where foreign spill.$_{ikjt}$ is a proxy for foreign export spillovers that measures the intensity of exports of product *k* to country *j* by foreign firms in province *i* at time *t* (see details below), Z is a bunch of time-varying controls specific to destination country *j* and/or to province *i* from which the export flow emanates, η_{ikj} is a province-product-destination country fixed effects and μ_t is a year fixed effect and ε_{ikjt+1} is the error term, distributed logistically. We estimate the determinants of this probability thanks to a conditional

logit estimation. Given the presence of province-product-destination country fixed effects, the impact of our explanatory variables is estimated in the time dimension. We test the heterogeneity of export spillovers depending on the difficulty of entry into export markets by splitting the sample into groups of countries, using as a threshold the mean of different country-specific measures of institutional quality and toughness of import procedures. We show that results also hold when using interaction terms.

Several remarks follow about the implications of our estimation strategy. We use a logit estimation with province-product-destination country fixed effects. From a technical point of view, this implies that triads for which we observe positive export flows, or on the opposite null export flows, all over the period, cannot participate to the estimation. In this case, the fixed effect would perfectly predict the outcome. This legitimates *ex-post* the limitation of our sample to triads for which we observe at least one export start over the period.

From a more conceptual point of view, the use of such fixed effects means that what we really explain is the timing of entry. We relate the year of entry of domestic firms on specific export markets to the presence of foreign firms exporting the same product to the same country the year before. If such an issue can be apprehended through a continuous time duration model, we still prefer using a discrete time model. According to Hess and Persson (2010, 2011) continuous-time methods perform poorly with large annual trade datasets with many short-lived trade relationships such as ours. Because our sample is at the product and destination country level, it contains a lot of entries and exits of domestic firms into/from export markets. Discrete-time specifications with adequate controls are preferable in this case. This is why we use a logit estimation with triadic (province-product-destination country) fixed effects.

This estimation strategy implies that our effects are estimated in the time dimension only. We thus capture short run determinants of the entry of domestic firms into export markets. The fact that we observe, for a given product and a given destination country, a lot of variations over the period in the export status of domestic firms suggests the existence of such short run determinants of entry. It is true that the nature of spillovers could be different in the short and in the long run: foreign firms might facilitate the

entry of domestic firms but could make, due to competition effects, their trade relationships less durable. However, it does not seem to be the case in China: Mayneris and Poncet (2011) show that their assessment of foreign export spillovers holds when they consider durable starts only[6], while Chen and Swenson (2009) find that the presence of foreign exports increases the durability of new export transactions created by domestic firms.

2.3 Spillover variables

Export spillovers have often been studied at a quite aggregated level. Swenson (2008) and Chen and Swenson (2010) explore foreign export spillovers within a given HS2 category. They thus consider less than one hundred sectors of activities. We think it is worth investigating export spillovers at a finer level in terms of product nomenclature. Many export regulations are actually defined at a very fine level in terms of product, and it is likely that specific tastes of foreign consumers also vary at a detailed level of product. In the same vein, the destination-country dimension has generally been overlooked, often because of the lack of data, while many trade impediments or many peculiarities in consumers' demand are specific to the destination country.

Koenig et al. (2010) confirm the interest of this detailed assessment of export spillovers. They show, on French firm-level data, that export spillovers are much stronger when product and destination specific. What matters for domestic starts is being surrounded by firms exporting the same product to the same country. Mayneris and Poncet (2011) find the same result for foreign export spillovers in China: The probability that Chinese domestic firms start exporting product k to country j is positively related to the presence in the same province of foreign firms exporting the same product k to the same country j the year before. We thus focus here on the product and destination country specific spillover.

Another issue is related to the way we measure foreign export activities. Less than 10% of domestic starts in our estimation sample are associated to the presence, the year

[6] Defined as exports for at least two consecutive years.

before, of positive foreign exports for the same product and same country. Using the value of foreign exports only as a proxy for spillovers would be problematic for the interpretation of our results: Are export spillovers linked to the intensity of foreign exports, or to the mere presence of foreign exporters in the province? As in Mayneris and Poncet (2011), we deal with this issue by introducing both a dummy equal to 1 in case of positive exports and the value of foreign exports.

Note however that besides the positive externalities they might bring to domestic firms, foreign firms may also generate competition effects on foreign markets or congestion effects at the local level. Hale and Long (2008) show for example that the presence of foreign firms puts pressure on local labor markets and increases the wages of skilled workers. This could be detrimental to domestic firms' export activities. Lu et al. (2010) find that the net externalities generated by horizontal FDI on Chinese domestic firms in terms of output and productivity depend on distance: foreign firms have a positive impact on domestic ones when they are close enough. Consequently, the coefficient we will obtain on our proxies for foreign export spillovers must be interpreted as the net effect of positive and negative externalities generated by foreign firms' export activities, but we cannot disentangle both types of externalities separately. [7]

Finally, one might worry that Chinese provinces are too large to investigate spillovers linked to information and knowledge spillovers between proximate foreign and domestic firms. We however provide evidence that export activities of foreign firms located in contiguous provinces have a lower marginal impact on export starts of domestic firms located in province *i* than export activities of foreign firms within this same province *i*. We thus observe the spatial decay that we expect to measure in case of export spillovers. Moreover, while the surface area of some provinces (especially those in the western part of China) is rather large, the economic activity is very concentrated. Data for 2000 indicate that roughly a third of industrial production is generated in the

[7] However, our strategy to introduce both a dummy for foreign presence and the value of foreign exports allows to assess the shape of export spillovers: if the dummy turns out to be positive and significant while the value is insignificant, this means that export spillovers are entirely driven by the sole presence of foreign firms, while a positive and significant coefficient on the value of exports only would mean that the intensity of spillovers increases log linearly with the value of foreign exports. Finally, a negative (resp. positive) and significant coefficient on the dummy and a positive (resp. negative) and significant coefficient on the value of exports indicate that export spillovers impact positively on domestic starts for high (resp. low) enough value of foreign exports only.

capital city of those provinces. It even rises to 37% in the province of Gansu, 45% in Shaanxi and 49% in Heilongjiang. Hence, the actual internal distance between economic players is much smaller than what the geographic size of the province suggests. This feature is also true for smaller provinces. For example, in the coastal province of Jilin, 46% of the industrial activity takes place in the capital city.

2.4 Time-invariant and time varying control variables

Many other determinants can explain why we observe exports of product *k* to country *j* by both foreign and domestic firms from the same province *i*. Some of them are time invariant and province specific: Provinces with better infrastructure or more educated workforce might attract FDI and facilitate exports, whatever the nationality of the firm. Some others are also time invariant but province and destination country specific: Some provinces might have, for example, specific relationships with particular countries, due to migrants' networks, geographic contiguity or history. These bilateral characteristics *ij* can explain why we observe exports to country *j* from both foreign and domestic firms located in province *i*. Third, there might exist time-invariant province and product specific determinants of export performance: Province *i* might have developed a specific know-how for product *k*, which could explain the good export performance of both foreign and domestic firms producing product *k* in that location. All these time invariant determinants are controlled for by the triadic (province-product-destination country) fixed effect *ikj* we finally introduce in our regression.

Our estimations also account for time-varying determinants of domestic and foreign firms' exports activities. For example, comparative advantages of provinces might have changed over the fast growing period 1997-2007. We consequently introduce total exports of product *k* by province *i*, total exports of province *i* and total Chinese exports of product *k* at time *t*. Since we control for time fixed effects, total Chinese exports are also controlled for, so that all the elements of a Balassa index of "revealed comparative advantage" at the province-product level are taken into account. We also include the bilateral export values to country *j* for China and for province *i* to control for the possible changes in bilateral commercial relationships with country *j* over the period. We finally introduce the GDP per capita of province *i* to account for supply side

determinants of exports. The evolution of demand in the destination country must also be taken into account. We consequently introduce total world imports of product *k* by country *j* in year *t*, taken from the BACI database[8], and destination country GDP per capita.[9]

The value in *t-1* of provincial and Chinese exports and of destination country imports is also introduced, to control for specific dynamics in local comparative advantages and demand.

Last, we want to be sure that foreign exports do not proxy for domestic firms' own experience into export markets. It could be the case that positive foreign export flows of product *k* to country *j* are more often observed in provinces where domestic firms also export product *k* or export to country *j* at time *t*. Foreign exports would in this case partly capture spillovers among domestic firms, or scope economies in domestic export activities. We thus introduce domestic exports of product *k* (to countries other than *j* by definition since we focus on domestic starts) and domestic exports to country *j* (of products other than *k*) at time *t*.

3- Results

We first replicate the results on the assessment of foreign export spillovers in China obtained by Mayneris and Poncet (2011). We then investigate several dimensions along which foreign export spillovers might vary depending on destination countries. All regressions are clustered at the province level (Moulton, 1990). To split the whole sample, we use as a threshold the mean of the variable used to measure access difficulty of the destination country. Results generally hold when using the median.[10]

[8] This dataset, which is constructed using COMTRADE original data, provides bilateral trade flows at the 6-digit product level (Gaulier and Zignago, 2010). BACI is downloadable from http://www.cepii.fr/anglaisgraph/bdd/baci.htm.

[9] World countries real GDP per capita in PPP are taken from the World Development Indicators database (World Bank).

[10] These results are available upon request from the authors.

3.1 Product and destination specific foreign export spillovers

We focus on ordinary domestic trade (ODT) export starts, most export starts of Chinese domestic firms occurring in ODT rather than in processing trade activities (PCS). Moreover, foreign export spillovers are found to mainly apply to domestic ordinary trade activities (Mayneris and Poncet, 2011). Results presented in the first column of Table 1 clearly show that foreign export spillovers exist in China, and that they are product and destination specific. The mere presence in province *i* of foreign firms exporting product *k* to country *j,* increases the probability that domestic firms from the same province start exporting product *k* to country *j* the year after by 10.96%[11], i.e. by 2.40 percentage point. A 10% increase in the value of foreign exports of product *k* to country *j* increases this same probability by 0.10%[12], i.e. by 0.02 percentage point. The impact of other foreign export activities is insignificant, or very small in magnitude (for foreign exports of product *k* to countries other than *j)*. This suggests that information foreign firms provide to domestic ones is both product and destination specific. This is not so surprising since consumers' tastes or quality norms and requirements imposed on imports are often both product and destination specific.

We then distinguish in column (2) ODT foreign exports from processing trade (PCS) foreign exports. Both the presence and the value of ODT foreign exports of product *k* to country *j* at time *t* have a positive and significant impact on the probability that Chinese domestic firms start exporting product *k* to country *j* in *t+1*. For PCS trade, the value of foreign exports has no significant impact while the dummy accounting for the presence of foreign exporters is only weakly significant. Again, foreign exports that are not product and destination specific are either insignificant or very small in magnitude, for both ODT and PCS activities.

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[11] Given the form of the logistic function, the increase in probability generated by the sole presence of foreign firms exporting product *k* to country *j* is equal to $[e^{0.104} - 1]$%. The increase expressed in percentage point of probability is found by multiplying by this expression by the probability of starting to export at the point at which the marginal impact is estimated.

[12] If we consider a reference value x_i for variable x, the increase in probability generated by a 10% increase in x is equal to $(1.1^{\beta x}-1)$, β_x being the coefficient on x. The increase expressed in percentage point of probability is equal to $(1.1^{\beta x}-1)P_{xi}$.

These results suggest that foreign export spillovers mainly derive from ODT foreign exports, and that they are product and destination country specific. We hence focus in column (3) and in the remaining of this study on product and destination specific foreign export spillovers from ODT to ODT export activities. Finally, in column (4), we also control for ODT export activities of foreign firms in surrounding (contiguous) provinces. The marginal impact of these firms is much lower, suggesting that they matter less to explain domestic starts than foreign firms within the province. We take this spatial decay as a confirmation that we actually capture externalities between proximate foreign and domestic firms.

Table 1: Nature of foreign export spillovers

Explained variable: ODT domestic new export link in t+1	Specification (1)	(2)	(3)	(4)
Same product/country Foreign export	0.011**			
	(0.004)			
0/1 same product/country Foreign export	0.104***			
	(0.042)			
Other country/same product Foreign export	0.003**			
	(0.002)			
Same country/Other products Foreign export	-0.0001			
	(0.003)			
Other country/product Foreign export	-0.288			
	(0.209)			
Same product/country ODT Foreign export		0.017***	0.017***	0.014***
		(0.003)	(0.003)	(0.003)
0/1 same product/country ODT Foreign export		0.062**	0.062**	0.079***
		(0.027)	(0.027)	(0.028)
Other country/same product ODT Foreign export		0.009**	0.009**	0.008***
		(0.002)	(0.002)	(0.002)
Same country/Other product ODT Foreign export		0.003	0.002	0.002
		(0.002)	(0.002)	(0.002)
Other country/product ODT Foreign export		0.082	0.084	0.081
		(0.110)	(0.107)	(0.107)
Neighboring ODT Same product/country Foreign export				0.009***
				(0.032)
Same product/country PCS Foreign export		0.002		
		(0.007)		
0/1 same product/country PCS Foreign export		0.098*		
		(0.056)		
Other country/same product PCS Foreign export		0.004**		
		(0.002)		
Same country/other product PCS Foreign export		-0.002		
		(0.002)		
Other country/product PCS Foreign export		-0.007		
		(0.068)		
Controls for domestic own experience into export markets		Yes		
Controls for demand (country-product imports and country GDP per capita)		Yes		
Controls for Macro export (Balasssa, bilateral exports of China and of province, province GDP per capita)		Yes		
Control for demand and macro export lags		Yes		
Observations		4161535		4161535
R-squared	0.13	0.13	0.13	0.13
Share of domestic starts		0.22		
Province-product-destination country FE		Yes		
Year fixed effects		Yes		

Heteroskedasticity-robust standard errors are reported in parentheses. Standard errors are clustered at the province level. ***, ** and * indicate significance at the 1%, 5% and 10% confidence level. Conditional logit estimations in all columns.

3.2 Foreign export spillovers and GDP per capita of the destination country

We first investigate the potential heterogeneity of foreign export spillovers depending on the destination country GDP per capita. Since rich countries have better institutions than poor countries on average, they might be easier targets for Chinese domestic firms. Moreover, rich countries import more varieties than poor countries (Hummels and Klenow, 2002), which could make them more accessible for Chinese domestic firms. In this particular case, the specific information that surrounding foreign exporters could provide would be less valuable for prospective domestic exporters. Overall, foreign export spillovers might be less important for these destination countries. This conjecture is confirmed by results presented in Table 2. In this table, we run separate regressions for low and high GDP per capita destination countries. A country is considered high GDP per capita if its GDP per capita is higher than 9,059 US dollars (the mean value for our sample), otherwise it is classified as a low-GDP per capita country. The comparison of columns 2 and 3 shows that the impact of foreign export spillovers (measured by the presence of surrounding foreign exporters) is significantly different between these two groups. The mere presence of foreign exports of product *k* to country *j* has a positive and significant impact on domestic starts only for countries which GDP per capita is below the average. Hence, when the destination country is poor, the presence of foreign firms increases the probability of a domestic start by around 13.2% (i.e. by 2.88 percentage point). No strong differences emerge regarding the impact of the value of foreign exports. As shown in the last column, the result is confirmed when we interact the dummy identifying countries with a GDP per capita above the average with the spillover variable: the coefficient on the interaction term is negative and significant. This last column is obtained thanks to a linear probability model, in order to interpret the coefficients as marginal impacts directly.

However, it is difficult to figure out what is really at play with this heterogeneity of foreign export spillovers depending on GDP per capita. We use ICRG and Doing Business indexes to go further into this question.

Table 2: Export spillovers and destination country GDP per capita

Explained variable: Domestic ODT new export link in t+1	Heterogeneity indicator			
	Destination country GDP per capita			
	≠.	≤ Mean	> Mean	Interaction
	(1)	(2)	(3)	(4)
Same product/country ODT Foreign export	0.015***	0.015***	0.015***	0.005***
	(0.003)	(0.005)	(0.005)	(0.001)
Same product/country ODT Foreign export * Above Threshold dummy				-0.001
				(0.001)
0/1 same product/country ODT Foreign export	0.079***	0.124***	0.036	0.033***
	(0.028)	(0.043)	(0.040)	(0.008)
0/1 same product/country ODT Foreign export * Above Threshold dummy				-0.025**
				(0.009)
Other country/same product ODT Foreign export	0.008***	0.007***	0.008***	0.001***
	(0.002)	(0.002)	(0.002)	(0.0004)
Same country/other product ODT Foreign export	0.002	-0.001	0.006	-0.0004***
	(0.002)	(0.002)	(0.005)	(0.00008)
Other country/product ODT Foreign export	0.084	0.108	0.047	0.017***
	(0.107)	(0.117)	(0.100)	(0.001)
Controls for domestic own experience into export markets	yes			
Controls for demand	yes			
Controls for Macro export	yes			
Control for demand and macro export lags	yes			
Observations	4161535	2350003	1311532	4161535
R-squared	0.125	0.139	0.097	0.087
Share of domestic starts	0.217	0.209	0.235	0.217
Province-product-destination country fixed effects	yes			
Year fixed effects	yes			

Heteroskedasticity-robust standard errors are reported in parentheses. Standard errors are clustered at the province level. ***, ** and * indicate significance at the 1%, 5% and 10% confidence level. Conditional logit estimations in all columns but the last column where a linear probability model is used.

3.3 Foreign export spillovers and institutional quality of the destination country

One novel contribution of our paper is to investigate the possibility that the relationship between foreign export spillovers and domestic creation of new trade linkages depends on destination countries' institutional quality.

We use the ICRG composite index, which is a weighted average of the political, financial and economic risks indexes (which respective weights are 50%, 25% and 25%)

calculated by the PRS group. The higher this index, the less risky the countries. The entry on risky markets being more difficult, we expect foreign export spillovers to be stronger for those destination countries. This is exactly what we observe in Table 3.

Table 3: Export spillovers and destination country institutional quality

Explained variable: Domestic ODT new export link in t+1	Heterogeneity indicator			
	Destination country ICRG composite index			
	≠.	≤ Mean	> Mean	Interaction
	(1)	(2)	(3)	(4)
Same product/country ODT Foreign export	0.015***	0.012**	0.017***	0.004***
	(0.003)	(0.006)	(0.005)	(0.001)
Same product/country ODT Foreign export * Above Threshold dummy				0.001
				(0.001)
0/1 same product/country ODT Foreign export	0.068**	0.141***	0.037	0.039***
	(0.029)	(0.045)	(0.038)	(0.009)
0/1 same product/country ODT Foreign export * Above Threshold dummy				-0.030***
				(0.001)
Other country/same product ODT Foreign export	0.007***	0.006***	0.008***	0.0009***
	(0.002)	(0.002)	(0.002)	(0.00007)
Same country/other product ODT Foreign export	0.002	-0.002	0.003	-0.0004***
	(0.003)	(0.003)	(0.004)	(0.00009)
Other country/product ODT Foreign export	0.095	0.094	0.091	0.019***
	(0.108)	(0.123)	(0.101)	(0.001)
Controls for domestic own experience into export markets	yes			
Controls for demand	yes			
Controls for Macro export	yes			
Control for demand and macro export lags	yes			
Observations	3850193	1904098	1946095	3850193
R-squared	0.126	0.145	0.108	0.083
Share of domestic starts	0.219	0.210	0.228	0.219
Province-product-destination country fixed effects	yes			
Year fixed effects	yes			

Heteroskedasticity-robust standard errors are reported in parentheses. Standard errors are clustered at the province level. ***, ** and * indicate significance at the 1%, 5% and 10% confidence level. Conditional logit estimations in all columns but the last column where a linear probability model is used.

In Table 3, the regressions are run separately for countries with a low/high ICRG composite index (defined as being below/above the sample average of 70) in column 2 and 3 respectively.

The presence of foreign firms exporting product *k* to country *j* at time *t* is positively associated with a rise in the probability that domestic firms start exporting the same

product to the same country in *t+1* for countries with a low ICRG composite index only, i.e. for more risky markets. We can compute that the mere presence of foreign exporters increases the probability of a domestic start the year after by 15.1% (3.32 percentage point) when considering countries with a low value of the ICRG index, while a 10% increase in the value of these exports raises this same probability by 0.11% (0.02 percentage point). For less risky market, no significant impact of foreign presence is detected, while a 10% increase of the value of foreign exports of product *k* to country *j* increases the probability of domestic starts by 0.16% (0.04 percentage point). The difference between both samples in terms of "intensive margin" of spillovers is thus negligible. Again, results are qualitatively similar when capturing heterogeneity through an interaction term (column 4). These results suggest that domestic exporters penetrating countries with poor institutional quality are likely to benefit differentially from multinational firm exposure because they are confronted to greater risks and informational asymmetries. Hence, our findings support the hypothesis that proximity to foreign exporters reduces informational barriers to trade.

3.4 Foreign export spillovers and import procedures in the destination country

Finally, we study another dimension of the difficulty of entry on a given market, using two measures of the restrictive effect of administrative procedures imposed by countries on their imports: the number of documents needed between the signature of the contract and the delivery of the goods, and the number of days between the arrival of commodities in the harbor and their delivery. The higher the values of these two variables, the more difficult the entry in the destination country.

Results presented in Table 4 indicate that the presence in the province of foreign exports of product *k* to country *j* increases the probability that domestic firms start exporting *k* to *j* by 10.63% (2.41 percentage point) when the number of documents required by the destination country is high, and by 13.66% (2.84 percentage point) when the number of days between the arrival in the harbor and the delivery of the commodities is high.

Table 4: Export spillovers and destination country administrative procedures

Explained variable: Domestic ODT new export link in t+1	Heterogeneity indicator						
	Nb of documents				Nb of days		
	≠.	≤ Mean	> Mean	Interaction	≤ Mean	> Mean	Interaction
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Same product/country ODT Foreign export	0.016***	0.016***	0.016**	0.006***	0.017***	0.014***	0.006***
	(0.003)	(0.005)	(0.006)	(0.001)	(0.005)	(0.004)	(0.001)
Same product/country ODT Foreign export * Above Threshold dummy				0.001			-0.0004
				(0.001)			(0.001)
0/1 same product/country ODT Foreign export	0.069**	0.052	0.101*	0.008	0.041	0.128***	0.008
	(0.031)	(0.045)	(0.056)	(0.006)	(0.040)	(0.038)	(0.006)
0/1 same product/country ODT Foreign export * Above Threshold dummy				0.019*			0.025**
				(0.010)			(0.012)
Othe country/same product ODT Foreign export	0.008***	0.008***	0.007***	0.001***	0.008***	0.007***	0.001***
	(0.002)	(0.002)	(0.002)	(0.00007)	(0.002)	(0.002)	(0.00007)
Same country/other product ODT Foreign export	0.001	0.001	0.001	-0.0005***	0.006	-0.002	-0.001***
	(0.002)	(0.003)	(0.002)	(0.00009)	(0.004)	(0.002)	(0.00009)
Other country/product ODT Foreign export	0.101	0.069	0.101	0.018***	0.070	0.097	0.017***
	(0.122)	(0.097)	(0.122)	(0.001)	(0.097)	(0.120)	(0.001)
Controls for domestic own experience into export markets				yes			
Controls for demand				yes			
Controls for Macro export				yes			
Control for demand and macro export lags				yes			
Observations	4041770	1747070	2294700	4041770	1743238	2298532	4041770
R-squared	0.124	0.105	0.140	0.086	0.104	0.141	0.086
Share of domestic starts	0.218	0.227	0.211	0.218	0.230	0.208	0.218

Heteroskedasticity-robust standard errors are reported in parentheses. Standard errors are clustered at the province level. ***, ** and * indicate significance at the 1%, 5% and 10% confidence level. Conditional logit estimations in all columns but columns 4 and 7 where a linear probability model is used.

No significant impact of foreign exporter presence is detected when administrative procedures in the destination country are lighter. The impact of the value of foreign exports is not significantly different across countries. Results are qualitatively the same when measuring heterogeneity thanks to an interactive term.

We have conducted a number of robustness checks. In the table in Appendix 2, we show in particular that the results we obtain for our four indices of access difficulty are qualitatively the same if we exclude the top and bottom 5% of countries for each index. "Outlier" countries do thus not drive the heterogeneity we capture in terms of foreign export spillovers. We would have also liked to disentangle which dimension of access difficulty of destination country, GDP per capita, institutions or import administrative procedures, matters most to account for this heterogeneity. This proved to be impossible. Indeed, all dimensions are highly correlated: correlation between GDP per capita and ICRG composite index is equal to more than 80%, while the correlation between GDP per capita and both measures of import administrative procedures is slightly higher than -60%. Consequently, when we try to introduce interactions of spillovers with all the different dimensions of access difficulty, results are poorly significant (results available upon request).

4 Conclusion

In this study, we explore how the intensity of foreign export spillovers in China varies depending on the difficulty of entry into export markets. This allows to shed light on the way the increasing presence of multinational firms influences the orientation of Chinese domestic firms' integration with the world economy. Several studies show that the presence of foreign firms in Chinese provinces and cities positively impacts on the entry of domestic firms into export markets. If the externality provided by the exposure to foreign exporters partially acts through information spillovers, hence helping the prospective domestic exporter to reduce the fixed cost of creating new trade linkages, we expect the effect to be particularly important for more difficult countries. This is what we find, using different proxies to define what a "difficult" country is. Our results indicate that the presence of surrounding foreign exporting firms helps domestic ones to start exporting, especially when destination countries have a lower GDP per capita, are

risky, as measured by the ICRG index, or when they impose tough administrative procedures for the import of commodities. However, we cannot disentangle which dimension matters most.

Our results suggest that the increasing presence of foreign exporting firms in China might contribute to the diversification of domestic firms' exports toward more difficult and previously inaccessible destinations. While on average exposure to foreign exporters is associated with a 10% increase in the probability that domestic firms start exporting the year after, the figure is around 30 to 50% higher when the targeted destination country is identified as difficult. This does not however mean that Chinese domestic firms export to easier markets than their foreign counterparts and that the gap between the two types of firms decreases over time thanks to foreign export spillovers. By contrast Chinese domestic firms actually export on average to more risky markets, or to countries where the administrative procedures imposed on imports are (by roughly 10%) tougher compared to foreign exporters located in China. Nevertheless, our results show that when domestic firms in a province do not export yet a given product to a given country, the beneficial effect of exposure to foreign exporters on the probability that Chinese domestic firms start exporting this product to this new destination is stronger the more the entry on this market is difficult.

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Appendix 1: Descriptive Statistics (average values for period 1997-2006)

Country	Nb of doc.	Nb of days	Composite ICRG	GDP per cap.	Share in China's exp.
United States	5.0	5.0	81	41,890	20.93
Hong Kong	5.3	8.7	81	25,604	14.71
Japan	5.0	11.0	85	35,484	11.71
Korea Rep	7.3	11.3	79	16,388	4.88
Germany	5.0	7.0	83	33,890	4.22
United Kingdom	4.0	14.0	83	36,555	2.66
Netherlands	5.0	6.0	87	38,248	2.28
Russia	13.0	36.0	63	5,342	2.23
Taiwan	7.0	12.0	83	15,270	2.17
Singapore	4.0	3.0	90	26,877	1.94
Italy	5.0	18.0	80	30,073	1.74
Canada	5.0	11.3	84	34,484	1.68
France	7.7	15.7	81	34,936	1.57
Australia	7.7	13.3	82	36,046	1.55
India	13.0	35.0	66	736	1.34
United Arab Emirates	8.0	13.0	79	28,612	1.32
Malaysia	7.0	14.0	76	5,159	1.29
Spain	8.0	10.0	79	25,914	1.26
Indonesia	8.0	29.0	58	1,301	1.18
Thailand	11.0	19.3	74	2,743	1.06
Mexico	5.0	23.0	70	7,447	0.80
Vietnam	8.0	23.0	67	637	0.76
Brazil	7.0	23.3	64	4,734	0.72
Kazakstan	14.0	76.0	70	3,771	0.68
Turkey	11.3	21.7	55	5,042	0.65
Philippines	8.0	18.0	70	1,184	0.61
Saudi Arabia	7.7	29.3	74	13,399	0.61
S. Africa	9.0	35.0	71	5,162	0.60
Iran	10.0	42.0	68	2,781	0.53
Pakistan	9.3	25.7	58	714	0.52
Denmark	3.0	5.0	87	47,769	0.47
Panama	4.0	9.0	71	4,791	0.46
Finland	5.0	8.0	87	36,820	0.44
Sweden	3.0	6.0	84	39,637	0.42
Poland	5.0	27.0	78	7,943	0.40
Bangladesh	11.7	48.7	63	423	0.40
Ukraine	10.0	39.0	64	1,830	0.39
Nigeria	10.3	48.3	55	686	0.38
Hungary	7.0	17.0	77	10,941	0.36
Chile	7.0	21.0	77	7,297	0.33
Greece	6.0	25.0	76	20,282	0.31
Egypt	8.0	24.0	69	1,211	0.31
Switzerland	5.0	9.0	89	49,351	0.30
Israel	4.0	12.0	68	17,828	0.29
Macau				25,162	0.23
Romania	9.0	18.0	64	4,569	0.23

Country	Nb of doc.	Nb of days	Composite ICRG	GDP per cap.	Share in China's exp.
Norway	4.0	7.0	90	63,918	0.22
Algeria	9.0	22.3	59	3,098	0.21
Argentina	7.0	20.0	67	4,728	0.20
New Zealand	5.0	9.0	80	26,664	0.20
Morocco	11.0	26.3	71	1,713	0.19
Ireland	4.0	12.0	87	48,524	0.19
Sudan	11.0	73.3	45	770	0.18
Korea DPR			46		0.17
Czech Rep	7.0	18.0	78	12,115	0.16
Benin	7.0	41.0		508	0.16
Kirghizia	13.0	75.0		478	0.15
Syrian	12.0	36.3	70	1,493	0.15
Colombia	10.0	34.3	60	2,735	0.14
Sri Lanka	10.0	25.0	63	1,199	0.14
Myanmar			59		0.14
Venezuela	11.3	58.0	64	5,449	0.14
Portugal	7.0	16.7	81	17,376	0.13
Jordan	8.7	24.0	72	2,349	0.12
Austria	5.0	8.7	85	37,175	0.12
Ghana	9.7	42.0	61	485	0.11
Kuwait	11.0	20.0	80	31,861	0.10
Cuba			62		0.10
Peru	8.0	31.0	67	2,838	0.09
Croatia Rep	10.3	23.7	72	8,754	0.09
Togo	9.0	33.7	59	343	0.09
Rep Yemen	9.0	31.0	65	798	0.09
Guatemala	8.3	29.0	68	2,517	0.07
Lebanon	9.7	35.3	58	5,366	0.07
Kampuchea	11.3	49.0		440	0.07
Ecuador	8.0	44.0	59	2,758	0.07
Kenya	9.7	45.3	62	560	0.07
Bulgaria	9.0	23.7	69	3,513	0.07
Iraq	10.0	101.0	42		0.06
Angola	9.0	58.0	49	2,058	0.06
Libyan Arab Jamahiriya			67	7,118	0.06
Lithuania	6.0	13.0	74	7,513	0.06
Malta			81	13,803	0.05
Marshall Is. Rep	5.0	33.0		2,282	0.05
Estonia	4.0	5.0	74	10,213	0.05
Mongolia	10.0	59.0	65	821	0.05
Ethiopia	8.0	42.0	61	160	0.04
Slovak Rep	8.0	25.0	75	8,803	0.04

Country	Nb of doc.	Nb of days	Composite ICRG	GDP per cap.	Share in China's exp.
Tanzania	9.0	37.0	60	327	0.04
Latvia	5.3	12.0	74	6,973	0.04
Dominican Rep	9.0	15.7	71	3,073	0.04
Azerbaijan	14.0	56.0	62	1,579	0.04
Slovenia Rep	8.0	21.0	79	17,173	0.04
United States	5.0	5.0	81	41,890	20.93
Hong Kong	5.3	8.7	81	25,604	14.71
Japan	5.0	11.0	85	35,484	11.71
Korea Rep	7.3	11.3	79	16,388	4.88
Germany	5.0	7.0	83	33,890	4.22
United Kingdom	4.0	14.0	83	36,555	2.66
Netherlands	5.0	6.0	87	38,248	2.28
Russia	13.0	36.0	63	5,342	2.23
Taiwan	7.0	12.0	83	15,270	2.17
Singapore	4.0	3.0	90	26,877	1.94
Italy	5.0	18.0	80	30,073	1.74
Canada	5.0	11.3	84	34,484	1.68
France	7.7	15.7	81	34,936	1.57
Australia	7.7	13.3	82	36,046	1.55
India	13.0	35.0	66	736	1.34
United Arab Emirates	8.0	13.0	79	28,612	1.32
Malaysia	7.0	14.0	76	5,159	1.29
Spain	8.0	10.0	79	25,914	1.26
Indonesia	8.0	29.0	58	1,301	1.18
Thailand	11.0	19.3	74	2,743	1.06
Mexico	5.0	23.0	70	7,447	0.80
Vietnam	8.0	23.0	67	637	0.76
Brazil	7.0	23.3	64	4,734	0.72
Kazakstan	14.0	76.0	70	3,771	0.68
Turkey	11.3	21.7	55	5,042	0.65
Philippines	8.0	18.0	70	1,184	0.61
Saudi Arabia	7.7	29.3	74	13,399	0.61
S. Africa	9.0	35.0	71	5,162	0.60
Iran	10.0	42.0	68	2,781	0.53
Pakistan	9.3	25.7	58	714	0.52
Denmark	3.0	5.0	87	47,769	0.47
Panama	4.0	9.0	71	4,791	0.46
Finland	5.0	8.0	87	36,820	0.44
Sweden	3.0	6.0	84	39,637	0.42
Poland	5.0	27.0	78	7,943	0.40
Bangladesh	11.7	48.7	63	423	0.40

Country	Nb of doc.	Nb of days	Composite ICRG	GDP per cap.	Share in China's exp.
Hungary	7.0	17.0	77	10,941	0.36
Chile	7.0	21.0	77	7,297	0.33
Greece	6.0	25.0	76	20,282	0.31
Egypt	8.0	24.0	69	1,211	0.31
Switzerland	5.0	9.0	89	49,351	0.30
Israel	4.0	12.0	68	17,828	0.29
Macau				25,162	0.23
Romania	9.0	18.0	64	4,569	0.23
Afghanistan	10.7	79.7			0.01
Netherlands Antilles					0.01
Suriname	7.0	25.0	64	2,989	0.01
Zambia	11.0	64.0	57	623	0.01
Niger	10.0	68.0	57	243	0.01
Georgia	9.7	26.7		1,433	0.01
Belize	6.0	26.0		3,786	0.00
Sierra Leone	7.0	34.0	42	220	0.00
Haiti	10.0	53.0	54	518	0.00
Guyana	8.0	35.0	65	1,057	0.00
Er Virgin Is.					0.00
Macedonia Rep	7.0	23.7		2,835	0.00
Armenia	6.7	32.7	59	1,625	0.00
Barbados				11,465	0.00
Equitorial Guinea	7.0	46.0		14,936	0.00
French Polynesia					0.00
Burkina Faso	11.0	54.0	61	431	0.00
Bosnia & Hercegovina	7.0	22.7		2,540	0.00
Maldives	9.0	20.0		2,296	0.00
Chad	9.0	102.0		604	0.00
Malawi	10.0	54.0	60	161	0.00
New Caledonia			64		0.00
Burundi	10.0	71.0		105	0.00
Somalia			38		0.00
Rwanda	16.0	85.3		237	0.00
St Vincent & Grenadines	6.0	16.0		3,612	0.00
Central African Republic	18.0	66.0		339	0.00
Vanuatu	9.0	30.0		1,741	0.00
Eritrea	14.3	69.0		220	0.00
Tuvalu					0.00
Samoa	7.0	31.0		2,184	0.00
Cape Verde	5.0	21.0		1,972	0.00
Guinea Bissau	3.5	26.0	46	190	0.00
Solomon Is.	4.0	21.0		624	0.00
Tonga	6.0	25.0		2,097	0.00
Seychelles	5.0	19.0		8,551	0.00

Country	Nb of doc.	Nb of days	Composit ICRG	GDP per cap.	Share in China's exp.
Micronesia FS	6.0	30.0		2,145	0.00
Cayman Is.					0.00
Comoros	10.0	21.0		645	0.00
East Timor				359	0.00
Gibraltar					0.00
St Kitts-Nevis	6.0	17.0		9,438	0.00
Bhutan	11.0	38.0		1,299	0.00
Greenland					0.00
Sao Tome Principe	9.0	29.0		719	0.00
Cook Is.					0.00
Norfolk Is.					0.00
Montserrat					0.00

Appendix 2: Heterogeneity investigation of Export spillovers: without extreme observations (top and bottom 5%)

	Specification			
	(1)	(2)	(3)	(4)
Criteria	GDP per capita	ICRG	Nb of doc	Nb of days
Same product/country Foreign ODT export	0.006***	0.005***	0.006***	0.006***
	(0.001)	(0.001)	(0.001)	(0.001)
Interaction with Above Threshold dummy	-0.001	0.001	-0.001	-0.001
	(0.001)	(0.001)	(0.001)	(0.001)
0/1 same product/country Foreign ODT export	0.027***	0.037***	0.007	0.006
	(0.007)	(0.009)	(0.006)	(0.006)
Interaction with Above Threshold dummy	-0.014	-0.030***	0.023**	0.026**
	(0.010)	(0.011)	(0.011)	(0.011)
Controls for domestic own experience into export markets	Yes			
Controls for demand (country-product imports and country GDP per capita)	Yes			
Controls for Macro export (Balasssa, bilateral exports of China and of province, province GDP per capita)	Yes			
Control for demand and macro export lags	Yes			
Observations	4004570	3722207	3985811	3906476
R-squared	0.08			
Share of domestic starts	0.20			
Province-product-destination country FE	yes			
Year fixed effects	yes			

Heteroskedasticity-robust standard errors are reported in parentheses. Standard errors are clustered at the province level. ***, ** and * indicate significance at the 1%, 5% and 10% confidence level. Linear probability model in all regressions.