Chinese firms' entry on export markets: the role of foreign export spillovers

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Abstract

The effect of the proximity to multinational exporters on the creation of new export linkages (extensive margin of trade) is debated. Using panel data from Chinese customs for the period 1997-2007, Chinese domestic firms' capacity to start exporting new varieties to new markets is shown to positively respond to the export activity of neighboring foreign firms. These spillovers are shown to be product and country specific. This conclusion is robust to fixed effects and instrumental variables specifications that control for both supply and demand shocks that could bias the estimations. The impact is sizable. The marginal impact of product-country specific foreign export spillovers is five times as large as the effect of a 10% increase in the demand for the product in the destination country. Foreign export spillovers are also shown to be mainly limited to ordinary trade activities. Overall, our findings suggest that, even for a country with important cost-advantage like China, there is space for policy-makers' initiatives favoring the diffusion among exporters of best practices regarding export experience.

JEL classification: F1, R12, L25.

Keywords: Extensive margin of trade; spillovers; FDI.

There is growing evidence that most of the recent Chinese export rise is due to foreign firms. Several studies also argue that foreign firms, typically engaged in processing trade activities, fully drive the skill content upgrading of China's manufacturing exports (Amiti and Freund, 2010; Xu and Lu, 2009). On the other hand, estimations of growth equations indicate that income gains from export performance and export upgrading are confined to improvements made by domestic firms. Jarreau and Poncet (2012) find that the positive association between GDP per capita growth and export sophistication at the province level is limited to ordinary export activities undertaken by domestic firms. These results, together with those emphasized by Amiti and Freund (2010), suggest that export activities of foreign firms in China do not matter for economic growth of Chinese provinces, once domestic exports have been controlled for. However, while there are no direct gains from foreign firms export upgrading in terms of GDP per capita, there may still be room for indirect effects of foreign firms on domestic ones through export spillovers. There are two channels through which export spillovers can act. Foreign firms can bring specific information on exports markets that can help domestic firms reduce their fixed export cost (information about the tastes of foreign consumers, on the distribution networks abroad etc.). It could also be the case that foreign export spillovers are linked to the mutualization of some fixed or variable export costs (participation to international fares, marketing, transport costs, etc.). Whether foreign firms in China act as export catalysts, fostering the creation of new export transactions by domestic firms, is thus a question worth investigation.

In this paper, using panel data from Chinese customs that record provincial export flows over the period 1997-2007 by product, destination country, type of firms and type of trade, Chinese domestic firms' capacity to start exporting new products to new markets is shown to positively respond to the export activity of neighboring foreign firms. These export spillovers are found to be very specific both in terms of activity and in terms of geography of exports.

Also, their effect exhibits a spatial decay, consistently with the spillover interpretation, and is mainly limited to ordinary trade activities. Endogeneity issues are carefully addressed by introducing relevant controls and fixed effects in the benchmark regression. The estimated impact is robust to more demanding specifications in terms of fixed-effects, and it also resists an instrumental variable approach, where the presence of export promotion zones interacted with product-country demand shocks are used as instruments for multinational firms' exports. From a quantitative point of view, the size of the effect is not negligible. The marginal impact of product-country specific foreign export spillovers is five times as large as a 10% increase in the demand for the product in the destination country.

Beyond their mere empirical quantification, the study of export spillovers is a relevant topic, both from an academic and a policy viewpoint. Indeed, with the globalization of exchanges, export performance has become an increasingly important dimension of countries' economic success. However, not all firms export and understanding both theoretically and empirically what determines entry on export markets is a pre-requisite to the design of adequate policies aimed at stimulating exports. Moreover, for a country very open to FDI such as China, analyzing the role of foreign firms on the development of domestic export capabilities is crucial.

Hence, our work contributes to several strands of the literature. It first participates to the literature on the role of the local environment on firm-level export performance. Many theoretical and empirical papers show that exporting firms represent a small fraction of active firms. Indeed, fixed and variable export costs generate selection mechanisms on export markets (e.g. Melitz, 2003; Bernard and Jensen, 2004; Melitz and Ottaviano, 2008; Mayer and Ottaviano, 2008). The necessity to find a distributor in the destination country, to adapt the products to foreign consumers' tastes or to discover new sources of demand partly explain those costs. Domestic firms might benefit from the experience of multinationals in this respect; possible channels are information externalities, cost-sharing opportunities and mutualized actions on

export markets. Krautheim (2012) is one of the few theoretical works on export spillovers, where proximity to other exporters is assumed to reduce the fixed export cost thanks to the endogenous formation of informational networks between exporting firms. Most of the literature on the topic is actually empirical. In a pioneer work, Aitken et al. (1997) show that the export decision of local firms in Mexico is positively influenced by the proximity to multinational exporters. This result has then been confirmed by Kneller and Pisu (2007) for UK data and by Kemme et al. (2009) for India. By contrast, Barrios et al. (2003) do not find clear evidence of such export spillovers from foreign firms in Spain, while Ruane and Sutherland (2005) find that the export intensity of foreign-owned enterprises is negatively correlated with the export decision and export intensity of domestic firms in Irish manufacturing. They argue that this result suggests that no (and even negative) export spillovers derive from third-country export-platform FDI. This prediction bodes ill for China where foreign firms are mostly engaged in processing trade, i.e. assembly of imported inputs and then re-export of the final product. In the context of China, three studies investigate export spillovers emanating from foreign firms (Ma, 2006; Swenson, 2008; Chen and Swenson, 2013). These papers relate the probability to export (or the number of new export transactions at the city or province level) to the presence of multinational firms. They find evidence of positive foreign export spillovers at the two-digit industry level (around 100 SITC or HS sectors).

This paper goes further in the understanding of the mechanisms at play with foreign export spillovers in China, exploiting data at a finer level, both in terms of geography of exports and in terms of activities. In particular, Krautheim (2012) argues in his theoretical paper that the relevant information might be destination specific. For example, technical regulations or specific consumers tastes vary across countries. Koenig (2009) finds evidence of export spillovers on French data only when the destination dimension is taken into account. Export spillovers might also occur at a rather fine product category level, more detailed than HS2 categories that might

be highly heterogeneous. For example, in the French case again, Koenig et al. (2010) show that export spillovers are magnified when they are product and destination specific (products being defined at the 4 digit level). By showing that foreign export spillovers in China are product-country specific and mainly limited to ordinary trade activities, this paper opens the "black box" of these spillovers. It is also valuable for policy-makers interested in tailoring fine-tuned export promotion policies based on spillovers between domestic and foreign firms. The kind of actions public authorities will favor and the kind of actors they will rely on to promote externalities will not be the same if export spillovers are specific to the exported product or to the destination country for example.

This paper also complements existing studies on the role of foreign firms in the evolution of Chinese exports. Beyond foreign firms' activities *per se*, it highlights the externality foreign firms can exert on domestic ones regarding the stimulation of the extensive margin of trade, through the creation of new export transactions.

Finally, it contributes to the literature on the determinants of growth in China, and more generally in countries that are very open to FDI. By showing that export externalities mostly apply to ordinary trade activities, it points at the limited role of export-platform activities for the promotion of Chinese firms' export performance. This may indicate that Chinese domestic firms are less likely to internalize benefits from foreign presence when multinationals' activities are limited to the mere assembly of previously imported inputs.

The rest of the paper is organized as follows. Section 2 describes the data, our empirical approach, and our measure of export spillovers. Section 3 presents and discusses our baseline results and Section 4 concludes.

I Data and indicators

Trade data sources

The data used come from the Chinese Customs and provide export flows aggregated by province, year, product and destination country, over the period 1997-2007.[1] We re-aggregate the original 8-digit level data into HS4 level data (more than 1,200 product lines). An interesting feature of this dataset is that it allows to identify whether export flows emanate from domestic or foreign firms,[2] and whether they correspond to processing trade or ordinary trade.[3] Processing trade includes all trade flows by firms operating in the assembly sector, that is to say firms that import inputs to process them in China and then re-export the final products abroad. Firms engaged in this kind of activity might be less embedded in their local environment, and might consequently generate less (and possibly benefit less from) externalities.

Explained variable: creation of new export linkages

The creation of a new export transaction is measured by a dummy which takes the value 1 if domestic firms in province i start exporting product k to country j at time $t+1$, and 0 otherwise. A specific database, incorporating the set of alternatives faced by each province, is constructed. For a given province, these are defined as the product-country pairs for which at least one export start is observed over the period 1997-2007.

For these province-product-country triads, the dataset is originally a balanced panel from 1997 to 2007, covering 211 countries and 1213 HS4 products. It includes 1,050,516 observations each year, resulting in a total of 11,551,716 (province/product/country/year) observations over the period 1997-2007. Around 11% of observations of the entire database correspond to domestic starts, that is to provinces where domestic firms do not export product k to country j at time t but do export k to j at time $t+1$.

These domestic starts are precisely the trade flows to be explained. As in Koenig et al. (2010), ceasing and continuing export flows are not included in the study. In the end, given the time span, for a given province-product-country triad, several starts might be observed. For example, the subsequent export statuses 00011001111 become in our sample .001..01..., with 1 denoting positive exports, 0 no exports and . denoting a missing value. By definition, all the observations are missing for 1997, the first year in the sample, since the export statuses in 1996 are not observed. Continuing export flows (a 1 preceded by another 1) and ceasing export flows (a 0 preceded by a 1) are also coded as a dot since they are excluded from the analysis.

Since the estimations will include province-product-country fixed effects, taking into account a broader definition of possible exported products or destination countries would not change the final sample used for the estimations. The behavior of province-product-country triads for which we observe positive export flows or null export flows every year of the period would be perfectly explained by the fixed effect.

Unreported results, available upon request, show that conclusions are very much the same when the sample is restricted to durable starts, defined as export starts leading to positive export values for at least two consecutive years. This suggests that the foreign export spillovers captured with the whole sample are not driven by short-lived transactions.[4]

Empirical approach

The creation of a new linkage (product k/country j) by domestic firms of province i at year $t+1$ is regressed on our proxy of foreign export spillovers in the previous year t and on various controls (measured in t and in $t-1$) following a gravity-type equation. Our empirical equation is thus the following:

$$\text{Prob(dom. start}_{ikj,t+1}) = \text{Prob}(\alpha \text{foreign\_spill}_{ikj,t} + \beta_1 \text{Z}_{ikj,t} + \beta_2 \text{Z}_{ikj,t-1} + \eta_{ikj} + \mu_{t+1} + \epsilon_{ikj,t+1} > 0) \quad (1)$$

It is estimated thanks to a conditional logit estimation, all regressions including fixed effects at the province-product-destination country level η_{ikj}. This allows to take into account all time-invariant characteristics that can explain export activities for product k to country j of both domestic and foreign firms in province i. Indeed, inward FDI might be attracted by certain provinces due to the presence of local specific advantages to export a given product and/or to a given destination. In this case, the estimation would suffer from a reverse causality issue. In particular, transport infrastructure and endowments of province i, variables that explain business relationships between province i and country j (distance, migrants networks etc.), local comparative advantage of province i in product k, are taken into account by η_{ikj} as long as they are fixed over time. Year fixed effects μ_{t+1} are also added to control for aggregate shocks on Chinese export activities. Given this estimation strategy, foreign export spillovers are identified based on the within (time) dimension of the data. Hence, time-varying determinants of domestic and foreign firms' exports Z must also be considered.

The conditioning set Z is made of three categories of variables. First, following the gravity literature, demand side determinants of new export linkages are controlled for by the destination country's import value defined at the 4-digit product level, taken from the BACI world trade dataset,[5] and the GDP per capita of the importing country.[6] Second, supply side determinants are also taken into account by introducing proxies for provincial and Chinese comparative advantages and export intensity. In the absence of firm-level data, these controls are crucial to account for time-varying ability of the different provinces to export different products to different countries. Hence, the log of province total export sales, province-product export sales and China-product export sales in year t are introduced. Since the regression also includes year fixed effects that account for the evolution of total Chinese exports, controlling for these

variables amounts to introducing the elements of a Balassa index of "revealed comparative advantage" at the province-product level. Total bilateral exports of province i to country j and total Chinese bilateral exports to country j are also introduced to control for specific relationships between the province/China and the destination country. This is important given the use of business and trade agreements by Chinese authorities to manage their diplomacy. Finally, province GDP per capita is used to take into account supply-side determinants of exports such as workers' skills.[7] Third, to ensure that the decision of domestic firms to start exporting does not capture the intrinsic dynamics of exports at the product level or at the country level, the lag values of Chinese and province i exports at the product level and at the destination country level are included, as well as the lag of foreign demand to control for specific dynamics on the demand side.

Last, the other export activities undertaken by domestic firms of province i in year t are controlled for. By construction, since only newly created linkages at the product-country level are considered, there is no export activity by domestic firms of the province in the previous year for the considered product-country pair. However, export activities in other products for the same country, in other countries for the same product and in other products and other countries respectively must be taken into account. This ensures that the coefficient on foreign export spillovers will not proxy for spillovers between different domestic firms, or for scope economies within the same firm.

Below, the empirical results obtained with such a specification are shown to hold when controlling further for potential remaining endogeneity, thanks to more demanding fixed effects and to instrumental variables.

Regarding export spillovers, two different proxies are proposed. First, the value of foreign exports is used. However, in only 4.2% of the final sample observations do we observe positive exports for the product-country specific spillover variable. Foreign export activities are then

decomposed into the mere presence of foreign exporters for a given product-country pair, as measured by a dummy, and the value of their exports. Doing so, it is possible to assess whether foreign export spillovers are due to a switch in foreign export activities (from no export to positive exports) or to changes in the scale of exports realized by foreign firms. Disentangling what is due to the scale of foreign export activities from the more general impact of the presence of foreign exporters[8] is important when the number of observations for which positive foreign export flows are observed is small compared to the number of observations for which foreign export flows are null.

Descriptive statistics

Province-product-country triads for which at least one export start is observed over the period participate to the estimation. For these province-product-country triads, observations originally constitute a balanced panel from 1997 to 2007, covering 220 countries and 1213 HS4 products. As reported in Table 1, it includes 1,050,516 observations each year, resulting in a total of 11,551,716 (province/product/country/year) observations over the period 1997-2007. Around 32% of the observations correspond to strictly positive export flows by domestic firms. As emphasized in Table 2, 1,268,768 observations out of the 11,551,716 observations of the entire database correspond to domestic starts, that is to provinces where domestic firms do not export product k to country j at time t but do export at time $t+1$.

[Table 1 about here]

[Table 2 about here]

As displayed in Table 1, 11.5% of the observations in this balanced sample have non-null product-country specific foreign export flows. The share rises to 26% if the sample is restricted to observations for which domestic firms report positive exports. As emphasized in Table 2, when focusing on domestic starts, 7.5% of them occur while foreign firms in the province were

exporting the same product to the same country the year before. As indicated in Table A-1 in the Appendix, the proportion is 69.8% when considering foreign exports of the same product to other countries and 88.6% when looking at foreign exports of other products to the same country.

The geographic and sectoral distributions of new trade linkages established by Chinese domestic firms over the period are described in Table 3. Export starts are quite diversified in terms of destinations. The US are the main destination of new trade linkages over the period, but they represent 1.8% of overall export starts only, followed by Hong-Kong, South-Korea and Japan, with 1.6 to 1.7% of overall export starts. New transactions are however more concentrated in terms of province of origin, the most dynamic exporters being, not surprisingly, Guangdong (8.5%) and Zhejiang (7.5%). Export starts are also more concentrated from a sectorial viewpoint: "Nuclear reactors, machinery et al." account for 10.5% of new transactions over the period, versus 6.6% for "Electrical machinery et al." and 4.4% for "Articles of iron and steel".

[Table 3 about here]

II Estimation of foreign export spillovers

Following Koenig et al. (2010), different types of spillovers are considered. Depending on the type of information needed to enter successfully export markets, the export spillovers could be destination specific, product specific or both. For a given triad province-product-destination country ikj, spillovers are thus decomposed in four non-overlapping components: product (HS4) and destination country specific (foreign exports in province i of product k to country j), country specific (foreign exports in province i of other products than k to country j), product specific (foreign exports of product k to countries other than j) and general spillovers (foreign exports

of other products than k to other countries than j).

The coefficient on the various spillovers variables will capture the net effect of the positive externalities described above and of some possible negative effects, such as the pressure exerted by foreign firms on local labor markets, which might increase wages (as highlighted by Hale and Long, 2011, for skilled workers in China), or congestion effects linked to the saturation of transport infrastructures for example.

Nature of foreign export spillovers

In this section, the value of exports realized by foreign firms is used as a proxy for foreign export spillovers. Moulton (1990) having shown that regressing individual variables on aggregate variables can induce a downward bias in the estimation of standard-errors, all regressions presented in the paper are clustered at the province level.

When relying on the most aggregated measure of local foreign export activity (all products-all destinations), a negative and weakly significant effect is detected (column 1 of Table 4). This might be due to crowding out effects, or to an accounting issue : since total exports in province i in year t are also controlled for, the higher the share of foreign firms in these exports, the less probable the entry of domestic firms on foreign markets the following year. Country-specific (all products-same destination) and product-specific (same product-all destinations) spillover variables also attract a negative sign, but the coefficient is very close to zero and not significant (columns 2 and 3 of Table 4). This is not the case for the most precise measure of foreign spillovers (same product-same destination). Interestingly, the product-country specific spillover variable is positive and significant at the 1% confidence level (column 4 of Table 4), attesting that the entry of domestic firms on export markets for product k and country j in year $t+1$ is positively influenced by export activities of foreign firms for product k and country j in year t.

[Table 4 about here]

To further assess the specificity of export spillovers for a given province-product-destination country triad ikj, the overall export value of foreign firms from province i is decomposed in column 5 in its four complementary components: exports of the same product k to the same country j, exports of the same product k to other countries, exports of other products to the same country j and exports of other products to other countries. The dynamics in demand-side and supply-side determinants of entry on export markets is also controlled for, by introducing relevant controls in $t-1$. With this specification, the product-country specific spillover measure is the only one to be positive and significant. When past export performance of domestic firms in province i is added to neutralize export spillovers between domestic firms and/or scope economies in domestic export activities, the main result holds: the coefficient on foreign product-country specific export spillovers slightly increases to reach 0.023 (column 6 of Table 4).

A series of robustness checks are presented in Table A-2 in Appendix. Excluding successively agricultural products and mining products, or focusing exclusively on the manufacturing sector, does not affect the results (columns 2 to 4 of Table A-2), suggesting that previous findings do not simply reflect weather conditions or local natural endowments that could jointly determine foreign and domestic export performance. Dropping product-country pairs for which China is the main supplier of the destination country (45% et 85% of total imports of product k by country j) also leaves the message unchanged (columns 5 and 6).[9] The top three exporting provinces (Guangdong, Shanghai and Jiangsu) do not drive the results (column 7). Similar conclusion is obtained when dropping the clothing, textile and footwear sectors that benefited from dramatic trade liberalization over the period (column 8). Finally, excluding greater China destinations (Hong-Kong, Macao and Taiwan) to account for round-tripping and the well-known outward oriented province of Guangdong does not modify the conclusions (columns 9 and 10). Results being remarkably stable across samples, foreign export spillovers do not seem to be driven by specific products or specific locations in China.

Endogeneity issues

So far, the estimations control for province-product-country fixed effects and for different time-varying dimensions of export performance of domestic and foreign firms in the two years preceding the observation. However, if shocks affect the capacity of both domestic and foreign firms from province i to export product k to country j, and if foreign firms jump into this new opportunity before domestic firms, our estimation strategy does not completely correct for endogeneity. Three types of shocks can be considered.

Productivity shocks : it might be the case that both foreign and domestic firms from province i experience at some point a productivity shock specific to product k, but do not enter export markets exactly at the same time. This would bias the estimation of spillovers. However, this unobserved change in the ability of foreign and domestic firms of province i to produce and export product k should have an impact on domestic starts whatever the destination country. These productivity shocks can thus be controlled for by adding a HS4-province-year fixed effect to the baseline regression. Foreign export spillovers are then identified using heterogeneity across destinations within a given HS4-province-year.

Demand shocks : preferences for product k of consumers from country j across the different importing sources might evolve differently over time. Controlling for total imports of product k by country j at time t and *t-1* does not account for such a heterogeneous dynamics of demand in the destination country: if German consumers start consuming more and more Chinese trousers at the expense of Vietnamese ones, this is not captured by our specification. However, if such a dynamics of preferences is at play, it is hard to believe that it differs across Chinese provinces : consumers know whether products are produced in China or not, but they do not know in which province they are produced. Consequently, if preferences of consumers from country j for product k produced in China evolve over time, it should do so homogenously across provinces. Destination country-HS4-year fixed effects should thus control for these demand shocks. Foreign

export spillovers would then be estimated by comparing, for a given HS4-destination country-year, the timing of domestic starts across Chinese provinces.

Province-Destination country shocks : In case of bilateral shocks affecting economic relationships between a province and a destination country (changes in the location of provincial diasporas abroad, province-country economic agreements etc.), HS4-province-year and HS4-destination country-year fixed effects will not be enough to purge the estimation of export spillovers from endogeneity. The inclusion of province-destination country-year dummies can address the issue.

Province-product-country-year shocks: finally, it could be the case that unobserved shocks specific to province i, product k, country j and time $t+1$ bias our results. The addition of the three types of fixed effects proposed before would then not solve the problem. However, it is not possible to introduce HS4-province-destination country-year fixed effects, since such fixed effects would be in the same dimension as the export spillovers. Instrumentation of the spillover variable is then the only solution. To instrument exports of product k to country j by foreign firms in province i at time t, variables that can explain foreign exports at time t without being directly correlated with domestic exports at time $t+1$ must be found. For this purpose, province-specific FDI policies that are likely to modulate, across Chinese provinces, the consequences of demand shocks specific to product k and country j, are a good candidate. In particular, Export Processing Zones (EPZ) have been one of the most important components of China's strategy to attract multinationals. Since 1980, the central government has opened a number of these zones that offer specific incentives to foreign investors (Fu and Gao, 2007). Another manifestation of the efforts of Chinese authorities to attract multinational firms, and more specifically those producing higher-end varieties, is the proliferation of government-sponsored high-tech zones (Wang and Wei, 2010).[10] Both types of zones are thus likely to favor exports by foreign firms, without directly affecting exports by Chinese firms. Our instrumentation strategy

then relies on the hypothesis that international demand conditions affect foreign firms' exports differently across provinces depending on the presence of such zones. In particular, the impact of a positive demand shock for product k in country j on foreign firms in province i will be stronger when the number of EPZ and high-tech zones in province i is high. Concretely, the variable used to instrument the export value of foreign firms in province i for a given product-country-year triad kjt is the interaction between demand conditions (import value from the rest of the world) for that country-product-year triad and the number of zones in the province. We use two instruments that rely respectively on the number of EPZs and the number of high-tech zones by province and year, taken from Wang and Wei (2010). Since EPZ and high-tech zones are not supposed to directly affect exports by domestic firms, and since total imports of product k by country j at time t is also introduced as an independent regressor, the instruments proposed are likely to be exogenous.

[Table 5 about here]

It is not possible to include the various above-mentioned additional fixed effects or to apply our instrumentation strategy in a conditional logit model. Hence, a linear probability model with adequate fixed effects is used in this section. Our benchmark results (column 6 of Table 4) are first replicated and do not differ much in terms of sign, significance and magnitude when using conditional logit (column 1 of Table 5) or a linear probability model (column 2 of Table 5). In column 2, coefficients can be interpreted as marginal effects. A 10% increase in the value of exports of product k to country j by foreign firms located in province i at time t increases the probability that domestic firms of the same province start exporting product k to country j at time *t+1* by 0.07 percentage point. This is reassuringly very close to what is found with a conditional logit estimation (0.05 percentage point).[11] It seems then reasonable to think that the results that will be obtained adding controls or using IV in the linear probability model would give a similar message were it possible to get them in a conditional logit specification. The in-

clusion of province-HS4-year, destination country-HS4-year fixed effects or province-destination country-year fixed effects does not modify the results (columns 3 to 5): the significance and the magnitude of the product and destination country specific foreign export spillovers remain unaffected. The ranking of the different types of spillovers remains also qualitatively the same. These results suggest that specific productivity shocks, demand shocks or province-country shocks do not drive the results. IV estimates are also reassuring (column 6). First-stage results suggest, as expected, that positive demand shocks result in greater foreign exports in provinces with many EPZs (column 7). The interaction with the number of High-tech zones however fails to be significant. The F-test statistic for the inclusion of additional instruments in the first stage regressions is above the rule of thumb value of 10, suggesting that the instruments are correlated with the endogenous variables, and that there is no weak instrument problem (Staiger and Stock, 1997). The Hansen test indicates that the overidentifying restriction is not rejected, hence supporting the validity of the instruments. In the second-stage, the coefficient of interest on the spillover variable appears greatly increased, but so is the standard-error. The Hausman test testing for the difference between our benchmark and the two-stage-least-squares estimates suggests that the exogeneity of the spillover variable in column 2 cannot be rejected. Hence, all these results tend to show that our benchmark specification does not suffer from major endogeneity issue. This is why, in the rest of the paper, the conditional logit specification with province-product-country fixed effects is conserved as the preferred specification.

Specification of spillovers

In this subsection, the appropriate way to model foreign export spillovers and the role of spatial proximity are discussed.

Two strategies to deal with the high number of zero foreign trade flows in our sample are adopted.

First, the sample is restricted to observations with non-zero foreign presence for product k and country j in year t (column 2 of Table 6). In this subsample, the average probability of new linkage creation by domestic firms rises from 21.9 to 38 % (as reported at the bottom of the columns). Also, the size of the coefficient increases and is now equal to 0.043, as compared to benchmark results (column 1 of Table 6). In column 3, the sample is then restricted to province/product/country triads for which positive foreign exports are observed in 1997, i.e. the first year of the sample). Overall, despite the reduction in the number of observations (100442 in column 2 and 66585 in column 3) the positive and significant impact of the product-country specific spillover variable is confirmed.

The second way to deal with the zero foreign export flows, which is used in the rest of the paper, is to conserve the full sample and to decompose foreign export activities into the mere presence of foreign exporters for a given product-country pair, as measured by a dummy, and the value of their exports. Note that this decomposition of foreign exports into presence of foreign exporters and value of foreign exports is also a way to describe the shape of export spillovers: are spillovers log-linear with respect to the scale of foreign export activities, or is there a discontinuity in the impact of foreign exporters linked to their sole presence? Results show that on average, both margins of spillovers have a positive impact on domestic starts (column 4). This specification does not affect our results on the other dimensions of foreign export activities.

Finally, the spatial dimension of foreign export spillovers has been a bit overlooked so far. Data are at the province level. Some Chinese provinces might be very large, whereas the interpretation of the results obtained in terms of spillovers imply some kind of geographic proximity. A first answer to this issue is that 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 one third of industrial production is generated in the capital

city of those provinces.

[Table 6 about here]

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 provinces 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.

We propose a formal test of the "localized" nature of the foreign export spillovers captured so far, introducing exports of product k to country j realized by foreign firms located in provinces that are contiguous to province i (columns 5 and 6). A positive impact if found for both the presence and the value of foreign exports in surrounding provinces, but it is clearly lower in magnitude than the effect of exports realized by foreign firms located in province i. Moreover, the impact of foreign exports from province i does not seem to be affected by the inclusion of exports in contiguous provinces. These results indicate a spatial decay of the effect of foreign exports on domestic starts, which is entirely coherent with the interpretation of our results in terms of spillovers. Also, in a companion paper (Mayneris and Poncet, 2013), foreign export spillovers are shown to be stronger for more difficult export markets (markets with tougher administrative procedures on imports or lower quality of institutions as measured by the ICRG index). This is again coherent with the idea that the positive association measured between domestic starts and foreign exports is due to spillovers.

Ordinary versus processing trade

One remaining question is whether the results hold when accounting for the important role of processing trade. Indeed, since firms engaged in processing trade "simply" import inputs in order to re-export a transformed product, they might be less embedded in their local environment,

and consequently generate less externalities. In Table 7, the two trade regimes (ordinary and processing) are thus considered separately. All regressions are estimated with the conditional logit estimator.

In unreported regressions, it is verified that endogeneity is not an issue in this case, relying on the same instrumentation strategy as before. Four instruments have to be found to instrument the four spillover variables (the foreign export value and the foreign export presence for both processing and ordinary trade). The interactions of the country-product-year import value from the rest of the world and of the yearly growth-rate of these imports with the number of EPZs and with the number of other special zones in the province-year are used. The first-stage F-tests of excluded instruments of these unreported regressions, presented at the bottom part of Table 7, show that instruments explain correctly potentially endogenous variables, while in all cases, the Hausman test shows that the benchmark regression is not significantly different from the two-stage-least-squares estimates. Exogeneity cannot be rejected, so that conditional logit estimations are preferred.

First, to identify whether export spillovers affect differently the creation of new linkages depending on the trade regime used by domestic firms, ordinary (ODT) export linkages creation and processing (PCS) export linkages creation are studied separately.

Interestingly, results on domestic starts in ordinary trade activities are virtually similar to those obtained when considering all export flows, suggesting that export spillovers mainly apply to ordinary export activities of domestic firms (columns 1 and 2). Only in that case, both the presence of foreign exporters and their export value are statistically and economically significant. By contrast, when the domestic starts are restricted to processing trade, foreign export activities have almost insignificant predictive power on the likelihood that domestic firms create new trade linkages (columns 3 and 4), the dummy being significant at the 10% level only while the coefficient on the value of exports is not significant at all. Moreover, processing trade

appears as a marginal trade regime for domestic firms compared to ordinary trade (289,940 observations for the former and 4,161,535 observations for the latter).

When focusing on export starts for domestic firms engaged in ordinary trade and decomposing foreign export spillovers into the two trade regimes (ordinary and processing), results suggest that foreign export spillovers mainly derive from ordinary export activities of foreign firms (columns 5 and 6). For this latter trade regime, the presence of foreign exporters and the size of their export flows both have a positive impact on export starts by domestic firms. By contrast, in the case of foreign processing activities, the dummy is significant at the 10% confidence level only while the value of exports has no significant impact. Unreported robustness checks show that these findings are not sensitive to the size of the initial export flow, and also to its duration. Results remain qualitatively the same for ODT, while both the dummy and the value of exports become insignificant for processing foreign activities in these checks.[12] These results are in line with previous findings on the heterogeneous impact of export upgrading depending on trade type. Jarreau and Poncet (2012) show for example that sophistication of foreign exports has no impact on provincial GDP per capita growth, and thus argue that processing export performance must not be taken as signaling a process of technological adoption in China, but rather as an artefact due to China's participation in the increasing fragmentation of production processes. Processing exports emanating probably from foreign firms involved in export-platform FDI, these results on the very weak or null export spillovers from processing trade activities are reminiscent of the results obtained by Ruane and Sutherland (2005) for Ireland.[13]

[Table 7 about here]

How big are foreign export spillovers in China?

Several thought experiments can give an idea of the magnitude of the foreign export spillovers measured so far.

Consider first a province where there are no firms, neither foreign nor domestic, exporting product k to country j at year t and another province, where there are foreign firms exporting product k to country j, but in negligible quantities. As measured in column 4 of Table 6, the sole presence of foreign exporting firms raises the probability that domestic firms start exporting product k to country j in $t+1$ by 11.96% in the latter province as compared to the former.[14] Considering the average probability to start exporting in the sample, equal to 21.9%, as a reference, the presence of foreign firms exporting product k to country j increases the average probability that domestic firms in the province start exporting the same product to the same country in $t+1$ by 2.62 percentage point. It is true that only 7.5% of domestic starts are associated with foreign exports for the same product-country pair the year before. However, the marginal impact of this presence is big. Indeed, the impact of the presence of foreign exports of product k to country j at time t is more than seven times bigger than the effect of a 10% increase of the GDP per capita in the destination country in t, and more than five times bigger than the effect of a 10% increase in total imports of product k by country j in $t-1$ (column 6 of Table 4).[15]

[Table 8 about here]

The marginal impact of the value of foreign exports is by contrast much more modest, since a 10% increase in the value of foreign exports of product k to country j raises the probability that domestic firms start exporting the same product to the same country by 0.1%, i.e. by 0.02 percentage point (see Table 8).[16]

In the end, focusing on ordinary trade activities for both foreign and domestic firms, the presence *per se* of foreign firms exporting product k to country j increases the average prob-

ability that domestic firms in the same province start exporting this product to this country by 1.39 percentage point.[17] This is almost four times bigger than the effect of a 10% increase in the GDP per capita of the destination country, and three times bigger than the impact of a 10% increase in the product-destination country total imports. A 10% increase in the value of foreign exports increases the average probability that domestic firms start exporting by 0.04 percentage point.[18]

III Conclusion

Using panel data from Chinese customs for the period 1997-2007, domestic firms' capacity to start exporting new varieties to new markets is shown to respond positively to the export activity of neighboring foreign firms. Results are very robust to the introduction of different sets of fixed effects and to instrumentation strategies that control for endogeneity of foreign exports. Weak or no foreign export spillovers are detected when other dimensions of export activities of foreign firms are considered (other destination countries, other products). This is coherent with preceding results obtained by Koenig et al. (2010) for France and indicates that externalities in terms of exports operate at a very detailed level of activities. Foreign export spillovers are also found to emanate mainly from ordinary trade activities and benefit to ordinary export starts of domestic firms.

These results have several implications. Over the past decade, the tremendous growth of Chinese exports has often been seen as irresistible due to the cost-advantage of Chinese firms. Our results emphasize that entering export markets still remains costly for Chinese firms and show that foreign firm export activities might help reducing this entry cost. Hence, even for a country like China, there is space for policy-makers' initiatives favoring the diffusion of best practices regarding export experience, the type of information to be diffused being however very

detailed and specific. Moreover, our findings suggest that foreign firms need to be sufficiently embedded in their local environment to generate spillovers since only limited spillovers are measured for foreign processing activities. This invites to be cautious about the gains to be expected for domestic exporters from an internalization strategy based on special economic zones as they mainly attract foreign firms involved in export-platform FDI.

Appendix

[Table A-1 about here]

[Table A-2 about here]

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Notes

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[1]We do not have firm-level data but we still think that province/firm-type/trade-type/product/destination country data are suitable for the investigation of micro-phenomena such as export spillovers. The information we have is actually very detailed. Feenstra and Hanson (2005) argue for example that their city/firm-type/trade-type/product/destination country dataset approaches the precision of a firm-level dataset. Moreover, with firm-level data, we would have information on overall size or productivity of the firm, but we would still lack information on firm/product specific ability. Finally, we already have more than 4 million observations for our regressions. For the analysis of the determinants of entry on export markets, firm-product-destination country data would be hardly tractable.

[2]The data are separately reported by firm type, including foreign-owned enterprises, Sino-foreign joint ventures, collective enterprises, private enterprises and state-owned enterprises. The first two categories are considered as foreign firms and the other categories as domestic firms. Unreported regressions, available upon request, show that results hold when restricting domestic firms to state-owned or to private firms respectively. Also foreign export spillovers appear to emanate similarly from fully-foreign and joint-venture firms.

[3]The data also refer to a third category ("Others") that groups other flows such as aid, border trade and consignment, representing overall less than 1% of total trade value per year. When considering the processing/ordinary trade distinction, this category is dropped.

[4]In the case of durable starts, note however that since our data are not at the firm-level but are aggregated by firm-type, it might be the case that the domestic exports we observe in the two consecutive years emanate from two different domestic firms.

[5]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.

[6]World countries' GDP per capita are taken from the World Development Indicators database (World Bank).

[7]Provincial GDP per capita are taken from the China Statistical yearbooks.

[8]By contrast, the share of null values for other (more aggregated) foreign export spillovers is very small, suggesting that the issue is restricted to product-country specific spillovers. It is respectively 0, 13.4 and 31.5% for other products/countries, same country-other products and same product-other countries spillovers. In unreported results, we check that results are unaffected when using the same approach (including both the presence dummy and the value) to study the impact of the other foreign export spillovers variables.

[9]Product-level world share of China is computed for the year 1997.

[10]In the rest of the paper, we include in this category the zones identified by Wang and Wei (2010) as "Special Economic Zones", "Economic & Technological Development Areas" and "Hi-Technology Industry Development Areas".

[11]The marginal impact of a 10% increase in the value of foreign exports of product k to country j is equal to $(1.1^{0.023}-1)\times$ average probability to start exporting $= (1.1^{0.023}-1)\times 0.219 \approx 0.05$ percentage point.

[12]We thank an anonymous referee for this suggestion. Our main message remains the same when we run regressions on durable starts, i.e. entries on a given market for at least two consecutive years, and when we focus on domestic export starts for which the export value is above a minimum value. We use two alternative thresholds that correspond to the bottom decile and bottom quartile of the export value of new export flows.

[13]Note that in 1998, US multinationals, for which export platform is a crucial motivation to invest in Ireland, represent 80% of foreign firms' manufacturing exports originating from Ireland. 96.4% of their turnover is exported. Export activities of US firms in Ireland thus look like some kind of processing trade.

[14]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 $[e^{0.113}-1]\%$.

[15]The marginal impact of a 10% increase in GDP per capita of the destination country being equal to $(1.1^{0.173}-1)\approx 1.66\%$, while the marginal impact of a 10% increase in product-destination country demand in $t-1$ is equal to $(1.1^{0.238}-1)\approx 2.29\%$.

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

[17]This figure corresponds to $[e^{0.062}-1]\times 0.217$ from column 6 of Table 7.

[18]This figure corresponds to $[1.1^{0.017}-1]\times 0.217$ from column 6 of Table 7.

Tables

Table A-1: Summary statistics on domestic starts and foreign presence nature

Year	Domestic start=1					Domestic start=0				
	Total	Foreign Exports>0				Total	Foreign Exports>0			
		Same product		Other products			Same product		Other products	
		Same country	Other countries	Same country	Other countries		Same country	Other countries	Same country	Other countries
1997	83818	5688	55047	71753	83818	776830	17230	444238	581812	776830
2006	159318	13001	118686	146838	159318	395054	31580	250577	358320	395054
Total	1268768	94690	885055	1123626	1268768	6060088	226741	3674106	4956347	6060088
Share (%)		7.5	69.8	88.6	100		3.7	60.6	81.8	100

Table A-2: Impact of foreign export spillovers: sample checks

	Explained variable	New export link in t+1									
	Estimator	Conditional Logit									
		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
		benchmark	no agriculture	no mining	manuf only	China's share <45%	China's share <85%	No top 3 provinces	No Textile Clothing	No Great China	Col. 9 and no Guangdong
Foreign Spillovers	Same product/country foreign export	0.023[a]	0.022[a]	0.022[a]	0.022[a]	0.022[a]	0.022[a]	0.022[a]	0.021[a]	0.023[a]	0.022[a]
		(0.001)	(0.002)	(0.001)	(0.002)	(0.002)	(0.001)	(0.002)	(0.002)	(0.001)	(0.002)
	Other countries-same product foreign export	0.004[b]	0.004[b]	0.003[b]	0.004[b]	0.003[c]	0.004[b]	0.003[c]	0.003[b]	0.004[b]	0.004[b]
		(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.001)	(0.002)	(0.002)
	Same country-other products foreign export	0.001	-0.001	-0.001	-0.001	0.001	0.001	0.003	0.001	-0.001	0.002
		(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
	Other countries/products foreign export	-0.255	-0.268	-0.250	-0.263	-0.253	-0.251	-0.067	-0.298	-0.243	-0.101
		(0.215)	(0.231)	(0.216)	(0.232)	(0.223)	(0.216)	(0.163)	(0.204)	(0.217)	(0.170)
	Control for domestic presence	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
	Control for GDPs	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
	Control for Macro export	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
	Control for Macro export lags	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
	Observations	4374850	4156282	4304081	4085513	3292691	4130129	3435584	3582556	4309616	3969541
	R-squared (%)	12.69	13.12	12.79	13.23	13.94	12.98	11.53	13.53	12.77	12.39
	Fixed effects	by province-product(HS4)-country triad and by year									

Heteroskedasticity-robust standard errors are reported in parentheses. Standard errors are clustered at the province level. [a], [b] and [c] indicate significance at the 1%, 5% and 10% confidence level.

Table 1: Summary statistics on domestic exports and foreign presence: number of observations

Year	Domestic exports>0			Domestic exports=0			All			
	Foreign exports		Share	Foreign exports		Share	Foreign exports		Total	Share
	=0	>0	For. exp.>0	=0	>0	For. exp.>0	=0	>0		For. exp.>0
1997	148,728	40,780	0.215	837,730	22,918	0.027	986,458	63,698	1,050,516	0.060
2000	205,471	59,359	0.224	757,474	27,852	0.035	962,945	87,211	1,050,516	0.083
2003	255,308	88,998	0.258	669,855	35,995	0.051	925,163	124,993	1,050,516	0.119
2006	354,655	141,129	0.285	509,791	44,581	0.080	864,446	185,710	1,050,516	0.177
Total	2,730,325	957,461	0.260	7,493,638	370,292	0.047	10223963	1,327,753	11,551,716	0.115

Table 2: Summary statistics on domestic starts and foreign presence: number of observations

Year	Domestic start=1			
	Foreign exports		Total	Share
	=0	>0		For. exp.>0
1998	78,130	5,688	83,818	0.068
2001	100,001	7,889	107890	0.073
2004	136,288	11,211	147,499	0.076
2007	146,317	13,001	159,318	0.082
Total	1,174,078	94,690	1,268,768	0.075

Table 3: Summary statistics on domestic starts: Share in total export starts over the period

Destinations	
USA	1.8%
Hong-Kong	1.7%
South-Korea	1.7%
Japan	1.6%
Malaysia	1.5%
Provinces	
Guangdong	8.5%
Zhejiang	7.5%
Shanghai	7.0%
Jiangsu	7.0%
Beijing	6.7%
Sectors (HS2)	
Nuclear reactors, machinery et al.	10.5%
Elect machinery et al.	6.6%
Art. of iron and steel	4.4%
Organic chem.	4.1%
Optical, photo.	4.0%

Table 4: Nature of foreign export spillovers

	Explained variable	Domestic new export link in t+1					
	Estimator	Conditional logit					
		(1)	(2)	(3)	(4)	(5)	(6)
Foreign export spillovers Year t	All products-countries foreign export	-0.247^{c}					
		(0.137)					
	Same country-all products foreign export		-0.004				
			(0.003)				
	Same product-all countries foreign export			-0.002			
				(0.002)			
	Same product/country foreign export				0.021^{a}	0.021^{a}	0.023^{a}
					(0.002)	(0.002)	(0.001)
	Other products-same country foreign export					-0.003	0.001
						(0.003)	(0.003)
	Other countries-same product foreign export					-0.003	0.004^{b}
						(0.002)	(0.002)
	Other countries/products foreign export					-0.232^{c}	-0.255
						(0.131)	(0.215)
Demand Year t	Ln country-product total imports	0.081^{a}	0.081^{a}	0.081^{a}	0.080^{a}	0.025^{a}	0.025^{a}
		(0.008)	(0.008)	(0.008)	(0.008)	(0.005)	(0.005)
	Ln country GDP per capita	0.258^{a}	0.260^{a}	0.258^{a}	0.256^{a}	0.172^{a}	0.173^{a}
		(0.035)	(0.035)	(0.034)	(0.034)	(0.035)	(0.034)
Supply Year t	Ln export province	0.687^{a}	0.570^{a}	0.572^{a}	0.568^{a}	0.437^{a}	0.574
		(0.196)	(0.204)	(0.204)	(0.204)	(0.155)	(0.747)
	Ln export province-product	0.182^{a}	0.184^{a}	0.186^{a}	0.182^{a}	0.170^{a}	0.075^{a}
		(0.007)	(0.007)	(0.007)	(0.007)	(0.007)	(0.010)
	Ln export province-country	0.147^{a}	0.151^{a}	0.148^{a}	0.147^{a}	0.140^{a}	0.065^{b}
		(0.018)	(0.019)	(0.017)	(0.017)	(0.018)	(0.028)
	Ln export China-product	0.426^{a}	0.424^{a}	0.425^{a}	0.421^{a}	0.340^{a}	0.331^{a}
		(0.014)	(0.015)	(0.015)	(0.015)	(0.016)	(0.015)
	Ln export China-country	0.217^{a}	0.217^{a}	0.215^{a}	0.215^{a}	0.173^{a}	0.171^{a}
		(0.026)	(0.026)	(0.027)	(0.027)	(0.022)	(0.022)
	Ln province GDP per capita	-0.413	-0.650	-0.652	-0.651	-0.498	-0.490
		(0.475)	(0.509)	(0.509)	(0.512)	(0.460)	(0.456)
Macro lags Year $t-1$	Lag Ln country-product total imports					0.239^{a}	0.238^{a}
						(0.009)	(0.009)
	Lag Export province					0.285^{c}	0.275^{c}
						(0.148)	(0.151)
	Lag Export province-product					0.027^{a}	0.028^{a}
						(0.006)	(0.006)
	Lag Export province-country					0.019^{c}	0.019^{c}
						(0.011)	(0.011)
	Lag Export China-product					0.080^{a}	0.077^{a}
						(0.012)	(0.012)
	Lag Export China-country					0.037^{b}	0.036^{b}
						(0.016)	(0.017)
Dom. presence Year t	Other countries-same product domestic export						0.098^{a}
							(0.006)
	Other products-same country domestic export						0.074^{a}
							(0.023)
	Other countries/products domestic export						-0.132
							(0.626)
	Observations	4,374,850					
	R-squared (%)	12.23	12.19	12.19	12.21	12.59	12.69
	Fixed effects	Province-product(HS4)-country triad					
	Fixed effects	year					
	Share of domestic starts	0.219					

Heteroskedasticity-robust standard errors are reported in parentheses. Standard errors are clustered at the province level. ^{a}, ^{b} and ^{c} indicate significance at the 1%, 5% and 10% confidence level.

Table 5: Impact of foreign export spillovers: controlling for endogeneity

	Explained variable	Domestic new export link in t+1						
	Estimator	conditional logit	Linear probability - fixed effects				IV	1^{st} stage
		(1)	(2)	(3)	(4)	(5)	(6)	(7)
Foreign Spillovers	Same product/country foreign export	0.023^{a}	0.007^{a}	0.007^{a}	0.006^{a}	0.006^{a}	0.083^{a}	
		(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.038)	
	Same country-other products foreign export	0.001	-0.001	-0.001	-0.0012^{b}	0.003^{b}	-0.001	-0.006^{a}
		(0.001)	(0.001)	(0.001)	(0.0005)	(0.002)	(0.001)	(0.002)
	Other countries-same product foreign export	0.004^{b}	0.001	0.004^{a}	-0.001	-0.0005^{b}	-0.0007^{c}	0.012^{a}
		(0.001)	(0.001)	(0.001)	(0.001)	(0.0002)	(0.00004)	(0.011)
	Other countries-products foreign export	-0.255	-0.028	0.034	-0.037^{c}	0.153^{c}	-0.021	-0.004
		(0.215)	(0.034)	(0.025)	(0.021)	(0.089)	(0.031)	(0.071)
	Country-product-year world imports × # EPZ							0.020^{a}
								(0.002)
	Country-product-year world imports × # High-Tech zones							-0.004
								0.003
	Control for Macro export	yes	yes	yes	yes	yes	yes	yes
	Control for Macro export lags	yes	yes	yes	yes	yes	yes	yes
	Control for domestic presence	yes	yes	yes	yes	yes	yes	yes
	Control for GDPs	yes	yes	yes	yes	yes	yes	yes
	Observations	4,374,850						
	Province-product(HS4)-country fixed effects	yes	yes	yes	yes	yes	yes	yes
	Year fixed effects	yes	yes	yes	yes	yes	yes	yes
	Province-product-year fixed effects	no	no	yes	no	no	no	no
	Country-product-year fixed effects	no	no	no	yes	no	no	no
	Province-country-year fixed effects	no	no	no	yes	no	no	no
	R-squared (%)	12.7	8.9	12.7	12.1	6.6	2.01	2.60
	F-test of excluded instruments							42.42^{a}
	Kleibergen-Paap F-stat							42
	Weak Cragg Donald F-test							7706
	Underid test Kleibergen-Paap							5.88^{b}
	Hansen overid test							2.02
	p-value							(0.16)
	Endogeneity						1.83	
	p-value						(0.18)	

Standard errors are clustered at the province level. ^{a}, ^{b} and ^{c} indicate significance at the 1%, 5% and 10% confidence level. In column 6 we instrument the product-country specific spillovers indicator (Same product/country foreign export) by the interactions of the country-product-year total import value with the number of EPZs and the number of High-Techn zones in the province-year taken from Wei and Wang (2010).

Table 6: Specification on foreign export spillovers

	Explained variable	Domestic new export link in t+1					
	Estimator	Conditional logit					
		Benchmark	Positive foreign exports in t	in 1997	Benchmark with dummy for exports >0		
						Spatial decay	
		(1)	(2)	(3)	(4)	(5)	(6)
Spillovers Year t	Same product/country foreign export	0.023^{a}	0.043^{a}	0.022^{a}	0.011^{b}	0.010^{b}	0.010^{b}
		(0.001)	(0.009)	(0.002)	(0.004)	(0.004)	(0.004)
	0/1 same product/country foreign export				0.113^{a}	0.113^{a}	0.110^{a}
					(0.039)	(0.039)	(0.040)
	Other products-same country foreign export	0.001	0.006	0.008	0.001	0.001	0.001
		(0.003)	(0.014)	(0.014)	(0.003)	(0.002)	(0.003)
	Other countries-same product foreign export	0.004^{b}	0.001	0.011^{b}	0.004^{b}	0.0035^{b}	0.0035^{b}
		(0.002)	(0.007)	(0.006)	(0.002)	(0.0016)	(0.0016)
	Other countries/products foreign export	-0.255	0.110	-0.189	-0.255	-0.264	-0.265
		(0.215)	(0.333)	(0.310)	(0.215)	(0.214)	(0.214)
	Same product/country foreign export in surrounding provinces					0.011^{a}	0.007^{a}
						(0.002)	(0.002)
	0/1 same product/country foreign export in surrounding provinces						0.052^{a}
							(0.017)
	Control for domestic presence	yes	yes	yes	yes	yes	yes
	Control for imports and GDPs	yes	yes	yes	yes	yes	yes
	Control for Macro export	yes	yes	yes	yes	yes	yes
	Control for Macro export lags	yes	yes	yes	yes	yes	yes
	Observations	4,374,850	100,442	66,585	4,374,850	4,374,850	4,374,850
	R-squared (%)	12.69	15.44	9.98	12.69	12.71	12.71
	Fixed effects	Province-product(HS4)-country triad					
	Fixed effects	year					
	Share of domestic starts	0.219	0.380	0.298	0.219	0.219	0.219

Heteroskedasticity-robust standard errors are reported in parentheses. Standard errors are clustered at the province level. ^{a}, ^{b} and ^{c} indicate significance at the 1%, 5% and 10% confidence level.

Table 7: Ordinary versus Processing trade

	Explained variable	Domestic new export link in t+1					
	Estimator	Conditional logit					
		Ordinary		Processing		Ordinary	
		(1)	(2)	(3)	(4)	(5)	(6)
Foreign Spillovers	Same product/country foreign export	0.011^b	0.011^b	0.013	0.013		
		(0.004)	(0.004)	(0.008)	(0.008)		
	0/1 same product/country foreign export	0.105^a	0.104^a	0.156^c	0.155^c		
		(0.042)	(0.042)	(0.088)	(0.088)		
	Total foreign export	-0.289		-0.350			
		(0.216)		(0.347)			
	Other products-same country foreign export		-0.0001		0.008		
			(0.003)		(0.010)		
	Other countries-same product foreign export		0.003^b		0.008^c		
			(0.002)		(0.004)		
	Other countries/products foreign export		-0.288		-0.343		
			(0.209)		(0.352)		
Foreign ODT Spillovers	Same product/country ODT foreign export					0.017^a	0.017^a
						(0.003)	(0.003)
	0/1 same product/country ODT foreign export					0.064^b	0.062^b
						(0.027)	(0.027)
	Total ODT foreign export					0.097	
						(0.112)	
	Other products-same country ODT foreign export						0.003
							(0.002)
	Other countries-same product ODT foreign export						0.009^b
							(0.002)
	Other countries/products ODT foreign export						0.082
							(0.110)
Foreign PCS Spillovers	Same product/country PCS foreign export					0.002	0.002
						(0.007)	(0.007)
	0/1 same product/country PCS foreign export					0.105^c	0.098^c
						(0.056)	(0.056)
	Total PCS foreign export					-0.001	
						(0.068)	
	Other products-same country PCS foreign export						-0.002
							(0.002)
	Other countries-same product PCS foreign export						0.004^b
							(0.002)
	Other countries/products PCS foreign export						-0.007
							(0.068)
	Control for domestic presence	yes	yes	yes	yes	yes	yes
	Control for imports and GDPs	yes	yes	yes	yes	yes	yes
	Control for Macro export	yes	yes	yes	yes	yes	yes
	Control for Macro export lags	yes	yes	yes	yes	yes	yes
	Observations	4,161,535		289,940		4,161,535	
	R-squared (%)	12.48	12.48	15.76	15.78	12.52	12.54
	Fixed effects	Province-product(HS4)-country triad					
	Fixed effects	year					
	Share of ODT domestic starts	0.217	0.217	0.184	0.184	0.217	0.217
Tests IV^i	F-test of excluded instruments^i	20.35^a	21.44^a	99.67^a	113.60^a	12.17^a	12.25^a
		18.25^a	19.44^a	70.17^a	77.36^a	11.62^a	11.85^a
						29.52^a	31.72^a
						27.03^a	29.38^a
	Hansen overid test	1.53	1.49	1.45	1.19	n.a.	n.a
	p-value	0.46	0.47	0.56	0.55	n.a.	n.a
	Endogeneity test	3.41	3.40	4.30	4.41	5.17	5.41
	p-value	0.18	0.18	0.12	0.11	0.24	0.25

Heteroskedasticity-robust standard errors are reported in parentheses. Standard errors are clustered at the province level. ^{a}, ^{b} and ^{c} indicate significance at the 1%, 5% and 10% confidence level.
^{i} The test statistics correspond to results from linear probability estimates instrumenting the foreign spillovers with the interactions of the country-product-year import value from the rest of the world and of yearly growth rate of these imports with the number of EPZs and the number of High Technology zones in the province-year respectively. The instrumented variables are same product/country foreign export and 0/1 same product/country foreign export in columns 1 and 2, same product/country ODT foreign export and 0/1 same product/country ODT foreign export in columns 3 and 4, and same product/country foreign ODT export, same product/country foreign PCS export, 0/1 same product/country ODT foreign export and 0/1 same product/country PCS foreign export in columns 5 and 6. In these two latter regressions, the model is exactly identified so that the Hansen overidentification test cannot be computed.

Table 8: Marginal impact in percentage point-Summary

	All sample	ODT
	Tab. 6 Col. 4	Tab. 7 Col. 6
Foreign presence *per se*	2.62	1.39
Foreign exports value	0.04	0.04

Figures correspond to the increase in the average probability that domestic firms start exporting in a product/country pair when foreign firms' exports are positive for this product/country pair (first row) and when foreign firms' exports rise by 10% (second row).