# Trade as Engine of Creative Destruction

## *The Mexican experience with Chinese competition*[*]

PRELIMINARY AND INCOMPLETE - PLEASE DO NOT CITE WITHOUT PERMISSION

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**Abstract**

This paper exploits the surge in Chinese exports from 1994 to 2004 as a natural experiment to evaluate the effects of an exogenous shock from competition on Mexican producers. The effect of this competition operates a selection at both firm and product-level as its effects are highly heterogeneous both on the intensive and extensive margins. Sales of smaller plants and more marginal products are compressed and are more likely to exit, while larger plants and products exhibit an opposite effect. Similar results hold both on the domestic market as well as for competition facing Mexican exporters on a third market (i.e. the United States).

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# 1 Introduction

Between 1990 and 2007 Chinese exports grew from 62 billions USD to 1.2 trillions USD, at the staggering average rate of about 20 percent per year. According to WTO data China "'is set to overtake Germany as the largest goods exporter in 2009"'.[1] The emergence of China and its impact on producers worldwide has been the focus of the attention of both policy-makers and researchers. At the same time, policy makers concerned about the adverse consequences of such shock have been voicing their concerns and argued for the importance of protecting their industries.[2]

The emergence of China has caused angst among policy-makers on all continents and at all levels of development. As argued in Winters and Yusuf (2007), however, in the near term there is probably relatively little to fear for OECD countries because their specialization in sophisticated products and in capital goods insulates their main producers from much of the competition. The pressure on the less sophisticated sectors and firms is in some sense pushing in the direction of improved overall economic performance by speeding up creative destruction. Similarly, policy-makers in low income countries often worry that China will leave no room for them in the markets for labor-intensive manufactures, but in fact as China becomes richer, its comparative advantage is shifting away from the simplest goods towards a middle range. Thus low income countries are also relatively insulated from the force of Chinese competition. Arguably the most direct competition is on middle-income countries whose established positions in manufactured markets have come under threat. This is the focus of this paper.

The main contributions presented are the closure of two gaps in the literature. On the one hand we provide a detailed investigation of the causal impact of competition on the intensive and extensive margin of products in addition to plants. On the other hand we evaluate this same impact on a third country market.[3] On both these markets we find strong heterogeneous effects of the competition shock on the extensive (firm exit and survival) and intensive (sales of plants) margin of plants. We also find evidence of product reallocation within plants as competition pressures them to focus on their core competencies (in this context see also Iacovone, Javorcic (2008), Eckel et al. (2009)).

We come to these results by treating the emergence of China on the export markets as a natural

[1]Quoted from the Financial Times article "'China set to be biggest exporter"', published on July 23, 2009 by Frances Williams.

[2]Some examples from the media to highlight this point: "'[We] must not repeat the mistakes of the nineties, when an 'invasion' of Chinese products destroyed entire sectors of our industry [...]"' (Medium Enterprises Association of Argentina, April 6, 2004), or: "'I made it very clear to Minister Bo Xilai that we will take the legal steps to give Brazilian industry the right to protect itself"' (Brazilian minister for Industry, Development and Commerce after meeting with his Chinese counterpart, October 4, 2005.)

[3]We should underscore that the share of Mexican exports to the US is larger than 85%, in this sense we are analyzing the impact on the near universe of the Mexican exports.

experiment of a strong and sudden surge of competition on manufacturing producers of Mexico. As depicted in figure 1 the growth rate of Chinese exports to Mexico and the United States increased substantially in value and share during the period considered. This sizeable growth was matched by a moderate increase of trade flows into the other direction; the share of exports from Mexico to China increased from 1.9 to 2.8 percent from 1994 to 2004.[4] Hence we interpret the situation at hand as a unilateral trade shock.

Within NAFTA Mexico has had a comparative advantage for the production of labor intensive goods, and hence seems to be one of the countries strongly affected by competition from China. Given that the large majority of Mexican exports go to the United States, the choice of country also allows us to go beyond domestic competition and to study the impact of the Chinese export shock on export markets (ie. the United States), which to our knowledge has not been done before. The objective of this study is to provide an example of how trade can work as a force of creative destruction that leads to competition enhancing readjustments within and across firms. For this reason we focus on both reallocation between firms and within firms, at product level.

There have been several recent studies that investigate the impact of Chinese competition on sectoral level.[5] These have shown where the pressure has arisen and its final effects in terms of outputs etc, but they are not able to address how economies adjust to this pressure. Adjustment is undertaken by firms which find their market positions eroded and it is only by studying firms that we are able to see whether Chinese competition induces an active response in terms of, say, innovation, introducing new products or giving up on old ones, new investment, etc, or a passive one in terms of cuts in investment and employment. And only firm level analysis can see whether competition undermines the heart of an industry or merely speeds up the decline of its periphery. If we are to understand the full impact of Chinese emergence on incomes and growth, we arguably need to know these things.

Firm-level studies of Chinese competition are rare - some studies have gone one step further by looking at the impact on firm level (see for example Bernard, Jensen and Schott (2006), Fernandes (2007), who focuses on quality upgrading for Colombian firms). However, none of studies investigate the impact of competition on product level, nor analyze the impact of Chinese competition on firm- and product-level in a third export market.

In addition to these findings our results are also of relevance for firms and policy makers alike. We provide an example of how the rise of China affected production patterns in Mexico. Of particular interest might be our finding that larger, more productive firms and products are shielded against the adverse effects that this competition poses.

[4]Source: COMTRADE. See also Dussel Peters (2007).

[5]See for example Freund, Ozden (2006), Hanson, Robertson (2007), Lederman et al. (2008), Soloaga et al. (2007), Devlin et al. (2006), Lall et al. (2005).

The rest of the article is organized as follows: Section 2 discusses some related literature, section 3 describes the theoretical framework, section 4 describes the applied data and strategy. Section 5 describes the results of the investigation, and section 6 evaluates some additional explanations that might be brought forward. Section 7 concludes.

# 2 Related Literature

Our work is related to several areas of research. Most studies analyzing the impact of the emergence of China on the world markets deal with the effect on developed countries, for which the pressure has a possibly constructive intersectoral effect. We ask about a country whose comparative advantage lies firmly in the same sort of sectors and sophistication as China's, as Mexicos comparative advantage within NAFTA lies in labor intensive goods.

First, there exists a large number of studies that rely on sectoral trade flows data to assess the competition threat from Chinese exports to Latin American producers (Freund, Ozden (2006), Hanson, Robertson (2007), Lederman et al. (2008), Soloaga et al. (2007), Devlin et al. (2006), Lall et al. (2005)). Other studies have evaluated the impact Chinese exports on wages and employment for various parts of Latin America, see Levinsohn (1999) for Chile, Pavcnik and Goldberg (2005) and Eslava, Haltiwanger, Kugler and Kugler (2009) for Colombia, Blom, Goldberg, Pavcnik and Schady (2004) for Brazil and Pavcnik (2002) for Chile. A sectoral study of the effects that Chinese imports to the US had on Mexican imports to the US finds some evidence for crowding out on this third market (see Iranzo and Ma (2006)). In a broad study Jenkins, Dussel Peters and Mesquite Moreira (2008) suspect that winners as well as losers should be expected in Latin America as a consequence of Chinas emergence.

Previous firm level studies highlight that trade does not only hurt producers but pushes them to improve their efficiency and organization. Bloom, Draca and Van Reenen (2008) find that imports from China to Europe increases the innovation activity of surviving firms in Europe, while it decreases the chances of survival and employment. Bernard, Jensen and Schott (2004) show that Chinese competition to the US make high wage and high skill companies there grow and cause the decline of low wage and low skill industries. Bernard, Jensen and Schott (2006) investigate how firms react to exposure to international trade and show that plant survival and growth are negatively correlated with competition while skill intensity, and industry switching positively.[6]

The question of the impact of trade on product level and within-firm reallocations however is with a few exceptions unexplored. Bernard, Redding and Schott (2009a) find that the impact

[6] In this context see also Arroba et al. (2008), Bernard and Jensen (2007) and Yusuf et al. (2007) and Teshima (2009), which also discusses the case of Mexico.

of product switching on US manufacturing growth is as large as that of firm exit and entry to the market, Baldwin and Gu (2005) find evidence that competition reduces diversification of Canadian producers. Eckel, Iacovone, Javorcik and Neary (2009) show that Mexican producers tend react by focusing on their core competencies. Fernandes and Paunov (2008) present evidence of product response in Chile.

Further numerous theoretical articles in the emerging trade models on multi-product firms are closely related to our analysis. Bernard, Redding and Schott (2009b) create a model of multi-product firms that predicts the drop of the less productive firms and products as a consequence of trade liberalization. The model by Eckel and Neary (2009) suggests that within-firm adjustments, as a consequence of trade reforms might generate substantial gains due to higher efficiency. Related models are further Melitz (2003), Melitz and Ottaviano (2009), Aghion et al. (2005).

Mayer, Melitz and Ottaviano (2009) is the model most closely related to our study as it extends Melitz and Ottaviano (2009), by introducing a multi-product dimension. They find that domestically an increase in the toughness of competition leads firms to drop their marginal products (the ones that also have a lower share in production), and reallocate their resources to an increased production of the remaining goods. The inter-firm reallocations generate an additional aggregate productivity increase. For export markets they predict that more competition will lead to a drop of the less substantial products and firms.

# 3 Model

The success of Chinese exports can be understood by its ability to undercut prices (as argued by among others Broda, Romalis (2009)). In a simple model we want to illustrate that if cost undercutting is the main characteristic of Chinese exports, we might expect heterogeneous results for firms and products on the Mexican market.

Consider a store $i$ that sells a good with a certain quality. Initially the store sells a domestic product, that it obtains from the producer of that item at costs $c^H$, at price $p_i(c^H)$ to the local consumers, from which it faces a downward sloping demand. We assume the price function $p(c)$ to be increasing in costs. The profits from selling the domestic product are in one period equal to $(p_i(c^H) - c^H)q_i^H$, where $q_i^H$ is the optimal quantity of the product sold if the purchase price to the store is $c^H$. The store discounts future periods with the discount factor $\delta$, which is assumed to be between zero and one. Then present plus discounted future profits are equal to: $(p_i(c^H) - c^H)q_i^H/(1 - \delta)$.

We consider the situation in which a foreign competitor enters the market to compete with the domestic producer by delivering a perfect substitute for that good at cost $c^F$. If the foreign competitor offers a lower price than the local producer ($c^F < c^H$), the store might consider to switch supplier. We assume that store $i$ can undertake such a change for the cost of $f_i$. We think of the switching costs $f_i$ to be heterogeneous across stores. A varying cost element emerges if it is costly to exit existing contracts, and these existing contracts have different expiry dates. Another reason for heterogeneity in switch costs is, that the costs for writing different contracts with the new suppliers will also depend on the nature and structure of the store concerned, or variation in the difficulty to overcome language barriers. Finally, different levels of risk aversion or judgment of the reliability of the new producer might again lead to different expectations of the switching cost. Hence if $N$ stores sell a similar product, a situation could emerge in which some of the stores change the suppliers while others do not.

The store changes supplier if $[(p_i(c^F) - c^F)q_i^F - (p_i(c^H) - c^H)q_i^H]/(1-\delta) > f_i$, and would be indifferent between changing or not if the inequality was an equality. If $c^F < c^H$ the left hand side of the inequality must be greater than zero, since it would be feasible for the store to charge price $p^H$ with quantity $q^H$ even at lower cost $c^F$, while an even greater profit might be made at adjusting price and quantity accordingly. Using a similar argument it can be shown that profits of store $i$ must be decreasing in costs $c$.

We further make the definition of Melitz (2003) and others that if one domestic firm has lower costs than another for the same product at the same quality, the lower cost firm has production advantages (which might consist for example of a better management). We refer to these differences as higher productivity, and think of the more productive firm as one that can deliver equal quality for a lower price. As in the literature on multi-product firms we further assume that the costs of a product can be decomposed into a firm productivity and a product productivity component, such that percental differences of costs from the mean are positively correlated for products within the same firm (see for example Bernard, Redding and Schott (2009)).

From this simple setting, we generate several propositions:

*Proposition 1: A product from a more productive firm sells at larger quantities.* By definition we characterize a more productive product as one that is passed on to the stores at lower costs conditional on quality. Given the assumptions of a downward sloping demand and a price function $p(c)$ that is increasing in costs, a lower cost product will be sold at a lower price, and hence at higher quantities.

*Proposition 2: A more productive firm sells larger quantities.* If a high and a low productivity firm produce the same number of products, from proposition 1 the more productive firm must sell larger overall quantities. However, it is plausible to assume that the more productive firm would sell a higher number of products, which would make the case even stronger.

*Proposition 3: Entry of a competitor is more likely to cause smaller products to exit from the* *market.* The greater the cost difference between the domestic and the foreign producer $(c^F - c^H)$ is, the more likely is a store to switch to the foreign producers since profits are decreasing in costs. Everything equal a product with higher costs is smaller (proposition 1), hence smaller products are more likely to be dropped as a competitor enters the market.

*Proposition 4: Entry of a competitor is more likely to cause smaller firms to exit the market.* A firm exits the market if all its products do. Hence from proposition 2 and 3 the statement must hold.

*Proposition 5: Conditional on survival, entry of a competitor reduces sales of a small product more than sales of a large product.* In this model we think of sales reduction as a partial replacement of the Mexican product by some stores, and not by others due to differences in the fixed costs $f_i$. Since a replacement by all stores is more likely for the small products (proposition 3), also the replacement by some of the stores must be more likely.

*Proposition 6: Conditional on survival, entry of a competitor reduces sales of a small firm more than sales of a large firm.* The same argument as in proposition 5 can be made with respect to proposition 4.

These propositions coincide largely with predictions made by the emerging models on multi-product firms in international trade referenced in the literature section. From this simple model we take the motivation to focus on product and firm exit as well as sales as interesting dependent variables, and expect a heterogeneous effect across products and firms of different size. The model might also be used to predict the effects of competition on a shared third market also, hence we do not expect the results for Mexican exporters on the export market to be very different from the domestic effects.

This model also creates an incentive to upgrade productivity for the established producers when faced with competition. Such a relationship was found by Bloom, Draca and Van Reenen (2008) for European manufacturing firms. Thus our finding (see section 5) that large firms grow as a reaction to Chinese competition is not inconsistent with the model sketched.

# 4 Data and Empirical Strategy

Mexico is one of the countries most intensely affected by the emergence of Chinese exports (see Freund and Ozden (2006), Hanson and Robertson (2007)). Between 1994 and 2004 the value of Chinese imports to Mexico increased exponentially from 0.5 to 14.4 billion USD, which corresponds to an increase of the share of Chinese imports in total imports from 0.6 to 7.3 percent (see graph 1, source: COMTRADE). In the same period the imports to the US increased from 41 to 201 million USD, which corresponds to an increase from 0.06 to 0.14 percent of imports and reflects a substantial impact to the US market.

To investigate this relationship further we rely on the Monthly Industrial Survey (EIM) data on Mexican plants provided by the Mexican Institute of Statistics (INEGI) which covers about 85 percent of Mexican industrial output. These unique survey contains detailed information on sales and exports of each of the products manufactured by Mexican plants as well as information on employment broken down by skills.[7]. Further, we use trade data from COMTRADE at HS-1996.[8]

Because the production database relies on the Mexican Industrial Classification CMAP-1994 (Clasificacin Mexicana de Actividades y Productos) at product level (i.e. 8-digit), while the trade data is based on the HS-1996 classification provided by the World Custom Organization at 6-digit level we had to match manually the individual product code using its description.[9] In cases when a correspondence was not found we exclude those products from our dataset. Whenever more than one HS code corresponds to one CMAP product we use the average trade value across the different HS codes.

After merging the trade and plant-product level datasets we obtain a specific measure of exposure to foreign competition at individual plant-product-level and we are left with information on 2744 individual products and a number of plants varying between 6219 and 4439 because of attrition during our sample period (from 1994 to 2004). The main variables of this dataset are described in table 3. The measure we apply for competition on product level is the share of Chinese in total imports, while on plant level we compute the weighted average of this measure for the produced products of each plant using the sales share of each product as its weight.

Using this dataset we estimate the following equation:

$$y_{it} = \beta_1 Z_{it-1} + \beta_2 Z_{it-1} x_{it-1} + \beta_3 X_{it-1} + \lambda_t + \mu_i + \epsilon_{it}, \quad (1)$$

where $y_{it}$ is a plant specific outcome variable of interest for plant $i$ at time $t$, $Z_{it}$ a measure of the Chinese competition shock, $X_{it}$ a set of control variables and $Z_{it}x_{it}$ the interaction of the Chinese competition with $x_{it}$, a subset of $X_{it}$. $\lambda_t$ denotes a year fixed effect and $\mu_i$ is a plant fixed effect.

We apply the same methodology to investigate the effect on product level. In these regressions

[7]These datasets have been used and described in previous studies, see for example Iacovone 2008b and Iacovone and Javorcik 2008

[8]For the bilateral trade transaction we rely on the reported imports since it is generally believed that the importer-reported data tend to be more accurate.

[9]We conduct the match of these databases relying on the English and Spanish HS 1996 classification obtained from the Export Helpdesk from the European Union (Export Helpdesk, 2009) and the Spanish language HS classification obtained from the SICA project from the Ecuadorian Ministry of Agriculture and Livestock (SICA, 2009).

we rewrite variables in terms of product $i$, which involves product specific outcomes, control variables on product and plant level, and plant-product specific fixed effects. Generally we cluster standard errors on the level at which we observe the competition from China.[10]

Aware of the potential endogeneity concerns that could bias our estimates of $\beta_1$ and $\beta_2$, our main variable of interests, we rely on instrumental variable estimators to tackle for the possible exogeneity of $Z_{it}$. As instruments we use Chinese exports to the EU and separately Chinese exports to the world excluding US and the EU. Further we create the interactions of these export numbers with $x_{it}$ which provides us with additional instruments for the regressions that involve interaction terms.

A potential concern about the exogeneity of the instruments are common trends that affect both Chinese exports and Mexican firms. However, as is widely believed at the heart of the rise of China lie policies such as the relaxation of prohibitations of economic activities which encouraged activity, stronger property rights and improvements of governance (see Philip Keefers article in Winters, Yussuf (2007) or Huang (2003)). In fact growth did not occur until meaningful improvements in governance occured.

Another concern is that plants and products affected by competition from China might differ initially from those that are not. As depicted in figure 1, Chinese trade to Mexico increased considerably after 1998, the Chinese shock could be dated for the period after. We create an indicator of firms that were affected by Chinese competition during the years 1998-2004, and regress log sales on firm level for the years 1994-1998 on that variable. In this sample of over 26.000 observations we do not find initial sales differences between firms facing later competition and firms that do not (with a p-value of 0.912).[11]

A final concern is that when we estimate the equation with sales as outcome, we use a lag-dependent variable and an interacted lag-dependent variable in panel data with fixed effects. As demonstrated by Nickell (1981), the coefficient on the lagged variable is likely biased. The size of the bias, and in particular the bias for the interacted variable is unknown. In Appendix 1 we run a simulation to show that the lag-dependent variable, its interaction and the exogenous variable used in the interaction are all three biased towards zero, hence our results are likely to underestimate the true size and significance of the impact in these regressions.

[10] On product level the competition varies at 8 digit CMAP codes, which is the cluster we apply. On plant level competition varies at plant level only, since competition for each plant is a weighted mean of its products and thus plant specific. Given that we apply plant fixed effects, we do not apply clusters in the plant regressions. Such clustering treatment is consistent with Moulton (1990).

[11] A similar exercise for exit can't be undertaken in the same way, given that competition is plant-year specific, and we do not know observe future competition for plants that exit. With log export sales the corresponding p-value is 0.07, hence it is also not significantly different at five percent level of significance. The lower p-value in the export market might reflect the fact that Chinese imports to the US were already observed in the years 1994-1998.

# 5 Results

In the long run it is apparent from table 2 that plants faced with more competition from China (measured by the interaction of level and growth rate of the share of imports from China in total imports) were more likely to exit from the market during that period, and exhibit lower average sales. On the export market the signs of this interaction term show the same signs and roughly the same magnitudes, but they are not significantly different from zero (the number of observations is much smaller here). In this section we will investigate this long run observation on a shorter time scale on sectoral, plant and product level for these variables considered.

*Sectoral level*
First we investigate the relationship of Mexican competition and sales at sectoral level, for which we aggregate the data to six digit CMAP level (table 4). In the OLS regressions we find no significant effect of the Chinese import share on sales in Mexico on sectoral level. This is in line with the results of other studies involving aggregate data, who also find a small or insignificant impact (for example Wood and Mayer (2009)).

There is a positive effect of the Chinese import share to the US on exports of Mexican plants to the US. The instrumental variable estimates are negative and significant at 1 percent level for both the export and the domestic market. Thus we find evidence of a crowding out of Mexican manufactures due to Chinese competition both domestically and in the third market. The difference between the OLS and the IV regressions highlights the need to take into account endogeneity problems. The first stage shows a strong correlation with the instruments, and a Sargan test of exogeneity of the instruments and a test of underidentification do not indicate invalidation of either.

These results at sectoral level could still hide an important amount of heterogeneity at firm and product level, with this objective in mind we move to a finer degree of disaggregation and investigate the impact of Chinese competition on both the extensive and intensive margin.

*Extensive margin*
At plant level we first investigate the relationship between the Chinese competition and plant exit from the market (see table 5 for the OLS and table 6 for the IV results while the first-stage results are reported by table **??**). In all the following regressions we exclude some outliers such as plants reporting to export more than they what sell and plants characterized by extreme values in the rates of Chinese imports growth.[12]

The plant exit variable used as an outcome in table 5 is a dummy variable that is equal to one

[12]We exclude those instances when Chinese imports increase by more than 300 percent or decrease by more than 90 percent, since given that the trade values are weighted means of product competition such huge changes are more likely to reflect changes in the product mix than in actual comptition. In total these outliers amount to about 10 percent of the data. Our results are robust to the inclusion of outliers.

if a plant has positive sales at times $t-1$ and $t$, and no sales at time $t+1$, and zero otherwise. Hence this variable indicates the year during which a plant leaves the market. We control for the following lagged variables on plant level: an index of plant price (which is derived as weighted average of a price index of the products produced in that plant), Herfindahl index as a measure of sectoral competition (a measure which is also a weighted mean of the competition for each of the product manufactured by the plants), the log number of employees as a control for plant size, the export share of producers and the ratio of white to blue collar workers. Further we use plant and year fixed effects.

We find in the first column that domestically Chinese competition in $(t-1)$ has no significant conditional mean effect on plant exit in the OLS regressions, a result which is confirmed in the IV regression.[13] The second column shows that Chinese competition affects plants asymmetrically depending on the degree of market concentration. The more a market is concentrated, the more Chinese competition reduces the chances of survival of Mexican plants, and this result holds also in the IV regression. In the third column we find that more productive plants (measured by the share of exports) are less likely to exit as a result of competition, but this result is not significant in IV estimation.

Finally we include an interaction between plant sales and Chinese competition (forth column). As suggested by the literature (see for example Mayer et al. (2009), Melitz (2003), Melitz et al. (2009)) we think of plant size to be correlated with productivity and/or managerial ability. In this case we uncover a significant asymmetric effect: plants with smaller overall sales are more affected than larger plants. The marginal effect of competition on the probability of exit is estimated to be $0.75 - 0.05\ln(\text{sales})$ in OLS. The mean and median log plant size are around a value of eleven, the percentile at which the mean estimated effect is zero is 70. This significant result for the extensive margin also holds qualitatively in the IV regression.[14]

We repeat a similar estimation with outcome variable plant exit from export market in tables 7 (OLS), 8 (IV) and **??** (first stage). In these regressions we look at the subset of firms that have a positive export share only, and again we control for price, firm size, the skill share and the export share of firms. A similar pattern emerges as an increase of Chinese competitive pressures in the export market increases the probability of Mexican plants to withdraw from exports. This mean effect is however not significant in the IV regression. OLS suggests that

[13]Table **??** shows the results of first stage regressions, in which "'China comp. world-EU-US"' shows the export share of China to the world with the exception of the EU and the US, and "'China exp EU"' shows the export value of China to the EU. The terms "'Int. 1"' to "'Int. 4"' are the interactions of these instruments with the variables interacted in the IV regressions. For example: "'Int. 1"' in the regression with the export share interaction is equal to the first instrument ("'China exp world-EU-US (t-1)"') times the lagged export share. The p-value of a Sargan test of exogeneity of instruments, the p-value of a test of underidentification and the F-value of the first stage are also displayed.

[14]If the IV coefficients are larger than OLS this is usually interpreted as unobserved response heterogeneity, which is commonly observed in similar contexts. See for example Lileeva and Trefler (2009) or Card (2001).

firms with a larger export share (which might be thought of as more productive firms) have a larger probability of exit. This effect also disappears in IV. What is significant in both the OLS and IV estimation is the evidence on the asymmetric effect of competition. In fact, the interaction between plant sales and Chinese competition abroad is negative and significant while the coefficient on the competition alone is positive and significant. An increase in competitive pressures on the export market makes Mexican exporters more likely to stop serving it, but this average effect is weaker for larger and more productive plants.

Next we investigate the extensive margin responses at product-level. Product drop at time $t$ is equal to one if a product is manufactured at time $t-1$ and $t$, but not at $t+1$ and $t+2$.[15] *Product add* is a dummy variable that indicates plants that introduce a new product to their portfolio. Table 9 shows the overall drop of products as a consequence of Chinese competition. In this exercise we restrict the sample to those plants that produce more than one product only. In all product regressions we use plant-product fixed effects (such that product $i$ produced in plant $j$ differs from product $i$ produced in plant $k$, and also from product $l$ produced in plant $j$) and cluster robust standard errors by product categories (CMAP 8-digit). On average, we find a positive and significant effect of Chinese competition on the probability of exit in the OLS and the IV regressions. The second and forth column introduce an interaction with the share of products within plants. We think of a product with a larger share as a more profitable product (Mayer et al. 2009) or "core products" (Eckel and Neary 2008, Eckel et al 2009). Also at product level we find evidence of selection effects as the impact of Chinese competition is asymmetric across products. Core products, or the ones that represent a larger a larger share of plant's sales, are less likely to be dropped. This heterogeneous responses at product level are confirmed in our IV regressions as shown in the forth column of Table 9.

We repeat the exercise for products in the export market, restricting the sample to exporting plants. Product drop from export at time $t$ is defined, as before, equal to one when a product is exported at time $t-1$, in $t$, but not $t+1$ and $t+2$. In these regressions we control additionally for the exit of plants from all markets, and from export markets. The coefficients on the variable measuring the degree of Chinese competition in the US market are not significant when this variable is not interacted with the share of product on total plant sales. However, once more we find, both in OLS and IV regressions, evidence of reallocation and heterogeneous responses as the interaction between the degree of Chinese competition and the share of products sales is negative and significant. This indicates that the more a product is "core" the less likely it is to exit export market in the face of Chinese competition.

Hence we find significant evidence that in response to the increased competition from China led to heterogeneous responses both at firm- and product-level with smaller plants and less im-

[15] Alternatively we have tested the robustness of our results by defining product drop at time $t$ equal to one if a product is manufactured at time $t-1$ and $t$, but not at $t+1$ and our results are substantially unchanged.

portant products facing larger probability of exiting from the market. In this way, competition operates as a selection mechanism that destroys less productive firms and products while, as we will show in the next section, spurring the expansion of more productive ones.

*Intensive margin*

When analyzing the responses at firm- and product-level along the intensive margin we confirm the existence of heterogeneous responses and a process of selection operating in the same direction as shown for extensive margin.

Table 11 shows the OLS results where log sales on plant level is the explained variable. First of all, we show in the first column that we do not find any average affect due to increased Chinese competition. However, when we include an interaction term between the degree of Chinese competition and plant size we find that while on average an increase in competition reduces plant-level sales, this effect is highly asymmetric as the larger a plant is the less it responds by reducing its sales. In other words, Chinese competition pushes smaller and less productive plants to become even smaller while larger and more productive ones actually expand their sales (column 4). This result also holds qualitatively in the IV regressions (table 12). In terms of magnitude we find in both the OLS and the IV results that the mean estimated impact of increasing Chinese competition on sales is negative for plants up to the $60^{th}$ sales percentile and positive for the ones above it. The IV results show a qualitatively similar result.[16]

In the corresponding export market regressions for exporting plants (see table 13 for OLS and table 14 for IV) the same pattern emerges. While there is no average effect of competition from China on the export markets, we find, both in OLS and IV, that the impact of competition is asymmetric forcing smaller plants to reduce their exports sales while larger ones response is the opposite as shown by the coefficient on the interaction term between Chinese competition on the export market and plant's sales (column 4 in both tables 13 and 14).

Next we investigate the responses along the intensive margin at product level. Table 15 confirms once more the "creative destruction" effect of competition and its reallocative consequences with less important products being forced to contract while "core" products expand. In column 1 of Table 15 we show there is actually no mean effect of competition, however when we introduce an interaction term between competition and product's share in column 2 we find that there is a significant asymmetric effect as while the coefficient on the variable capturing competition alone is negative and significant, this is counterbalanced by the interaction term pointing toward the

[16]In this sales and the corresponding export sales IV regression (tables 12 and 14) we lag the four instruments one more period than usually in columns four and eight. Without the additional lag the Sargan test of exogeneity of instruments suggests an endogeneity problem. We do not think that this invalidates our instruments – rather in our standard format for instrumenting we apply an interaction that uses the lagged log plant sales as an instrument, while plant sales are the explained variable in these regression. With the additional lag the Sargan test suggests no problem of endogeneity. In the specification with only one lag the IV coefficients on competition and sales are -27.4 (1.3) and 2.6 (1.2) respectively in the domestic and -19.5 (6.6) and 1.6 (0.5) in the export regression.

fact that while competition forces a contraction along the intensive margin on average this effect is attenuated, and eventually reverted, for the "core products". This results are consistent across OLS and IV estimation (column 2 and 4 in Table 15). The only case when this "asymmetric" effect of competition does not emerge is Table 16 where we present the product-level response to the Chinese competition on the export market. In this case, both in the OLS and IV estimation, we find a significant and negative effect of Chinese competition on product-level sales but the coefficient on the interaction term between Chinese competition and the product relevance, captured by its share over total plant sales, is positive but not significant.

The relationships of sales and exit for plant and product level is graphically depicted in figures 2 and 3, where the x-axis shows sales centiles and the y-axis the marginal effect of competition for firms of that size. The shapes and significance of these curves reflects the results previously described: larger plants and products are shielded more against competition in terms of sales and exit probability. Magnitudes can be readily obtained from these graphs; for example the exit graph in figure 3 suggests that an increase of one percent of total imports of Chinese imports for a certain good translates into an increased exit probability of 0.002 for these products on the domestic market if they occupy 10 percent of plant sales, and it does not increase the exit probability for goods that occupy 90 percent of sales of a plant.

To explore further the nature of this asymmetric effect given by our interaction term between plant size and degree of competition we perform quantile regressions and quantile IV regressions of the domestic size regression (see Table 17)[17]. The results reveal a similar relationship with a negative distributional effect below the median and a positive effect above in OLS and IV. The relationship is increasing and seems to be of a concave nature.

The quantile regression technique allows us to see the impact of competition for firms with the same size but different skill shares, as well as the impact of holding the skill share constant and varying size. Figure 4 displays a size - skill surface, which uses the coefficients estimated in table 19), whereby we use the ratio of white to blue collar workers as a measure of skill intensity of plants. The figure suggests that among the small plants the competition hurts only those that have a low skill intensity, while small plants with a high skill intensity might even grow. Also among large plants those with a high skill intensity might grow as a result of competition, while large plants with a low share of white collar workers remain unaffected.

*Employment*

As a third outcome of interest we analyze changes in the number of workers as a consequence of increased competitive pressures from Chinese competition. This question is of high policy interest and often raised by both previous researchers and politicians in the context of Chinese imports.

[17] For the implementation of the quantile IV regressions we use the strategy and codes developed by Chernozhukov and Hansen (2006).

Tables ?? and ?? show the results for the overall log number of white and blue collars as explained variables respectively. OLS (columns one and three) shows no significant change of either in the regressions with no interaction terms. The coefficient on skill share in these regressions is likely to be endogneous since it contains the lagged dependent variable. We nevertheless include this variable since we consider it important control variable.

In the IV regressions we find a significant mean reduction of blue collar, but not of white collar workers. The regressions with the size interaction (columns two and four) show a reduction of blue and white collar workers that is again less apparent for large plants. The coefficient on the Chinese import share is stronger on blue collar workers (in OLS the coefficients on Chinese competition compare as -3.1 for blue and -1.9 for white collar workers, in IV as -7.1 for blue and -4 for white collar workers).

In the corresponding regressions for the export market (tables ?? and ??) we find that there is no mean effect on blue and a positive significant effect on white collar workers in OLS that disappears in the IV regression. The interacted variables show in IV a significant decrease for both that is more pronounced on the coefficient of competition for blue collar workers. These results are related to Lileeva and Trefler (2009) who use plant specific tariff cuts to show that trade between the US and Canada increased the labor productivity of lower productivity manufacturers in Canada.

# 6 Robustness

So far we have not considered the effect of Chinese exports on inputs, which might be an additional factor to drive plant exit and sales, and potentially causes the results presented to this point to underestimate the true impact. Thus the importance of China in imports represents a potential omitted variable.

To account for this concern we generate a measure for the Chinese shares in inputs using the input-output tables for 2003 provided by INEGI and the Chinese trade values from COMTRADE.[18] For the computation we weight each sector listed as input by its imports share, and the import share by the Chinese share in inputs for that sector. Total imports from China for a sector are positively correlated with Chinese imports for imports to that sector as apparent from figure 5. This graph might suggest that Chinese manufacturers need to acquire and produce the inputs for the production of their final goods, and it is only reasonable to think that they in part export these inputs.

Table 20 provides the main regressions for plant exit and sales on the domestic and export

[18]Given constraints from the available input-output table this variable is computed on sectoral level (with 32 sectors) only.

market with plant size interactions with the addition of the measure for the Chinese importance in inputs and the interaction of this variable with plant size. Absent the addition of these two variables, the regressions provided in this table are identical to column 4 in tables 5, 7, 11 and 13, although we only provide the main variables of interest. While for some of the previously used coefficients the significance is reduced, qualitatively the results remain the same. The inputs variable mimics the results of Chinese imports; for small firms it increases the probability of exit and reduces sales, while the contrary holds for larger firms.

Another concern is that many firms in the sample do not experience competition from China, and might bias the results. Also they might be different for firms affected more by competition from China. In table **??** we show that the coefficients from the size-interaction column of the regressions remain similar in sign for the subsample of firms affected by Chinese competition in at least one year, and the quartile of the most affected plants (the coefficients on the mean and the size effect for the exit regressions are larger for the subsamples with more competition, but the difference is not statistically significant). Conversely, when the main regressions are tested for those firms that are least affected by Chinese competition, the effects of the competition coefficients on sales and exit disappear, and are not statistically significantly different from zero.

In table **??** we provide a breakdown of overall exit probability within industries in the domestic and export market. While there is some variance in magnitudes, the table demonstrates substantial exit from both market within all manufacturing industries.

# 7 Conclusions

The surge of Chinese exports provided us with a quasi-natural experiment to evaluate the impact of a surge in competition on the extensive and intensive margin both at plant and product-level. In this study, for the first time to our knowledge, we analyze the impact of such competitive pressures both on the domestic market as well as on the export market on sectoral, plant and product level.

We find that the surge of China challenges Mexican firms, and leads to plant exit, the loss of products and contraction. These effects are asymmetric along many dimensions: First, and most crucially, we show that indeed the effect of competition is highly asymmetric because while smaller and less productive plants are forced to shrink and exit from the market, this effect is attenuated and eventually reverted for larger and more productive plants. Second, we show that this process of "creative destruction" and market selection does not operate only at firm- but also at product-level. Third, such heterogeneous micro-level results are hidden by average effects at sectoral level pointing towards the need to use firm- and product level data and allow for heterogeneous effect through interaction terms. Forth, crucially for policy makers, this asymmetric effects are not confined to sales and exports but are also present when we analyze the employment impact on smaller plants, and blue collars, being particularly strong and adverse.

These results highlight that the rise of Chinese exports influences existing production patterns, a question of great relevance to policy makers and firms worldwide. We show that while a crowding out effect is observed for less productive plants, the more productive larger plants are shielded against this competition. These results, of course, do not tell us how the advent of China as a world trading power has affected Mexican welfare. They pay no regard to consumption benefits, nor to the extent to which competition in manufacturing has led to growth in other sectors. Even within manufacturing the extent of the aggregate shock is not always clear. What the results do show, however, is that resistance to Chinese competition is possible and that it entails 'moving up market'. The future of Mexican manufacturing appears to lie in greater efficiency and sophistication and that policy responses to Chinese competition should be in this direction rather than defensive. This is not a new message - many policy-makers have advocated this at a firm or a sectoral, or even an economy-wide level - but this paper is the first to have produced proof for that proposition.

These results reinforce the messages emerging from the recent theoretical literature on heterogeneous firms spurred by the seminar paper of Melitz (2003) and recently expanded towards the introduction of a further layer of heterogeneity at product-level (Eckel and Neary 2008, Bernard et al 2008, Mayer et al 2009).

Still pending for our future research agenda is to understand more in details the mechanisms through which this "heterogeneous" responses operates at firm- and product-level, such as the role of innovation, firm organizational practices, skills and workers' training.

# 8 Appendix 1: Bias

As is often highlighted in the econometric literature, a fixed effects model with lag dependent variables is likely biased. While the size of that bias for a model with a lag dependent variable has been described (Nickell (1982)), we are not aware of a formulation of the bias of an interacted lag dependent variable. To investigate this bias we undertake a simple simulation exercise.

We generate a panel data of 1000 firms over a time period of 10 years. We generate a simulated competition variable, which is distributed iid. uniformly between 0 and 1 (just as the Chinese imports share in the previous analysis is bounded by 0 and 1). In the first period sales are exogenously given and distributed iid. standard normally. In each further period we generate sales for firm $i$ in period $t$ as:

$$Sales_{it} = Competition_{it-1}\beta_1 + Sales_{it-1}\beta_2 + Sales_{it-1}Competition_{it-1}\beta_3 + \epsilon_{it}$$

The error terms $\epsilon_{it}$ are iid. standard normally distributed. We assume the parameters: $\beta_1 = -0.5$, $\beta_2 = 0.5$, $\beta_3 = 0.5$. After computing the data we estimate above model with the inclusion of firm fixed effects. To see the direction and size of the biases of the coefficients, we repeat described data generation and estimation 1000 times. Table 1 reports how often the estimated coefficient was significantly below or above its true value, and how often we could not reject that it is equal to zero. This count reads as follows:

Table 1: Simulation results

| Coefficient | Below | Above | Zero |
|---:|:---:|:---:|:---:|
| Sales | 1000 | 0 | 0 |
| Competition | 3 | 118 | 0 |
| Interaction | 182 | 2 | 0 |

The coefficient on the lagged sales is always below its true value of 0.5 (at five percent level of significance), and always above zero. The coefficient on lagged competition is 118 times above its true value of 0.5 and never zero, suggesting a modest attenuation bias. The interaction is over 180 times below its true value of 0.5. Hence we find evidence for an attenuation bias for all three coefficients that is most pronounced for lagged sales. The sales regressions are thus potentially biased in a way that would lead us to underestimate the true size of the effects, and lower the significance of our estimates.

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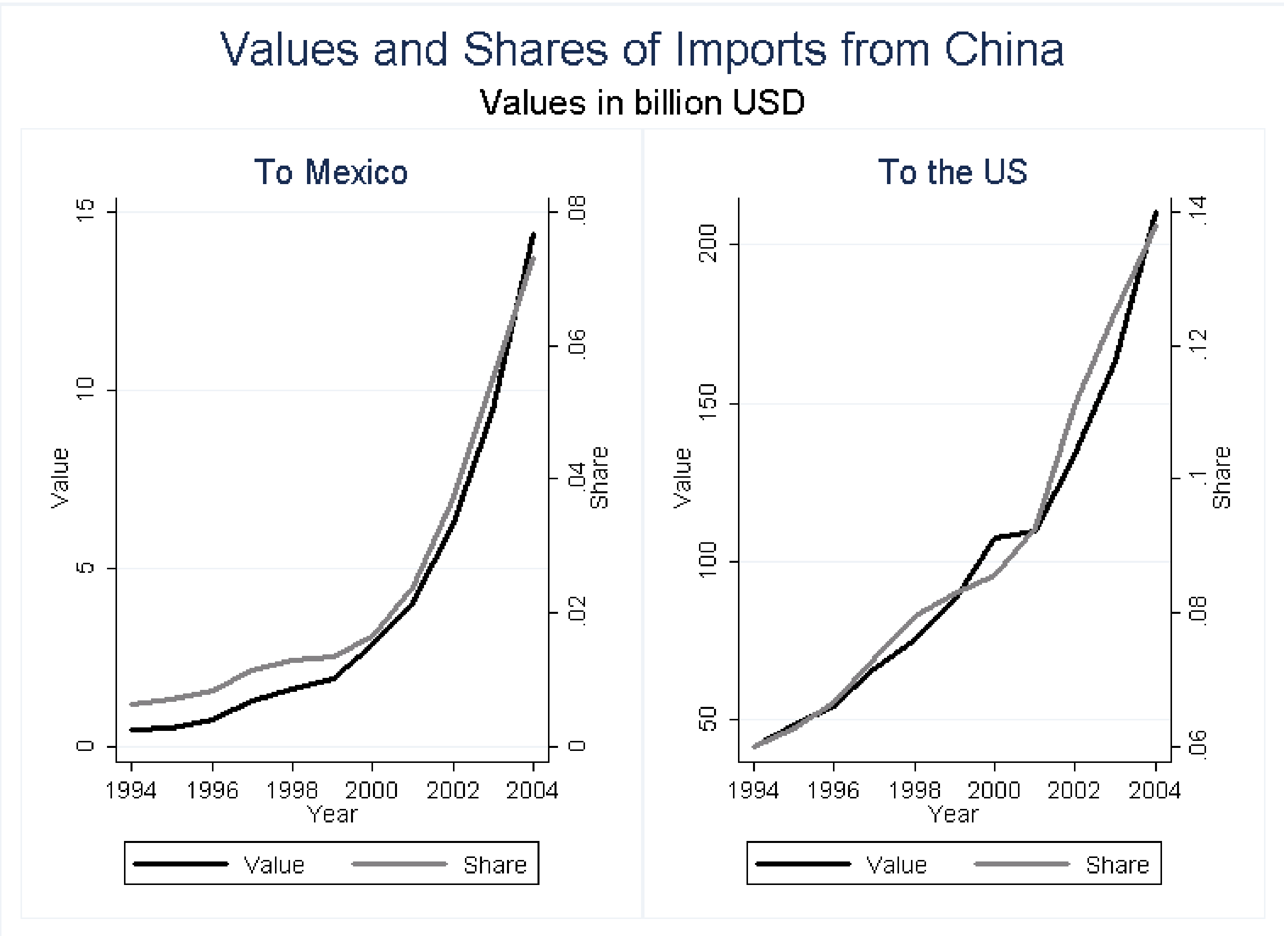
Figure 1: Imports value and share




The left scales of both graphs denotes import values in billion US dollars, while the right scales show the share of Chinese in total imports. Source: COMTRADE.

Table 2: Descriptive statistics

| **Firm data variables** | | | | |
|---|---|---|---|---|
| | **Mean** | **S. D.** | **Min.** | **Max.** |
| China comp. Mex | 0.02 | 0.06 | 0.00 | 0.86 |
| China comp. US | 0.02 | 0.09 | 0.00 | 0.95 |
| Export share | 0.10 | 0.22 | 0.00 | 1.00 |
| ln(Sales) | 10.54 | 1.91 | 0.00 | 18.01 |
| ln(Export Sales) | 9.21 | 2.45 | 0.00 | 17.84 |
| Skill share | 0.31 | 0.20 | 0.00 | 1.00 |
| Nr. of products | 3.18 | 2.93 | 1.00 | 33.00 |
| Herfindahl | 0.08 | 0.09 | 0.01 | 1.00 |
| Overall price inex | 196.67 | 100.88 | 39.23 | 1799.05 |
| Export price index | 158.49 | 84.82 | 52.49 | 1606.50 |
| **Product data variables** | | | | |
| China comp. Mex | 0.02 | 0.06 | 0.00 | 0.96 |
| China comp. US | 0.08 | 0.15 | 0.00 | 1.00 |
| Share | 0.32 | 0.36 | 0.00 | 1.00 |
| ln(Sales) | 8.49 | 2.63 | 0.00 | 18.00 |
| ln(Export Sales) | 8.14 | 2.63 | 0.00 | 17.84 |

Note: This table presents main variables used in the regressions. *China comp. Mex* and *China comp. US* denote the shares of Chinese in total imports, *Skill share* the ratio of white to blue collar workers, and *Share* the share of sales of a given product within its firm.

Table 3: Long run

| | Overall exit | Log overall sales | Export exit | Log epxort sales |
|---|---|---|---|---|
| China comp. Mex | 0.648* | -4.050 | -0.0605 | -1.260 |
| | (0.329) | (2.348) | (0.189) | (1.679) |
| Comp. Mex. growth (1994-2004) | -0.0561 | -0.500 | -0.250* | 0.361 |
| | (0.0651) | (0.905) | (0.117) | (0.901) |
| Comp.*growth Mex | 1.999*** | -26.48** | | |
| | (0.443) | (9.655) | | |
| China comp. US | | | 0.125 | -1.196 |
| | | | (0.188) | (0.877) |
| Comp. US growth (1994-2004) | | | -0.230** | 0.818 |
| | | | (0.0855) | (0.741) |
| Comp.*growth US | | | 2.952* | -18.50 |
| | | | (1.513) | (9.979) |
| Export share | | | -0.180** | 3.874*** |
| | | | (0.0753) | (0.599) |
| Observations | 3426 | 3426 | 717 | 717 |

Note: Robust standard errors clustered by industry (CMAP-2 digit) level. *Comp.* variables indicate the share of Chinese imports. Stars denote significance at one (***), five (**) and ten (*) percent level of significance.

Table 4: Sectoral regressions

| | OLS | | IV | |
|---|---|---|---|---|
| | Log domestic sales | Log export sales | Log domestic sales | Log export sales |
| China comp. Mex (t-1) | -0.735 | | -4.5*** | |
| | (0.628) | | (0.743) | |
| China comp. US (t-1) | | 4.049** | | -11.44*** |
| | | (2.19) | | (3.58) |
| Year fe. | Yes | Yes | Yes | Yes |
| Sector fe. | Yes | Yes | Yes | Yes |
| N | 2050 | 2050 | 2050 | 2050 |
| | | | | |
| **First stage** | | | | |
| China comp.-EU-US (t-1) | | | 0.1165*** | 0.1783*** |
| | | | (0.0261) | (0.0221) |
| China comp. EU (t-1) | | | 0.4224*** | 0.1982*** |
| | | | (0.0376) | (0.3184) |
| | | | | |
| Sargan p-value | | | 0.292 | 0.1219 |
| First stage F-value | | | 41.91 | 34.95 |

Note: The *China comp.* variables indicate the lagged share of Chinese imports in total imports to Mexico, to the US, to the world with the exceptions EU and US and to the EU. The underlying data is aggregated to CMAP-6 sectoral level. Stars denote significance at one (***), five (**) and ten (*) percent level of significance.

Table 5: Domestic plant exit, OLS

| | Domestic exit - OLS | | | |
|---|---|---|---|---|
| Chn. comp. Mex (t-1) | 0.0266 | -0.0534 | 0.0703 | 0.770** |
| | (0.0463) | (0.0658) | (0.0568) | (0.319) |
| log tot. imports (t-1) | -0.00157 | -0.00159 | -0.00155 | -0.00150 |
| | (0.00141) | (0.00141) | (0.00141) | (0.00141) |
| log tot. sales (t-1) | -0.0576*** | -0.0576*** | -0.0575*** | -0.0563*** |
| | (0.00357) | (0.00357) | (0.00357) | (0.00357) |
| Herf. (t-1) | 0.0891* | 0.0730 | 0.0909** | 0.0924** |
| | (0.0459) | (0.0463) | (0.0459) | (0.0460) |
| log exp. share (t-1) | -0.0139 | -0.0139 | -0.00945 | -0.0137 |
| | (0.0133) | (0.0133) | (0.0134) | (0.0133) |
| skill share (t-1) | -0.00553 | -0.00589 | -0.00588 | -0.00733 |
| | (0.0176) | (0.0175) | (0.0176) | (0.0175) |
| Chn. Herf int. (t-1) | | 0.510 | | |
| | | (0.326) | | |
| Chn. exp share int. (t-1) | | | -0.297*** | |
| | | | (0.104) | |
| Chn. sales int. (t-1) | | | | -0.0696** |
| | | | | (0.0272) |
| Plant f.e. | Yes | Yes | Yes | Yes |
| Year f.e. | Yes | Yes | Yes | Yes |
| Observations | 33998 | 33998 | 33998 | 33998 |

Note: Domestic exit indicates the plants that leave the sample in the consequent period. Robust standard errors used, stars denote significance at one (***), five (**) and ten (*) percent level of significance. *Chn. comp. Mex* indicates the share of Chinese in total imports.

Table 6: Domestic plant exit (IV)

| | Exit | Exit | Exit | Exit | FS ChnMex | FS ChnMex | FS ChnMex | FS ChnMex |
|---|---|---|---|---|---|---|---|---|
| Chn. comp. Mex (t-1) | -0.0446 | -0.262* | -0.0630 | 1.258** | | | | |
| | (0.110) | (0.134) | (0.116) | (0.514) | | | | |
| log imports (t-1) | -0.00155 | -0.00161 | -0.00156 | -0.00142 | 0.0003 | 0.0002 | 0.0002 | 0.0002 |
| | (0.00144) | (0.00144) | (0.00144) | (0.00144) | (0.0002) | (0.0002) | (0.0002) | (0.0002) |
| log tot. sales (t-1) | -0.0575*** | -0.0576*** | -0.0576*** | -0.0553*** | 0.0006** | 0.0007** | 0.0006* | -0.001*** |
| | (0.00225) | (0.00225) | (0.00225) | (0.00238) | (0.0003) | (0.0003) | (0.0003) | (0.0003) |
| Herf. (t-1) | 0.0904** | 0.0372 | 0.0891** | 0.0969*** | 0.0126** | -0.0185*** | 0.0121** | 0.0115** |
| | (0.0367) | (0.0391) | (0.0367) | (0.0367) | (0.005) | (0.0055) | (0.0050) | (0.005) |
| log exp. share (t-1) | -0.0139 | -0.0140 | -0.0166 | -0.0135 | 0.0002 | 0.0006 | -0.0071*** | -0.0003 |
| | (0.0119) | (0.0120) | (0.0127) | (0.0119) | (0.00164) | (0.0016) | (0.0019) | (0.0016) |
| skill share (t-1) | -0.00561 | -0.00673 | -0.00538 | -0.00889 | -0.0029 | -0.0028 | -0.0026 | -0.0018 |
| | (0.0147) | (0.0147) | (0.0147) | (0.0148) | (0.00202) | (0.002) | (0.002) | (0.002) |
| Chn. Herf int. (t-1) | | 1.658*** | | | | | | |
| | | (0.435) | | | | | | |
| Chn. exp share int. (t-1) | | | 0.185 | | | | | |
| | | | (0.296) | | | | | |
| Chn. sales int. (t-1) | | | | -0.125*** | | | | |
| | | | | (0.0454) | | | | |
| Chn. comp. -US -EU (t-1) | | | | | 0.0161*** | 0.0111*** | 0.0167*** | -0.00129 |
| | | | | | (0.00141) | (0.00177) | (0.00142) | (0.00781) |
| Chn. comp. EU (t-1) | | | | | 0.428*** | 0.387*** | 0.412*** | -0.0792** |
| | | | | | (0.00701) | (0.00855) | (0.00742) | (0.0349) |
| interaction instrument 1 | | | | | | 0.107*** | 0.0309*** | 0.0019** |
| | | | | | | (0.0190) | (0.0114) | (0.0008) |
| interaction instrument 2 | | | | | | 0.273*** | 0.150*** | 0.0488*** |
| | | | | | | (0.0491) | (0.0283) | (0.0034) |
| Observations | 35376 | 35376 | 35376 | 35376 | 35376 | 35376 | 35376 | 35376 |
| Sargan p - value | 0.706 | 0.796 | 0.733 | 0.239 | | | | |
| F-Statistic | | | | | 448.4 | 409.1 | 402.1 | 418.3 |

Note: The first four columns give the results from an IV regression, while the other four columns report the corresponding first stages. Robust standard errors, year and plant fixed effects used throughout, stars denote significance at one (***), five (**) and ten (*) percent level of significance.

Table 7: Exit from export, plant, OLS

| | **Exit from export** | | | |
|---|---|---|---|---|
| Chn. comp. US (t-1) | 0.0321 | -0.0128 | 0.233*** | 0.755** |
| | (0.0608) | (0.0763) | (0.0790) | (0.315) |
| log US imports (t-1) | -0.00390 | -0.00390 | -0.00348 | -0.00386 |
| | (0.00410) | (0.00410) | (0.00411) | (0.00410) |
| log exp. sales (t-1) | -0.0369*** | -0.0368*** | -0.0368*** | -0.0360*** |
| | (0.00466) | (0.00466) | (0.00466) | (0.00466) |
| Herf. (t-1) | 0.0596 | 0.0193 | 0.0552 | 0.0574 |
| | (0.0908) | (0.0931) | (0.0904) | (0.0910) |
| log exp. share (t-1) | 0.0804*** | 0.0809*** | 0.106*** | 0.0769** |
| | (0.0304) | (0.0304) | (0.0308) | (0.0303) |
| skill share (t-1) | -0.000652 | -0.00127 | -0.00363 | -0.00867 |
| | (0.0475) | (0.0475) | (0.0474) | (0.0478) |
| Chn. Herf int. (t-1) | | 0.479 | | |
| | | (0.468) | | |
| Chn. exp share int. (t-1) | | | -0.655*** | |
| | | | (0.134) | |
| Chn. sales int. (t-1) | | | | -0.0616** |
| | | | | (0.0254) |
| Year f.e. | Yes | Yes | Yes | Yes |
| Plant f.e. | Yes | Yes | Yes | Yes |
| Observations | 11414 | 11414 | 11414 | 11414 |

Note: In the underlying data only exporting firms are considered. Robust standard errors applied, stars denote significance at one (***), five (**) and ten (*) percent level of significance. *Chn. comp. US* indicates the share of Chinese in total imports.

Table 8: Exit from export, plant, IV

| | Exit exp. | Exit exp. | Exit exp. | Exit exp. | FS ChnUS | FS ChnUS | FS ChnUS | FS ChnUS |
|---|---|---|---|---|---|---|---|---|
| Chn. comp. US (t-1) | 0.162 | 0.0771 | 0.206 | 2.049*** | | | | |
| | (0.212) | (0.210) | (0.231) | (0.718) | | | | |
| log US imports (t-1) | 0.000344 | 0.000518 | 0.000593 | -0.000381 | 0.00545*** | 0.00525*** | 0.00544*** | 0.00545*** |
| | (0.00436) | (0.00435) | (0.00436) | (0.00438) | (0.000650) | (0.000649) | (0.000650) | (0.000650) |
| log exp. sales (t-1) | -0.00996*** | -0.00990*** | -0.00981*** | -0.00786** | -0.000343 | -0.000361 | -0.000338 | -0.000395 |
| | (0.00344) | (0.00344) | (0.00345) | (0.00353) | (0.000533) | (0.000531) | (0.000533) | (0.000540) |
| Herf. (t-1) | 0.0467 | -0.00333 | 0.0451 | 0.0416 | -0.0293** | 0.0199 | -0.0296** | -0.0295** |
| | (0.0922) | (0.109) | (0.0922) | (0.0923) | (0.0143) | (0.0159) | (0.0143) | (0.0143) |
| log exp. share (t-1) | 0.0311 | 0.0321 | 0.0389 | 0.0218 | 0.00872** | 0.00777* | 0.00269 | 0.00883** |
| | (0.0275) | (0.0275) | (0.0296) | (0.0277) | (0.00424) | (0.00423) | (0.00466) | (0.00425) |
| skill share (t-1) | -0.00963 | -0.0102 | -0.0111 | -0.0278 | 0.00812 | 0.00732 | 0.00825 | 0.00849 |
| | (0.0456) | (0.0456) | (0.0456) | (0.0461) | (0.00706) | (0.00704) | (0.00706) | (0.00709) |
| Chn. Herf int. (t-1) | | 0.602 | | | | | | |
| | | (0.707) | | | | | | |
| Chn. exp share int. (t-1) | | | -0.215 | | | | | |
| | | | (0.311) | | | | | |
| Chn. sales int. (t-1) | | | | -0.150*** | | | | |
| | | | | (0.0536) | | | | |
| Chn. comp. -US -EU (t-1) | | | | | -0.0264*** | -0.0189* | -0.0323*** | -0.00610 |
| | | | | | (0.00741) | (0.0107) | (0.00823) | (0.0503) |
| Chn. comp. EU (t-1) | | | | | 0.621*** | 0.722*** | 0.587*** | 0.451*** |
| | | | | | (0.0204) | (0.0261) | (0.0246) | (0.136) |
| interaction instrument 1 | | | | | | -0.131 | 0.0265 | -0.00189 |
| | | | | | | (0.0892) | (0.0233) | (0.00455) |
| interaction instrument 2 | | | | | | -0.659*** | 0.124** | 0.0152 |
| | | | | | | (0.130) | (0.0555) | (0.0121) |
| Observations | 12089 | 12089 | 12089 | 12089 | 12089 | 12089 | 12089 | 12089 |
| Sargan p-value | 0.317 | 0.494 | 0.523 | 0.279 | | | | |
| F-Statistic | | | | | 143.1 | 131.2 | 127.3 | 126.4 |

Note: The first four columns report the results from an IV regression, the last four columns show the corresponding first stages. Only exporting firms are considered. Robust standard errors, year and plant fixed effects applied throughout, stars denote significance at one (***), five (**) and ten (*) percent level of significance.

Table 9: Product drop overall

| | **Product drop (OLS)** | | **Product drop (IV)** | | **First stage** | |
|---|---|---|---|---|---|---|
| Chn. comp. Mex (t-1) | 0.0879** | 0.150** | 0.330*** | 0.521*** | | |
| | (0.0399) | (0.0588) | (0.124) | (0.164) | | |
| log imports (t-1) | 0.000404 | 0.000406 | 0.000347 | 0.000356 | <0.001 | <0.001 |
| | (0.00195) | (0.00196) | (0.00173) | (0.00174) | (<0.001) | (<0.001) |
| skill share (t-1) | -0.00554 | -0.00558 | -0.00421 | -0.00437 | -0.003* | -0.003* |
| | -0.0169 | -0.0169 | -0.0152 | -0.0152 | (0.00) | (0.00) |
| Herf. (t-1) | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| | (<0.001) | (<0.001) | (<0.001) | (<0.001) | (<0.001) | (<0.001) |
| log nr. prods. (t-1) | -0.0285*** | -0.0289*** | -0.0280*** | -0.0293*** | <0.001 | <0.001 |
| | (0.00613) | (0.00613) | (0.00549) | (0.00551) | (<0.001) | (<0.001) |
| log exp. share (t-1) | -0.0102 | -0.0108 | -0.00957 | -0.0113 | -0.003* | -0.003 |
| | (0.0133) | (0.0133) | (0.0120) | (0.0122) | (0.00) | (0.00) |
| share (t-1) | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| | (<0.001) | (<0.001) | (<0.001) | (<0.001) | (<0.001) | (<0.001) |
| share interaction | | -0.249* | | -0.807*** | | |
| | | (0.129) | | (0.269) | | |
| Chn. comp. -US -EU (t-1) | | | | | <0.001 | <0.001 |
| | | | | | (<0.001) | (<0.001) |
| Chn. comp. EU (t-1) | | | | | 0.479*** | 0.520*** |
| | | | | | (0.06) | (0.07) |
| interaction instrument 1 | | | | | | -0.192** |
| | | | | | | (0.09) |
| interaction instrument 2 | | | | | | 0.098*** |
| | | | | | | (0.004) |
| Observations | 85770 | 85770 | 83276 | 83276 | | |
| Sargan p-value | | | | | 0.2585 | 0.339 |
| First stage F-value | | | | | 16.89 | 15.27 |

Note: The ”Int” terms are the interactions of the China instruments with the product share. Year and product fixed effects used throughout. Robust standard errors are clustered at CMAP 8 product level, stars denote significance at one (***), five (**) and ten (*) percent level of significance. A coeficient of < 0.001 represents coefficients that are too small for their first non-zero digit to appear numerically.

Table 10: Product drop from export

| | **Product drop (OLS)** | | **Product drop (IV)** | | **First stage** | |
|---|---|---|---|---|---|---|
| Chn. comp. US (t-1) | -0.0542 | 0.0695 | -0.0468 | 0.161 | | |
| | (0.0567) | (0.0821) | (0.0989) | (0.127) | | |
| log imports (t-1) | -0.00338 | -0.00342 | -0.00338 | -0.00344 | <0.001 | <0.001 |
| | (0.00464) | (0.00463) | (0.00405) | (0.00404) | (<0.001) | (<0.001) |
| skill share (t-1) | 0.0143 | 0.0163 | 0.0145 | 0.0177 | -0.016** | -0.016** |
| | (0.0397) | (0.0398) | (0.0346) | (0.0347) | (0.01) | (0.01) |
| Herf. (t-1) | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| | (<0.001) | (<0.001) | (<0.001) | (<0.001) | (<0.001) | (<0.001) |
| log nr. prods. (t-1) | 0.0203* | 0.0201* | 0.0202* | 0.0200* | 0.003 | 0.003 |
| | (0.0120) | (0.0120) | (0.0105) | (0.0104) | (0.00) | (0.00) |
| log exp. share (t-1) | 0.00235 | 0.00298 | 0.00231 | 0.00348 | 0.005* | 0.005* |
| | (0.0164) | (0.0164) | (0.0143) | (0.0143) | (0.00) | (0.00) |
| share (t-1) | -0.0582** | -0.0345 | -0.0582*** | -0.0164 | -0.004 | 0.003 |
| | (0.0247) | (0.0260) | (0.0216) | (0.0239) | (0.01) | (0.01) |
| share interaction | | -0.375*** | | -0.661*** | | |
| | | (0.114) | | (0.172) | | |
| Chn. comp. -US -EU (t-1) | | | | | 0.285*** | 0.297*** |
| | | | | | (0.04) | (0.05) |
| Chn. comp. EU (t-1) | | | | | 0.776*** | 0.838*** |
| | | | | | (0.09) | (0.10) |
| interaction instrument 1 | | | | | | -0.164 |
| | | | | | | (0.17) |
| interaction instrument 2 | | | | | | -0.036 |
| | | | | | | (0.07) |
| Observations | 16687 | 16687 | 15837 | 15837 | | |
| Sargan p-value | | | | | 0.24 | 0.25 |
| First stage F-value | | | | | 20.34 | 20.03 |

Note: The "Int" terms are the interactions of the China instruments with the product share. Product and year fixed effects as well as controls for firm exit and firm exit from export used throughout. Robust standard errors are clustered at CMAP 8 product level, stars denote significance at one (***), five (**) and ten (*) percent level of significance. A coeficient of $< 0.001$ represents coefficients that are too small for their first non-zero digit to appear numerically.

Table 11: Ln Domestic Sales - OLS

| | Log Plant sales | | | |
|---|---|---|---|---|
| Chn. comp. Mex (t-1) | 0.0177 | 0.0925 | -0.0288 | -1.200* |
| | (0.117) | (0.134) | (0.120) | (0.689) |
| log imports (t-1) | -0.000420 | -0.000415 | -0.000434 | -0.000497 |
| | (0.00497) | (0.00497) | (0.00497) | (0.00497) |
| log tot. sales (t-1) | 0.658*** | 0.658*** | 0.658*** | 0.656*** |
| | (0.0136) | (0.0136) | (0.0136) | (0.0137) |
| Herf. (t-1) | -0.527*** | -0.510*** | -0.529*** | -0.533*** |
| | (0.129) | (0.133) | (0.130) | (0.130) |
| log exp. share (t-1) | -0.956*** | -0.956*** | -0.962*** | -0.957*** |
| | (0.0645) | (0.0645) | (0.0654) | (0.0644) |
| skill share (t-1) | -0.0554 | -0.0551 | -0.0551 | -0.0520 |
| | (0.0488) | (0.0488) | (0.0488) | (0.0489) |
| Chn. Herf int. (t-1) | | -0.507 | | |
| | | (0.505) | | |
| Chn. exp share int. (t-1) | | | 0.300 | |
| | | | (0.550) | |
| Chn. sales int. (t-1) | | | | 0.113* |
| | | | | (0.0601) |
| Year f.e. | Yes | Yes | Yes | Yes |
| Plant f.e. | Yes | Yes | Yes | Yes |
| Observations | 39254 | 39254 | 39254 | 39254 |

Note: Robust standard errors used, stars denote significance at one (***), five (**) and ten (*) percent level of significance.

Table 12: Domestic Sales - IV

| | Dom. sales | Dom. sales | Dom. sales | Dom. sales | FS ChnMex | FS ChnMex | FS ChnMex | FS ChnMex |
|---|---|---|---|---|---|---|---|---|
| Chn. comp. Mex (t-1) | -0.485* | -0.0337 | -0.237 | -6.743*** | | | | |
| | (0.259) | (0.339) | (0.271) | (1.401) | | | | |
| log imports (t-1) | ¿-0.001 | ¿-0.001 | ¿-0.001 | ¿-0.001 | -0.0003 | -0.0003 | -0.0003 | -0.0003 |
| | (0.004) | (0.004) | (0.004) | (0.004) | (0.0002) | (0.0002) | (0.0002) | (0.0002) |
| log tot. sales (t-1) | 0.658*** | 0.659*** | 0.658*** | 0.645*** | -0.0002 | -0.0002 | -0.0002 | -0.0002 |
| | (0.00597) | (0.00598) | (0.00598) | (0.00661) | (0.0003) | (0.0003) | (0.0003) | (0.0003) |
| Herf. (t-1) | -0.518*** | -0.392*** | -0.498*** | -0.550*** | 0.0100** | 0.0004 | 0.00997* | 0.0101** |
| | (0.0940) | (0.109) | (0.0944) | (0.0944) | (0.00510) | (0.00545) | (0.00510) | (0.00510) |
| log exp. share (t-1) | -0.955*** | -0.954*** | -0.906*** | -0.960*** | 0.00111 | 0.00122 | 0.0007 | 0.001 |
| | (0.0322) | (0.0322) | (0.0354) | (0.0323) | (0.00175) | (0.00175) | (0.00183) | (0.00175) |
| skill share (t-1) | -0.0564 | -0.0541 | -0.0601 | -0.0384 | -0.002 | -0.002 | -0.002 | -0.002 |
| | (0.0391) | (0.0391) | (0.0391) | (0.0393) | (0.0002) | (0.0002) | (0.0002) | (0.0002) |
| Chn. Herf int. (t-1) | | -3.723** | | | | | | |
| | | (1.625) | | | | | | |
| Chn. exp share int. (t-1) | | | -2.630*** | | | | | |
| | | | (0.781) | | | | | |
| Chn. sales int. (t-1) | | | | 0.594*** | | | | |
| | | | | (0.130) | | | | |
| Chn. comp. -US -EU (t-1) | | | | | <0.001 | <0.001 | <0.001 | <0.001 |
| | | | | | (<0.001) | (<0.001) | (<0.001) | (<0.001) |
| Chn. comp. EU (t-1) | | | | | <0.001 | <0.001 | <0.001 | <0.001 |
| | | | | | (<0.001) | (<0.001) | (<0.001) | (<0.001) |
| interaction instrument 1 | | | | | | <0.001 | <0.001 | <0.001*** |
| | | | | | | (<0.001) | (<0.001) | (<0.001) |
| interaction instrument 2 | | | | | | <0.001*** | <0.001 | <0.001*** |
| | | | | | | (<0.001) | (<0.001) | (<0.001) |
| Observations | 38774 | 38774 | 38774 | 38774 | 38774 | 38774 | 38774 | 38774 |
| Sargan p-value | 0.683 | 0.0154 | 0.368 | 0.453 | | | | |
| F-Statistic | | | | | 522.0 | 466.0 | 464.1 | 277.5 |

Note: The "Int" terms are the interactions of the four China instruments with the interacted term from the corresponding column from table 11. In columns four and eight the instruments are lagged two instead of one period. Robust standard errors applied, stars denote significance at one (***), five (**) and ten (*) percent level of significance. A coeficient of < 0.001 represents coefficients that are too small for their first non-zero digit to appear numerically.

Table 13: Ln Export Sales - OLS

| | Log export sales | | | |
|---|---|---|---|---|
| Chn. comp. US (t-1) | -0.498** | -0.295 | -2.718*** | -4.924*** |
| | (0.196) | (0.225) | (0.231) | (1.042) |
| log Mex. imports (t-1) | 0.0269** | 0.0270** | 0.0253** | 0.0270** |
| | (0.0128) | (0.0128) | (0.0127) | (0.0128) |
| log US. Imports (t-1) | 0.00521 | 0.00525 | 0.000750 | 0.00501 |
| | (0.0141) | (0.0141) | (0.0143) | (0.0141) |
| log exp. sales (t-1) | 0.423*** | 0.423*** | 0.418*** | 0.417*** |
| | (0.0192) | (0.0192) | (0.0188) | (0.0192) |
| Herf. (t-1) | -0.575** | -0.401 | -0.509** | -0.575** |
| | (0.261) | (0.278) | (0.252) | (0.261) |
| log exp. share (t-1) | 0.276*** | 0.273** | -0.0607 | 0.293*** |
| | (0.106) | (0.106) | (0.106) | (0.106) |
| skill share (t-1) | -0.136 | -0.135 | -0.117 | -0.0797 |
| | (0.156) | (0.156) | (0.155) | (0.157) |
| Chn. Herf int. (t-1) | | -2.255* | | |
| | | (1.238) | | |
| Chn. exp share int. (t-1) | | | 8.118*** | |
| | | | (0.587) | |
| Chn. sales int. (t-1) | | | | 0.377*** |
| | | | | (0.0863) |
| Year f.e. | Yes | Yes | Yes | Yes |
| Plant f.e. | Yes | Yes | Yes | Yes |
| Observations | 12139 | 12139 | 12139 | 12139 |

Note: Robust standard errors used, stars denote significance at one (***), five (**) and ten (*) percent level of significance.

Table 14: Ln Export Sales - IV

| | Exp. sales | Exp. sales | Exp. sales | Exp. sales | ChnUS | ChnUS | ChnUS | ChnUS |
|---|---|---|---|---|---|---|---|---|
| Chn. comp. US (t-1) | -0.632 | -0.561 | -1.395*** | -12.27*** | | | | |
| | (0.491) | (0.492) | (0.524) | (3.319) | | | | |
| log US. Imports (t-1) | 0.00615 | 0.00613 | 0.00390 | 0.00872 | 0.006*** | 0.006*** | 0.006*** | 0.006*** |
| | (0.0134) | (0.0134) | (0.0133) | (0.0135) | (0.001) | (0.001) | (0.001) | (0.001) |
| log Mex. imports (t-1) | 0.0266** | 0.0267** | 0.0262** | 0.0260** | -0.001** | -0.001** | -0.001** | -0.001** |
| | (0.0122) | (0.0122) | (0.0120) | (0.0122) | (0.0006) | (0.0006) | (0.0006) | (0.0006) |
| log exp. sales (t-1) | 0.423*** | 0.423*** | 0.421*** | 0.408*** | <0.001 | <0.001 | <0.001 | <0.001 |
| | (0.0119) | (0.0119) | (0.0118) | (0.0127) | (<0.001) | (<0.001) | (<0.001) | (<0.001) |
| Herf. (t-1) | -0.579** | -0.522 | -0.551** | -0.588** | -0.0384*** | 0.0253 | -0.0385*** | -0.0379*** |
| | (0.278) | (0.332) | (0.274) | (0.278) | (0.0143) | (0.0161) | (0.0143) | (0.0143) |
| log exp. share (t-1) | 0.277*** | 0.276*** | 0.149 | 0.324*** | 0.00766* | 0.00589 | 0.00703 | 0.00670 |
| | (0.0886) | (0.0886) | (0.0948) | (0.0898) | (0.00457) | (0.00454) | (0.00503) | (0.00458) |
| skill share (t-1) | -0.135 | -0.135 | -0.128 | 0.00641 | 0.0107 | 0.00933 | 0.0105 | 0.0114 |
| | (0.141) | (0.141) | (0.139) | (0.147) | (0.007) | (0.00726) | (0.00731) | (0.00731) |
| Chn. Herf int. (t-1) | | -0.734 | | | | | | |
| | | (2.374) | | | | | | |
| Chn. exp share int. (t-1) | | | 3.078*** | | | | | |
| | | | (0.886) | | | | | |
| Chn. sales int. (t-1) | | | | 0.955*** | | | | |
| | | | | (0.269) | | | | |
| Chn. comp. -US -EU (t-1) | | | | | -0.0362*** | -0.0413*** | -0.0444*** | -0.143*** |
| | | | | | (0.0088) | (0.0138) | (0.0102) | (0.0278) |
| Chn. comp. EU (t-1) | | | | | 0.776*** | 0.946*** | 0.818*** | 0.993*** |
| | | | | | (0.019) | (0.0264) | (0.0253) | (0.0695) |
| interaction instrument 1 | | | | | | -0.0282 | 0.0462* | 0.0123*** |
| | | | | | | (0.100) | (0.0253) | (0.00300) |
| interaction instrument 2 | | | | | | -1.177*** | -0.153*** | -0.0243*** |
| | | | | | | (0.139) | (0.0573) | (0.00721) |
| Observations | 11771 | 11771 | 11771 | 11771 | 11771 | 11771 | 11771 | 11771 |
| Sargan p-value | 0.165 | 0.366 | 0.492 | 0.314 | | | | |
| F-Statistic | | | | | 195.4 | 185.5 | 175.3 | 176.1 |

Note: Robust standard errors, controls for firm exit and firm exit from export used throughout. Stars denote significance at one (***), five (**) and ten (*) percent level of significance.

Table 15: Product sales

| | Log sales - OLS | | Log sales - IV | | First stage | |
|---|---|---|---|---|---|---|
| Chn. comp. Mex (t-1) | -0.197 | -0.868*** | -1.245** | -3.827*** | | |
| | (0.185) | (0.262) | (0.573) | (0.808) | | |
| log imports (t-1) | 0.0239** | 0.0243** | 0.0261** | 0.0265** | 0.001 | 0.001 |
| | (0.0103) | (0.0103) | (0.0108) | (0.0108) | (0.00) | (0.00) |
| skill share (t-1) | -0.286*** | -0.287*** | -0.239*** | -0.238*** | -0.005** | -0.005** |
| | (0.0773) | (0.0768) | (0.0750) | (0.0751) | (0.00) | (0.00) |
| Herf. (t-1) | 1.552** | 1.546** | <0.001 | <0.001 | <0.001 | <0.001 |
| | (0.631) | (0.630) | (<0.001) | (<0.001) | (<0.001) | (<0.001) |
| log nr. prods. (t-1) | -0.0132 | -0.00852 | 0.0107 | 0.0289 | -0.002* | -0.002* |
| | (0.0247) | (0.0246) | (0.0242) | (0.0240) | (0.00) | (0.00) |
| log exp. share (t-1) | 0.413*** | 0.416*** | 0.384*** | 0.406*** | -0.002 | -0.002 |
| | (0.0550) | (0.0550) | (0.0545) | (0.0548) | (0.00) | (0.00) |
| share (t-1) | <0.001 | <0.001 | <0.001 | <0.001 | | |
| | (<0.001) | (<0.001) | (<0.001) | (<0.001) | | |
| share interaction | | 1.894*** | | 10.39*** | | |
| | | (0.425) | | (1.738) | | |
| Chn. comp. -US -EU (t-1) | | | | | 0.121*** | 0.120*** |
| | | | | | (0.02) | (0.02) |
| Chn. comp. EU (t-1) | | | | | 0.517*** | 0.540*** |
| | | | | | (0.07) | (0.07) |
| interaction instrument 1 | | | | | | -0.083 |
| | | | | | | (0.07) |
| interaction instrument 2 | | | | | | 0.000 |
| | | | | | | (0.00) |
| Observations | 107601 | 107601 | 91517 | 91517 | | |
| R-squared | 0.925 | 0.925 | 0.095 | 0.088 | | |
| Number of product | | | 14346 | 14346 | | |
| Sargan p-value | | | | | 0.8090 | 0.73 |
| First stage F-value | | | | | 18.93 | 18.78 |

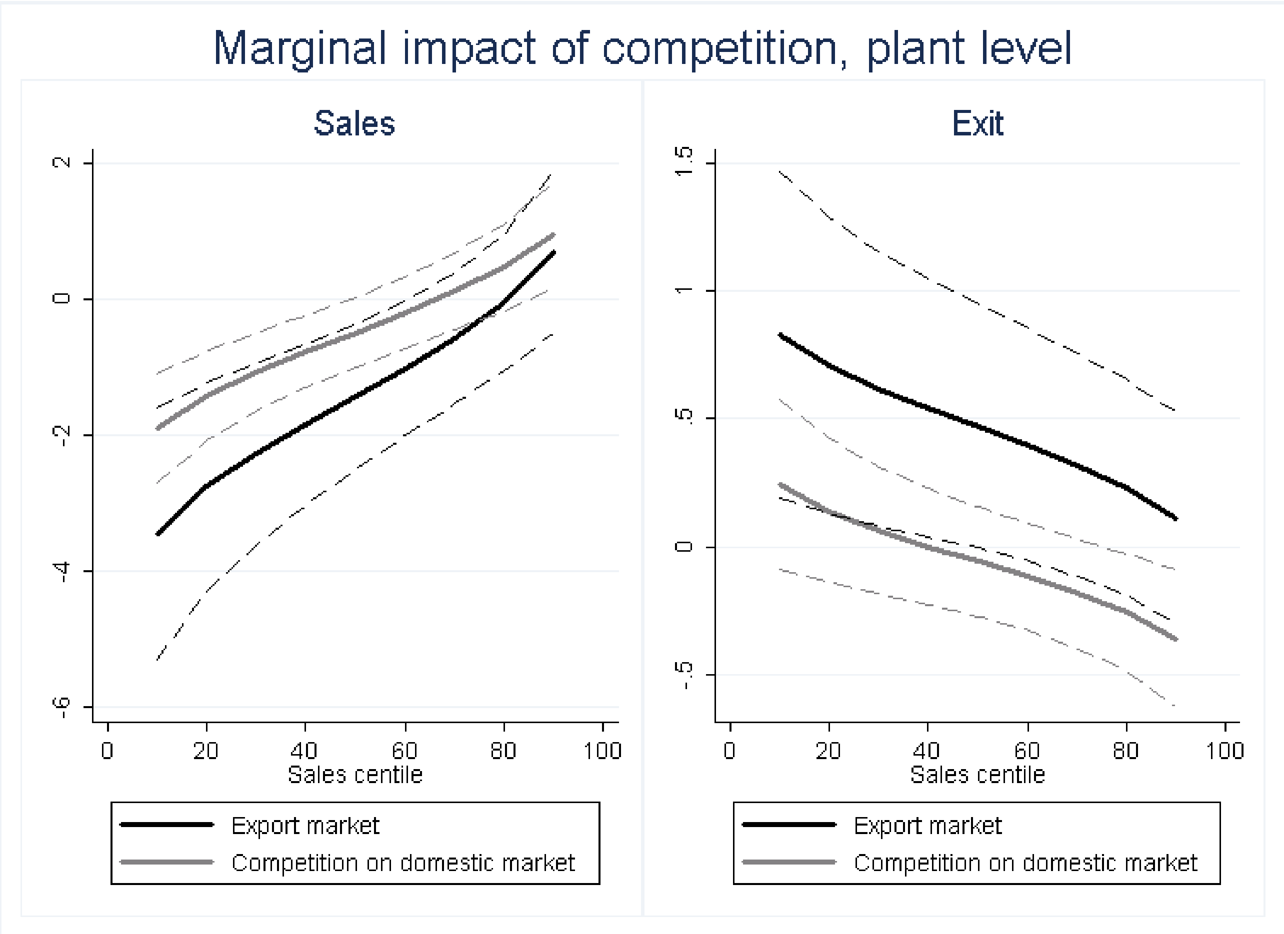
Note: The "Int" terms are the interactions of the China instruments with the product share. Year and product fixed effects used throughout. Robust standard errors are clustered at CMAP 8 product level, stars denote significance at one (***), five (**) and ten (*) percent level of significance.

Table 16: Export sales product

| | **Log exp. sales - OLS** | | **Log exp. sales - IV** | | **First stage** | |
|---|---|---|---|---|---|---|
| Chn. comp. US (t-1) | -0.794** | -1.876*** | -1.014* | -2.396*** | | |
| | (0.319) | (0.368) | (0.567) | (0.585) | | |
| log imports (t-1) | 0.129*** | 0.129*** | 0.129*** | 0.129*** | 0.001 | <0.001 |
| | (0.0461) | (0.0461) | (0.0403) | (0.0403) | (0.00) | (<0.001) |
| skill share (t-1) | -0.140 | -0.160 | -0.146 | -0.172 | -0.007 | -0.011 |
| | (0.217) | (0.217) | (0.190) | (0.190) | (0.01) | (0.01) |
| Herf. (t-1) | 0.373 | 0.350 | <0.001 | <0.001 | -0.000*** | -0.000*** |
| | (0.903) | (0.903) | (<0.001) | (<0.001) | (0.00) | (0.00) |
| log nr. prods. (t-1) | -0.000195 | 0.00264 | -0.000331 | 0.00299 | -0.000 | -0.000 |
| | (0.0119) | (0.0117) | (0.0104) | (0.0103) | (0.00) | (0.00) |
| log exp. share (t-1) | 1.436*** | 1.424*** | 1.437*** | 1.423*** | 0.003 | 0.003 |
| | (0.0913) | (0.0908) | (0.0800) | (0.0794) | (0.00) | (0.00) |
| share (t-1) | 1.85e-05 | 1.54e-05 | 1.80e-05 | 1.41e-05 | 0.000 | -0.000*** |
| | (1.68e-05) | (1.54e-05) | (1.47e-05) | (1.33e-05) | (0.00) | (0.00) |
| share interaction | | 3.421*** | | 4.076*** | | |
| | | (0.660) | | (0.854) | | |
| Chn. comp. -US -EU (t-1) | | | | | 0.302*** | <0.001 |
| | | | | | (0.04) | (<0.001) |
| Chn. comp. EU (t-1) | | | | | 0.824*** | 1.019*** |
| | | | | | (0.09) | (0.11) |
| interaction instrument 1 | | | | | | -0.184 |
| | | | | | | (0.15) |
| interaction instrument 2 | | | | | | <0.001 |
| | | | | | | (<0.001) |
| Observations | 21049 | 21049 | 19802 | 19802 | 19802 | 19802 |
| Sargan p-value | | | | | 0.33 | 0.46 |
| First stage F-value | | | | | 29.18 | 24.64 |

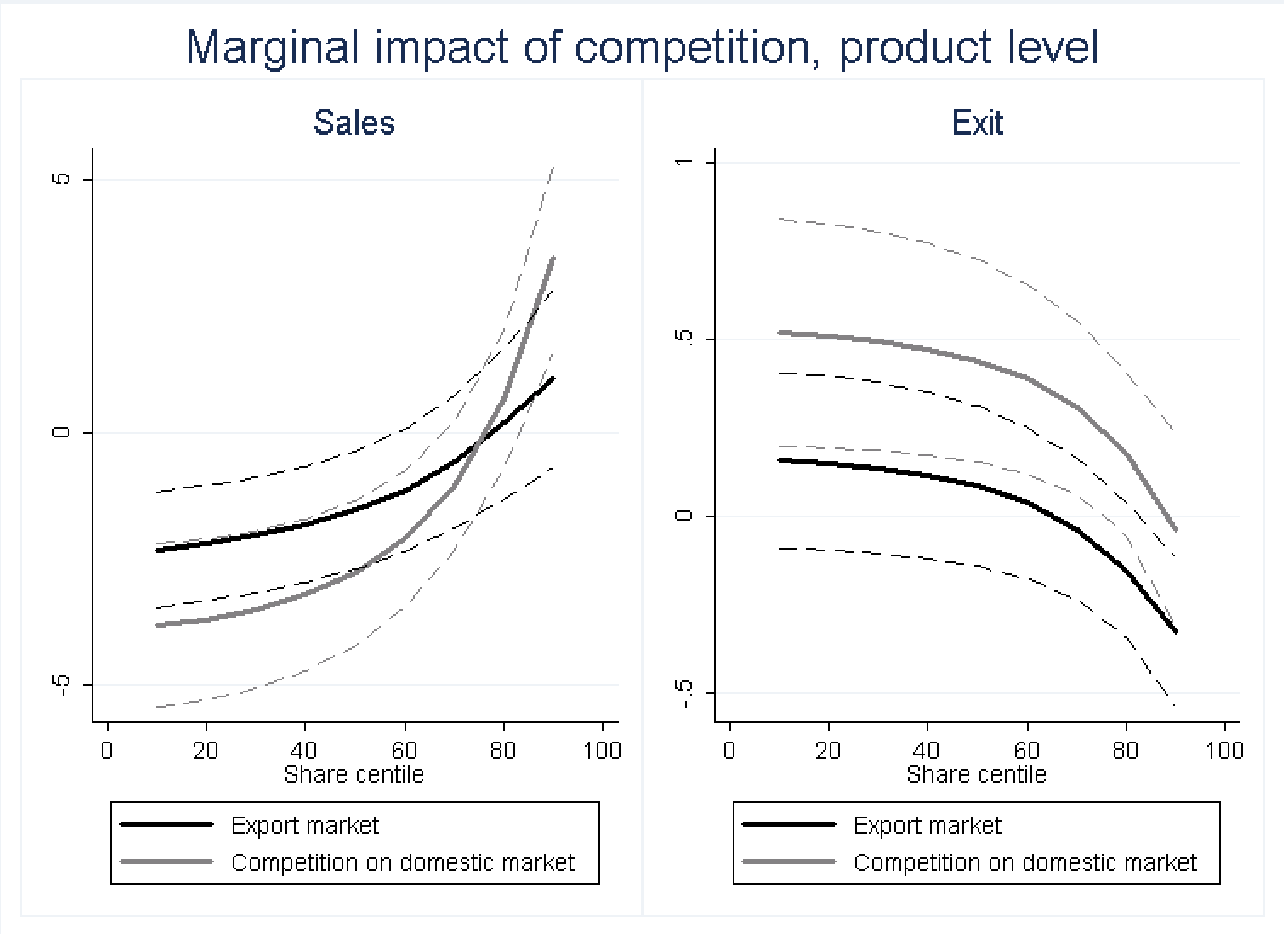
Note: The "Int" terms are the interactions of the China instruments with the product share. Robust standard errors are clustered at CMAP 8 product level, stars denote significance at one (***), five (**) and ten (*) percent level of significance. A coeficient of < 0.001 represents coefficients that are too small for their first non-zero digit to appear numerically. Year and product fixed effects as well as controls for firm exit and firm exit from export used throughout.

Figure 2: Marginal effect of competition, plant level




Based on the fourth column of the OLS regressions reported in tables 5, 7, 11 and 13.

Figure 3: Marginal effect of competition, product level




Based on the fourth column of the OLS regressions reported in tables 9, 10, 15 and 16.

Table 17: Quantile regression

| | Q1 | Q2 | Q3 | Q4 | Q5 | Q6 | Q7 | Q8 | Q9 |
|---|---|---|---|---|---|---|---|---|---|
| log Chn. Imports (t-1) | -0.025*** | -0.009** | -0.006** | -0.004* | -0.003* | -0.004* | -0.003 | -0.000 | 0.004 |
| | (0.006) | (0.003) | (0.002) | (0.002) | (0.002) | (0.002) | (0.002) | (0.003) | (0.004) |
| log tot. imports (t-1) | -0.029* | -0.019** | -0.011** | -0.002 | -0.002 | 0.001 | 0.005 | 0.011 | 0.012 |
| | (0.012) | (0.007) | (0.004) | (0.003) | (0.003) | (0.004) | (0.004) | (0.006) | (0.009) |
| log nr. Employment (t-1) | -0.039 | -0.009 | -0.003 | -0.002 | 0.010* | 0.024*** | 0.040*** | 0.052*** | 0.088*** |
| | (0.022) | (0.011) | (0.007) | (0.005) | (0.005) | (0.005) | (0.006) | (0.008) | (0.015) |
| log sales (t-1) | 0.749*** | 0.745*** | 0.748*** | 0.751*** | 0.743*** | 0.723*** | 0.704*** | 0.672*** | 0.612*** |
| | (0.020) | (0.010) | (0.005) | (0.004) | (0.004) | (0.005) | (0.005) | (0.008) | (0.015) |
| Herf. (t-1) | -0.971*** | -0.441*** | -0.370*** | -0.330*** | -0.303*** | -0.241*** | -0.286*** | -0.296** | -0.615*** |
| | (0.242) | (0.127) | (0.074) | (0.059) | (0.056) | (0.064) | (0.069) | (0.092) | (0.162) |
| exp. share (t-1) | 0.030 | 0.020 | 0.025 | 0.056** | 0.037 | 0.056* | 0.053* | 0.072* | 0.116* |
| | (0.077) | (0.042) | (0.025) | (0.020) | (0.019) | (0.022) | (0.025) | (0.034) | (0.058) |
| skill share (t-1) | -0.282** | -0.121* | -0.044 | -0.013 | -0.004 | 0.008 | 0.014 | 0.022 | 0.046 |
| | (0.095) | (0.051) | (0.030) | (0.024) | (0.023) | (0.026) | (0.028) | (0.038) | (0.064) |

Note: To mimic plant fixed effects all variables were demeaned. Stars denote significance at one (***), five (**) and ten (*) percent level of significance. $Q1$ gives the quantile regression at the $10^{th}$ percentile.

Table 18: Quantile IV regression

| | Q1 | Q2 | Q3 | Q4 | Q5 | Q6 | Q7 | Q8 | Q9 |
|---|---|---|---|---|---|---|---|---|---|
| log Chn. Imports (t-1) | -0.4199*** | -0.2522*** | -0.1959*** | -0.1635*** | -0.1106*** | -0.0591 | -0.0336 | 0.0246 | 0.1112*** |
| | (0.0423) | (0.0433) | (0.0461) | (0.0411) | (0.0339) | (0.03) | (0.0362) | (0.032) | (0.0284) |
| log tot. imports (t-1) | 0.2127*** | 0.1655*** | 0.1323*** | 0.1164*** | 0.0812*** | 0.0485** | 0.0371 | -0.0027 | -0.0508*** |
| | (0.0311) | (0.0366) | (0.0363) | (0.0331) | (0.0261) | (0.0234) | (0.0301) | (0.0241) | (0.0208) |
| log nr. Employment (t-1) | 0.03 | 0.0514** | 0.0448*** | 0.0429** | 0.0372*** | 0.0401*** | 0.0554*** | 0.0567*** | 0.0757*** |
| | (0.0251) | (0.0208) | (0.0168) | (0.0151) | (0.0129) | (0.011) | (0.0116) | (0.0135) | (0.0152) |
| log sales (t-1) | 0.7523*** | 0.7419*** | 0.7517*** | 0.7482*** | 0.7503*** | 0.7383*** | 0.719*** | 0.6841*** | 0.6036*** |
| | (0.0165) | (0.0136) | (0.0109) | (0.0104) | (0.0095) | (0.0086) | (0.0081) | (0.0095) | (0.0105) |
| Herf. (t-1) | -1.5433*** | -0.9707*** | -0.6478*** | -0.5031*** | -0.3769*** | -0.3545*** | -0.2624*** | -0.2546*** | -0.4116*** |
| | (0.2107) | (0.1664) | (0.1353) | (0.1167) | (0.0871) | (0.0917) | (0.1028) | (0.0941) | (0.1352) |
| exp. share (t-1) | 0.1338* | 0.0739* | 0.0657 | 0.0613* | 0.0625* | 0.0688** | 0.0564* | 0.0477 | 0.0608 |
| | (0.0732) | (0.0498) | (0.0411) | (0.0393) | (0.0331) | (0.0289) | (0.029) | (0.03) | (0.0447) |
| skill share (t-1) | -0.3725*** | -0.1942*** | -0.0838* | -0.0557 | -0.0102 | 0.0076 | 0.0201 | 0.0468 | 0.0845* |
| | (0.0966) | (0.0589) | (0.0466) | (0.0431) | (0.0377) | (0.0335) | (0.0351) | (0.0416) | (0.0499) |

Note: To mimic plant fixed effects all variables were demeaned. The usual instruments were applied. Stars denote significance at one (***), five (**) and ten (*) percent level of significance. $Q1$ gives the quantile regression at the $10^{th}$ percentile.

Table 19: Quantile - skill interaction

| | Q1 | Q2 | Q3 | Q4 | Q5 | Q6 | Q7 | Q8 | Q9 |
|---|---|---|---|---|---|---|---|---|---|
| lnLCHN_MEX | -0.024** | -0.012** | -0.011*** | -0.011*** | -0.009*** | -0.010*** | -0.008** | -0.003 | -0.002 |
| | (0.008) | (0.005) | (0.003) | (0.002) | (0.002) | (0.002) | (0.003) | (0.004) | (0.006) |
| lnLALL_MEX | -0.029** | -0.020** | -0.012** | -0.004 | -0.003 | -0.001 | 0.003 | 0.010 | 0.009 |
| | (0.012) | (0.006) | (0.004) | (0.004) | (0.003) | (0.003) | (0.004) | (0.006) | (0.009) |
| LlnPO | -0.040 | -0.009 | -0.003 | 0.000 | 0.009* | 0.025*** | 0.038*** | 0.054*** | 0.091*** |
| | (0.022) | (0.011) | (0.006) | (0.005) | (0.005) | (0.005) | (0.006) | (0.008) | (0.014) |
| LlnVV | 0.749*** | 0.744*** | 0.748*** | 0.750*** | 0.742*** | 0.723*** | 0.703*** | 0.671*** | 0.612*** |
| | (0.020) | (0.009) | (0.005) | (0.004) | (0.004) | (0.004) | (0.005) | (0.008) | (0.015) |
| LHerf6 | -0.959*** | -0.439*** | -0.369*** | -0.327*** | -0.301*** | -0.234*** | -0.276*** | -0.281** | -0.611*** |
| | (0.243) | (0.122) | (0.074) | (0.061) | (0.056) | (0.058) | (0.068) | (0.094) | (0.152) |
| Lexpshare | 0.031 | 0.024 | 0.029 | 0.053 | 0.046* | 0.055** | 0.055* | 0.070* | 0.117* |
| | (0.078) | (0.041) | (0.025) | (0.020) | (0.019) | (0.020) | (0.024) | (0.034) | (0.056) |
| Lskil | -0.271* | -0.162* | -0.136** | -0.098** | -0.075* | -0.068 | -0.086* | -0.039 | -0.038 |
| | (0.127) | (0.068) | (0.042) | (0.036) | (0.033) | (0.035) | (0.041) | (0.055) | (0.088) |
| i_CHNMEXsk 1 | -0.004 | 0.010 | 0.017* | 0.020*** | 0.017* | 0.019*** | 0.020** | 0.011 | 0.021 |
| | (0.019) | (0.011) | (0.007) | (0.006) | (0.005) | (0.006) | (0.007) | (0.009) | (0.013) |

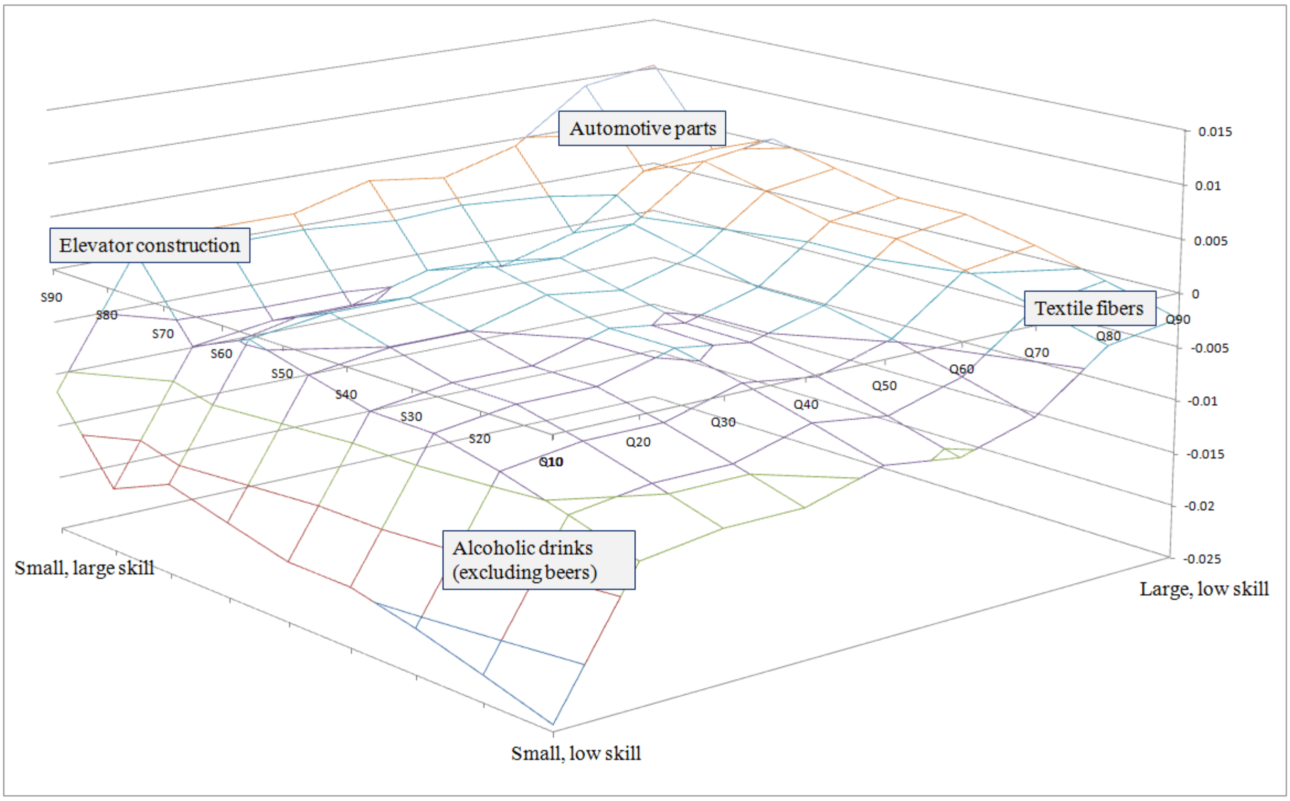
Note: To mimic plant fixed effects all variables were demeaned. Stars denote significance at one (***), five (**) and ten (*) percent level of significance. $Q1$ gives the quantile regression at the $10^{th}$ percentile.

Table 20: Chinese impact via intermediate inputs

| | exit | exit_exp | lnVD | lnVE |
|---|---|---|---|---|
| Chn. comp. Mex (t-1) | 0.599* | | -0.125 | |
| | (0.327) | | (0.690) | |
| Sales interaction (t-1) | -0.0550** | | 0.0209 | |
| | (0.0279) | | (0.0602) | |
| Chn. comp. US (t-1) | | 0.693*** | | -2.992*** |
| | | (0.219) | | (1.021) |
| Sales interaction (t-1) | | -0.0696*** | | 0.219*** |
| | | (0.0201) | | (0.0848) |
| Chn. imp. share (t-1) | 1.361*** | 4.904*** | -4.985*** | -13.14*** |
| | (0.371) | (0.891) | (0.743) | (1.640) |
| Sales interaction (t-1) | -0.109*** | -0.381*** | 0.412*** | 1.086*** |
| | (0.0323) | (0.0703) | (0.0655) | (0.133) |
| Observations | 35828 | 11414 | 39254 | 12139 |

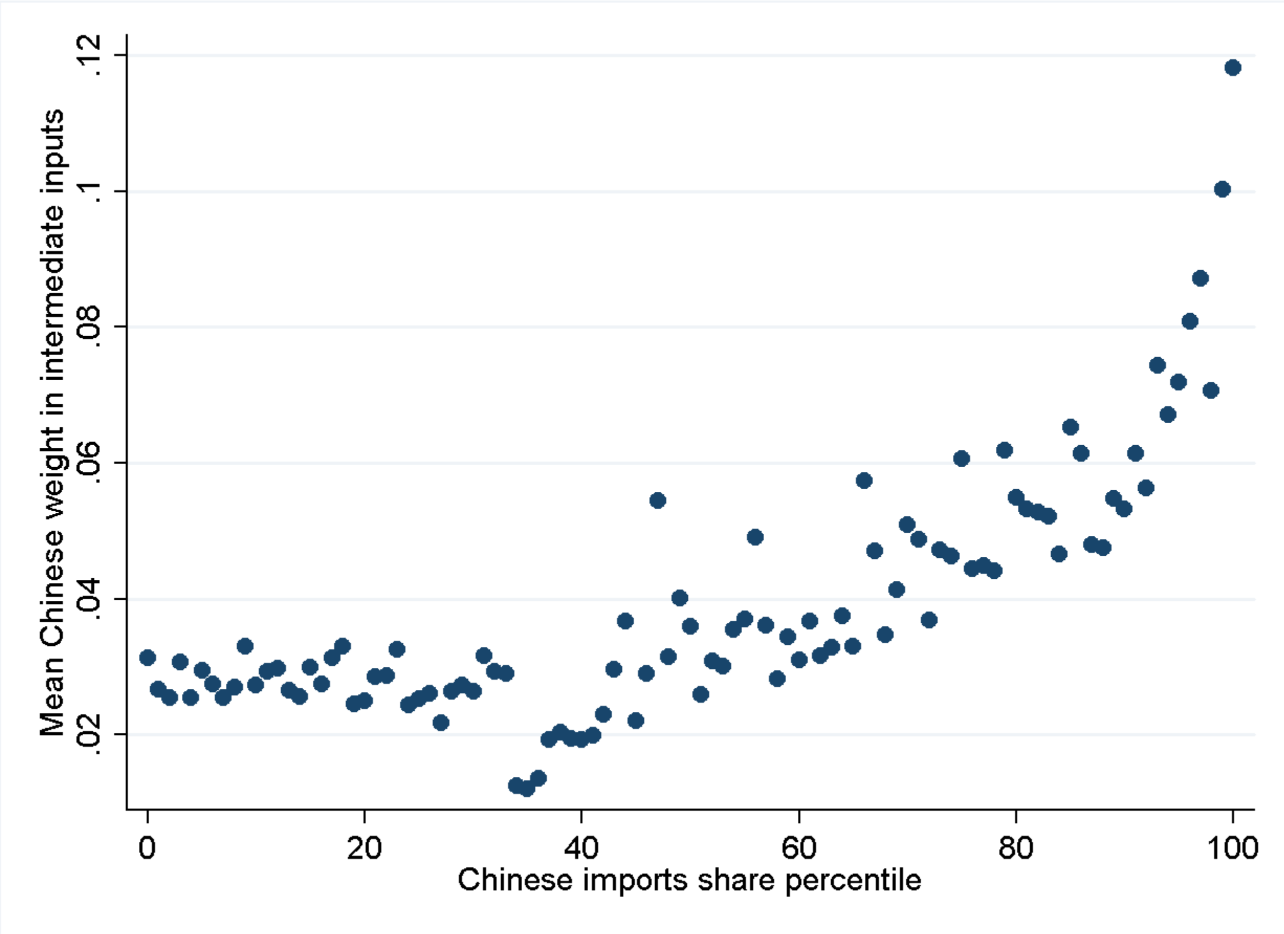
Note: These regressions are identical to the fourth column of plant OLS regressions in tables 5, 7, 11 and 13, except that "inputs share" and "inputs share int." are also included. Only the main coefficients are reported. Robust standard errors are applied, stars denote significance at one (***), five (**) and ten (*) percent level of significance. The interactions report the coefficient on the product of sales with the previous variable.

Figure 4: Marginal effect of competition




This figure shows the marginal effect of competition as estimated in table 19. The axis from left to right displays initial size percentiles, the axis running back and forth skill share percentiles, and the vertical axis the effect of competition on size. For example: The front right corner shows a negative marginal effect of Chinese competition on size for the firm at the 5th percentile of size (Q5) and the 1 percent percentile of skillshare (S1).

Figure 5: Chinese importance in inputs




This graph shows the relationship of Chinese imports share in inputs and overall.

Table 21: Robustness 1

| | Top 20% competition | | | | Bottom 20% competition | | | |
|---|---|---|---|---|---|---|---|---|
| | Exit | Exit exp. | Dom. sales | Exp. sales | Exit | Exit exp. | Dom. sales | Exp. sales |
| Chn. comp. Mex. (t-1) | 0.884*** | | -1.285* | | 11821 | | 2665 | |
| | (0.319) | | (0.736) | | (8723) | | (13635) | |
| Sales interaction (t-1) | -0.0751*** | | 0.129** | | -971.0 | | -268.4 | |
| | (0.0270) | | (0.0638) | | (699.0) | | (1417) | |
| Chn. comp. US. | | 0.610* | | -4.364*** | | -0.267 | | -5.311 |
| | | (0.350) | | (1.192) | | (1.048) | | (5.771) |
| Sales interaction (t-1) | | -0.0500* | | 0.356*** | | -0.00466 | | 0.466 |
| | | (0.0286) | | (0.100) | | (0.0870) | | (0.432) |
| Observations | 7843 | 5026 | 7856 | 5423 | 4697 | 1601 | 4941 | 1534 |
| R-squared | 0.374 | 0.439 | 0.936 | 0.907 | 0.475 | 0.462 | 0.929 | 0.911 |

Note: These regressions are identical to the fourth column of plant OLS regressions in tables 5, 7, 11 and 13, except that they report the subsamples of the 20 percent top and bottom mean competition. Only the main coefficients are reported. Robust standard errors are applied, stars denote significance at one (***), five (**) and ten (*) percent level of significance.

Table 22: Robustness 2

| | Placebo | | | No antidumping | | | |
|---|---|---|---|---|---|---|---|
| | Dom. sales | Exp. sales | | Exit | Exit exp. | Dom. sales | Exp. sales |
| Chn. comp. Mex. (t+4) | -1.491 | | Chn. comp. Mex. (t-1) | 0.676* | | -2.179*** | |
| | (1.882) | | | (0.380) | | (0.823) | |
| Sales interaction (t+4) | 0.139 | | Sales interaction (t-1) | -0.0600* | | 0.206*** | |
| | (0.176) | | | (0.0324) | | (0.0711) | |
| Chn. comp. US. (t+4) | | -1.480 | Chn. comp. US. (t-1) | | 1.374*** | | -5.504*** |
| | | (2.731) | | | (0.387) | | (1.288) |
| Sales interaction (t+4) | | 0.280 | Sales interaction (t-1) | | -0.106*** | | 0.409*** |
| | | (0.249) | | | (0.0311) | | (0.107) |
| Observations | 12970 | 3597 | Observations | 30400 | 9491 | 33327 | 10110 |
| R-squared | 0.962 | 0.956 | R-squared | 0.422 | 0.451 | 0.948 | 0.905 |

Note: These regressions are identical to the fourth column of plant OLS regressions in tables 5, 7, 11 and 13, except for the following modifications: In the first two regressions we report the regression for the years 1994-1998 with forward looking competition (for exit the forward competition can't be determined). The last four regressions show the results for the subsample of plants in sectors not affected by successful Mexican anti-dumping cases with respect to China.