Prices, Markups and Quality: The Effect of Chinese Competition on Mexican Exporters*

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Abstract

We investigate effect of rise of Chinese exports in the US market on Mexican exporters using detailed plant-product level production data from Mexico and detailed product-level trade data from UN Comtrade. We estimate markups of Mexican exporters at plant-product level using the production data, and plant-product level quality using market shares data. We find strong evidence that Mexican exporters reduce their markup in response to rise of China in the US market. However, the competitive pressure is attenuated in industries that offer more scope for quality adjustment, as measured by their longer estimated quality ladders.
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1 Introduction

Between 1990 and 2007 Chinese exports grew from 62 billion to 1.2 trillion United States dollars (USD), at the staggering average rate of about 20% per year. China became the world's largest exporter in 2009, and the second largest economy of the world in 2010. The emergence of China and its impact on producers worldwide has been a focus of attention for both policy-makers and researchers.

While no set of countries is entirely insulated from competition from China, one might expect the effects to be most immediate on those middle-income countries whose established positions in manufactured markets have come under threat. This is the focus of this paper, in which we examine the impact of Chinese competition on Mexican manufacturing firms. We combine a detailed plant level panel of production and cost data for Mexican manufacturing plants between 1994 and 2007 and data on product-level bilateral trade flows among China, Mexico, and the United States (US) from the United Nations (UN) Comtrade database. In the period of our study, despite the signing of the North American Free Trade Agreement in 1994, China's share of US imports rose from 6.7% to 16.9%. while Mexico's rose from 9.1% to 10.6%. In our empirical work, we first characterize products by their intensity of competition between China and Mexico. We investigate how Mexican firms respond along the price and quality dimensions to increased Chinese competition. In particular, we are interested in whether firms attempt to protect the market share of their products by lowering their markups or by improving their product quality and how this response varies with industry characteristics.

Iacovone *et al.* (2013) studies a similar question, investigating the intensive and extensive margin of adjustment by Mexican manufacturing plants. They find that sales of smaller plants and more marginal products are compressed and are more likely to cease, whereas those of larger plants and core products seem relatively impervious to the shock. We look deeper into the intensive margin of adjustment – i.e., we are interested in the firm-product pairs that continue to be exported – focusing on the quality-upgrading and variable markup channels of adjustment by Mexican firms in response to rise of China.

This is an important question, in part because it can shed light on the pro-competitive effects of international trade. Recent papers (see, e.g., Edmond *et al.*, 2015; Arkolakis *et al.*, 2015) have emphasized these effects as a potential source of gains from trade that are not accounted for by the widely used class of quantitative trade models characterized by Arkolakis *et al.* (2015), which assume perfect competition or monopolistic competition with constant markups. This paper provides direct evidence of the response of markups and quality, both in the domestic and a major foreign market, to a country's exposure to foreign competition, which will be useful in shaping future quantitative trade models that seek to capture these effects.

2 Data

This paper uses plant-level Mexican manufacturing data, collected from the *Instituto Nacional de Estadística y Geografía* (National Institute of Statistics and Geography, INEGI henceforth) and covering the period 1994-2007. The two main datasets used are the *Encuesta Industrial Anual* (Annual Industrial Survey, EIA henceforth), the main survey covering the manufacturing sector, and the *Encuesta Industrial Mensual* (Monthly Industrial Survey, EIM henceforth), a monthly survey that monitors short-term trends.

The EIA contains information on 6867 plants in 1994, but this number decreases over time due to attrition. It covers roughly 85 percent of all manufacturing output value based on information from the industrial census. The EIA captures variables related to output indicators, inputs and investment. These data make it possible to calculate the value of material, which includes raw materials (domestic and imported), intermediate inputs and energy consumption, as well as the value of capital stock using the perpetual inventory method. We use aggregate price indices provided separately by the INEGI to obtain the quantity of material and capital stock.

The EIM has traditionally been run in parallel with the EIA and covers the same plants. The EIM contains information on the number of workers, their wage bills and number of hours worked by occupation type. Workers are split into white collar (or non-production) and blue collar (or production). The EIM also contains output-related variables, specifically production, total sales and export sales. There are two important things to notice regarding these variables. First, plants are asked to report both values and quantities, thus an implicit average unit price can be calculated. Second, for these variables plants are requested to distinguish each one of their products, so that each one of these variables is reported product by product chosen according to a list given by INEGI for each six-digit class of activity. More information on the EIA and EIM can be found in Iacovone (2008) and Caselli *et al.* (2014).

In addition to the plant-level data, this paper makes use of product-level trade data are from the UN Comtrade database. Trade flows are classified according to the 6-digit Harmonized System (1992 revision). The dataset contains 5129 product categories with positive US imports over the period 1994-2007.

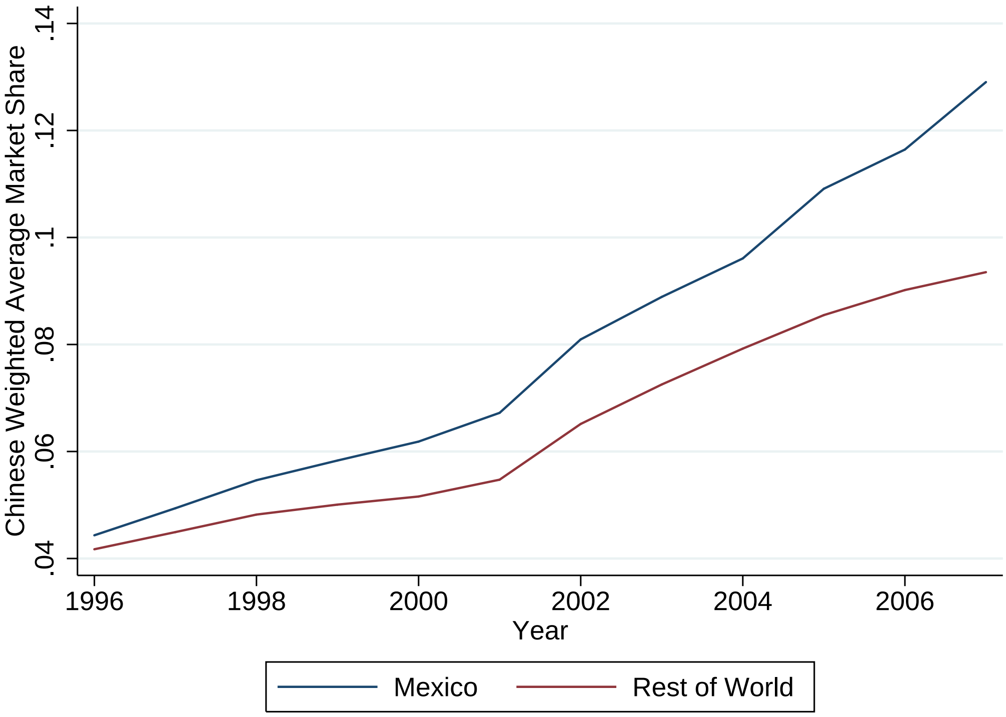
3 Competition from China

Before analysing the plant-level data, we can get a sense of the competition that Mexican producers have faced from Chinese exports by looking at patterns of the product-level trade data. First, we look at the degree to which the growth in Chinese exports to US has been in products also exported by Mexico. To do this, we calculate the following measure:

$$\Omega_{nmc} \equiv \sum_j \frac{M^j_{nm}}{M_{nm}} \frac{M^j_{nc}}{M_n},$$

where M^j_{nm} is the volume of imports by n from m of product j, M^j_{nc} is the volume of imports by n from c of product j, M_{nm} is total imports by n from m of all products, and M_n is total imports by n of all products from all sources. Thus, Ω is a weighted average of c's market share, weighted by product j's importance in m's overall exports to n. In

Figure 1: Rise of China in the US Market



Source: Own calculations based on COMTRADE data

other words, it is a measure of competition m's exporters face in market n from c.

Figure 1 plots China's average market share, measured by Ω, weighted by Mexico's exports as well as, for comparison, the exports of the rest of the world, excluding both China and Mexico, to the US. Clearly, the degree of direct competition faced by Mexican exports from China increased dramatically over the sample period, both in absolute terms and relative to the rest of the world. This indicates that Mexican firms during this period are a particularly relevant group for which to study the effects of competition in foreign markets.

Table 1 provides further insight into the patterns of the growth of Chinese exports. It depicts the results of a regression of the log change Chinese product-level exports to the US from 1996 to 2007 on the initial market shares of both China and Mexico in US imports. The results demonstrate that the composition of Chinese exports changed dramatically over this period, which is consistent with the findings of Amiti and Freund

Table 1: Growth of Chinese Exports to the US

Variable	Coefficient (Std. Err.)
MktShr_MEX$_{1996}$	0.629**
	(0.276)
MktShr_CHN$_{1996}$	-5.081***
	(0.202)
Intercept	2.991***
	(0.046)

Table 2: Growth of Mexican Exports to the US

Variable	Coefficient (Std. Err.)	Coefficient (Std. Err.)
MktShr_CHN$_{1996}$	-0.302	-0.932***
	(0.352)	(0.340)
ExpGrth_CHN_USA	0.308***	
	(0.032)	
MktShr_CHN$_{1996}$×ExpGrth_CHN_USA	-0.474***	
	(0.071)	
ExpGrth_CHN_ROW		0.220***
		(0.029)
MktShr_CHN$_{1996}$×ExpGrth_CHN_ROW		-0.326***
		(0.086)
Intercept	0.399***	0.611***
	(0.102)	(0.077)

(2010), and that a portion of this change was the growth of exports of products for which Mexico had an initial comparative advantage.

Table 2 gives us a sense of the way in which Mexican exports were affected by the growth of Chinese exports to the US. The table presents the results of a regression of the log change in Mexican product-level exports to the US between 1996 and 2007 on China's initial share of US imports and the subsequent log changes in Chinese exports to the US for each product. The second column replaces Chinese exports to the US with Chinese exports to the rest of the world as a test of whether the results are driven by the growth of China or by changes in the US market.

The positive coefficient on the growth of Chinese exports indicates that that Mexican and Chinese exports expanded at a faster rate for a similar set of products, while the negative coefficient on the interacted term indicates that that Mexican exports grew relatively slowly for the products for which China increased an already significant market share. It is in the latter set of products which we would expect the growth of China to most negatively effect Mexican firms. Thus, we interpret these results as evidence that Chinese and Mexican firms were competing for market share for a similar set of products and that the increase in Chinese exports, in many cases, came at the expense of the sales of Mexican firms.

A direct consequence of this rising competition from China on Mexican exporters is increased product market competition, which is expected to lower markups of existing producers. We next investigate whether this competitive pressure transaltes into a markup reduction. Howver, if Mexican exporters can adjust quality of their products, this may allow them to escape some of the competetion enhancing effects of trade. In order to investigate this, we characterize industries by the length of their quality ladder and examine whether markup reduction is lower in industries with larger quality ladder.

4 Estimation of Markups and Quality

4.1 Markups

This subsection describes how markups and marginal costs are estimated in a sample of multi-product plants using production data. The methodology is derived from De Loecker and Warzynski (2012) and De Loecker *et al.* (2014) and it has been recently used in Caselli *et al.* (2014) using the same data from Mexican manufacturing. The approach requires that plants minimise costs and at least one input is adjusted freely (material), while the other factors show frictions in the adjustment (capital and labour). It relies on the assumption that multi-product plants manufacture a particular product using the same technology employed by single-product plants that manufacture that same product. However, it does not impose assumptions regarding the returns to scale and scope, demand and market structure of each industry. For instance, input prices and, therefore, total costs may vary depending on the number of products manufactured. Moreover, following the approach of using inputs to control for unobservables in production function estimations (Olley and Pakes, 1996; Levinsohn and Petrin, 2003; Ackerberg *et al.*, 2006), it assumes that productivity is Hicks-neutral and specific to the plant.

We obtain an expression for markups, derived from a plant's cost minimisation problem. This expression is given by the following equation:

$$\mu_{ijdt} = \theta^{m}_{ijdt} \left(\alpha^{m}_{ijdt}\right)^{-1}, \tag{1}$$

where μ_{ijdt} is the markup of product j manufactured by plant i at time t and sold at destination d (domestic or export market), θ^{m}_{ijdt} is the output elasticity with respect to material (denoted by superscript m), and α^{m}_{ijdt} is the expenditure share of revenue spent on material. In order to estimate markups at the plant-product-market-year level, it is necessary to obtain estimates of the output elasticity and the revenue share of material at the plant-product-market-year level. Hence, the strategy for estimating markups at the market-product-plant-year level involves two key steps. In the first step of this approach, we obtain estimates of the output elasticity and the revenue share of material at the plant-year level. In the second step, we estimate input allocation shares across markets and products within plant-year pairs. Finally, we combine estimates from these two steps to obtain estimates of markups at plant-product-market-year level.

We get estimates of the output elasticity with respect to material by estimating translog production functions at the two-digit sector level based on the input control approach in Ackerberg *et al.* (2006).[1] Since the data do not contain information on the share of inputs by product and market within plant-year pairs, De Loecker *et al.* (2014) propose to estimate the production function for an unbalanced sample of single-product plants observed for at least three consecutive years with a correction for sample selec-

[1]The sectors included are: Food, beverages and tobacco; Textile, wearing apparel and leather; Wood and wood products; Paper and paper products, printing and publishing; Chemicals, petroleum, coal, rubber and plastic products; Non-metallic mineral products; Basic metal products; Fabricated metal products, machinery and equipment, and other manufacturing.

Table 3: Estimated export markups by plant type

	Total sales		Workers		Capital	
Quartile	Mean	Median	Mean	Median	Mean	Median
1st quartile	2.21	1.27	2.23	1.40	2.30	1.35
2nd quartile	2.29	1.38	2.45	1.41	2.65	1.43
3rd quartile	2.70	1.44	2.58	1.43	2.63	1.43
4th quartile	2.87	1.48	2.88	1.38	2.62	1.39
All	2.57	1.41	2.57	1.41	2.57	1.41

Notes: The table reports the export markups estimated by the quartile in which plants fall according to their total sales, number of workers and quantity of capital. The table trims observations with markups that are below the 5th and above the 95th percentiles within each sector and in both domestic and export markets.

tion. This way, we obtain consistent estimates of the production function coefficients that make possible to calculate the output elasticity with respect to material and total factor productivity at the plant-year level. Separately, we calculate the revenue share of material, also at the plant-year level, from the data available.

Next, we estimate input allocation shares across markets and products within plant-year pairs based on the assumption that these are related to the product revenue share from each market. We combine the output elasticity and revenue share of material at the plant-year level obtained from the first step with these input allocation shares to obtain estimates of the output elasticity and revenue share of material at the market-product-plant-year level. This final step allows us to estimate markups according to equation (1).

Once we have estimated markups, we can calculate marginal costs at the market-product-plant-year level by using the following definition of prices

$$p_{ijdt} = \mu_{ijdt} \cdot mc_{ijdt}, \tag{2}$$

where p_{ijdt} is the price of the output good and mc_{ijdt} is its marginal cost.

Table 3 shows the mean and median markup estimates at the product-plant-year level in the export market and how these markups change by plant type. Plant type is defined by plants' total sales, number of employees and quantity of capital. Lower quartiles indicate smaller plants that employ fewer workers and less capital. The overall mean and median markups in the export market are 2.57 and 1.41. These values are in the same order of magnitude as those estimated by De Loecker *et al.* (2014). Mean markups are generally higher and more dispersed than median markups. The table clearly shows that larger plants have on average larger markups in a rather consistent way. We also observe significant heterogeneity in estimated markups across sectors and markets. Additional results are available upon request.

4.2 Quality

In addition to markups, we estimate a measure of quality at the product-firm level for the domestic and export markets using market shares data. The methodology is based on the nested logit framework by Berry (1994). The estimation procedure follows closely Khandelwal (2010) and Bernini and Tomasi (2015), but it is applied to firm-level survey data. According to this approach, the quality of an eight-digit product j manufactured by firm i at time t and sold at destination d can be measured as the residual from the estimation of the following demand model

$$\ln(s_{ijdt}) - \ln(s_{odt}) = \gamma p_{ijdt} + \sigma \ln(ns_{ijdt}) + \lambda_{1,ij} + \lambda_{2,t} + \lambda_{3,ijdt}, \tag{3}$$

where s_{ijdt} is the market share of variety ij in terms of quantity of output within a two-digit sector, s_{odt} is the market share of an outside variety that is used to normalise the utility from the consumption of variety ij, p_{ijdt} is the variety price or unit value, ns_{ijdt} is the nest share, i.e., the market share of variety ij over the more disaggregated eight-digit product category, $\lambda_{1,ij}$ and $\lambda_{2,t}$ are respectively variety and year fixed effects and $\lambda_{3,ijdt}$ is an idiosyncratic error term. According to theory, the coefficient γ is supposed to be negative and the coefficient σ should lie between 0 and 1.

The market share of each variety is calculatd as $s_{ijdt} = q_{ijdt}/MKT2_{dt}$, where q_{ijdt} is quantity sold of variety ij and $MKT2_{dt} = \sum_i \sum_j q_{ijdt}/(1 - s_{odt})$ is a proxy of total market size for each two-digit sector. In order to calculate the total market size, we divide the total quantity sold in each market by all Mexican producers by the share of Mexican producers within that market, i.e., one minus the share of the outside option. The outside option is a substitute for Mexican products and, thus, it is composed of imports from all countries except for Mexico from UN COMTRADE data. We choose to measure the markets shares within two-digit sectors because too few observations would be available for some more disaggregated industry levels. The nest share is calculated as $ns_{ijdt} = q_{ijdt}/MKT8_{dt}$, where $MKT8_{dt} = \sum_j q_{ijdt}/(1 - s_{ojdt})$ is a proxy of total market size at the eight-digit product level and s_{ojdt} is the outside option at the same product level.

In this context, differences in quality between varieties are generated from variations in their market shares not explained by differences in prices. Quality is, thus, defined as $\lambda_{ijdt} = \lambda_{1,ij} + \lambda_{2,t} + \lambda_{3,ijdt}$, where the first term on the right-hand side captures the time-invariant valuation of variety ij and the second term captures the secular trend common to all varieties. The product-firm and year fixed effects substitute for missing information on detailed variety characteristics. The third term represents deviations in valuation from the fixed effects that are observed by the econometrician. This definition of quality is indubitably broad and it embodies both horizontal and vertical components.

The error term or quality component $\lambda_{3,ijdt}$ might be correlated with the unit value and the nest share, thus potentially giving rise to a problem of endogeneity. To deal with this possible issue of endogeneity, we also estimate equation (3) by Two-Stage Least Squares (2SLS). Following Khandelwal (2010) and Bernini and Tomasi (2015), the instruments used in 2SLS are the average price computed across all Mexican varieties within eight-digit product categories, the number of products sold by each plant and the number of plants selling a particular eight-digit product.

After estimating quality, whether by fixed effects (FE) or fixed effects with instrumental variables (FE-IV), we construct the measure of quality ladder as the difference between the maximum and minimum quality within a product for the initial year 1994, $Ladder_{jd94} = \lambda^{max}_{jd94} - \lambda^{min}_{jd94}$.

Table 4: Quality estimation results

	Mean	Median	Min	Max
Price coefficient, γ, FE	-0.017	-0.010	-0.142	-0.004
Nest share coefficient, σ, FE	0.204	0.171	0.160	0.623
Quality, λ, FE	-7.867	-7.953	-14.095	-1.155
Ladder, FE	0.450	0.205	0	1.950
Price coefficient, γ, FE-IV	-0.028	-0.009	-0.092	0.143
Nest share coefficient, σ, FE-IV	-0.088	-0.430	-1.980	0.398
Quality, λ, FE-IV	-9.351	-9.383	-15.588	-1.998
Ladder, FE-IV	1.689	0.836	0	8.623

Notes: The table reports the mean, median, minimum and maximum of the coefficients of equation (3) and the estimates of quality and quality ladder for the export market. The table trims observations with markups and quality estimates that are below the 5th and above the 95th percentiles within each sector and in both domestic and export markets.

Equation (3) is regressed separetely for each two-digit sector and for the domestic and export markets. Estimation results and the estimates of quality and quality ladder for the FE and FE-IV estimations are summarised in Table 4. The results show that the FE regressions provide more reliable estimates than the FE-IV regressions because all price coefficients negative and all nest share coefficients lie between 0 and 1. This can be due to a weak instrumentation problem, although the coefficients on the instrumental variables are generally significant and the first-stage F-tests are also significant. The problem with the FE-IV estimation is also evident in the estimates of the quality ladder. The quality ladder estimates are similar to those in Khandelwal (2010) in the case of the FE regressions, while they take much more extreme values in the case of the FE-IV regressions. Therefore, in the rest of the paper we make use of the estimates based on the FE regressions.

5 Empirical Analysis

In this section, we test our theoretical predictions concerning estimated markups in the export market. In particular, our main theoretical predictions are that a) markups of Mexican exports decrease when competition from China, measured by the share of US imports from China within eight-digit product categories, increases and b) the decrease in prices and markups of exports is smaller for those products that can adjust their quality

Table 5: Price and markup responsiveness to competition from Chinese products

Dependent variable	*Log price*		*Log markup*	
China Share, lag	-0.00	-0.01	-0.33**	-0.30**
	(0.09)	(0.09)	(0.16)	(0.15)
Log Total Factor Productivity		-0.08***		0.22***
		(0.02)		(0.03)
Product-plant fixed effects	yes	yes	yes	yes
Year fixed effects	yes	yes	yes	yes
No of obs.	17408	17408	17408	17408
R^2 (within)	0.23	0.23	0.00	0.05
F statistic	109.19	102.79	1.99	4.96

Notes: The dependent variable is the log of the price of exports in columns 1 and 2 and the log of the markup of exports in columns 3 and 4. The table trims observations with markups that are below the 5th and above the 95th percentiles within each sector and in both domestic and export markets. Standard errors clustered at the eight-digit product level are shown in parentheses. ** and *** indicate coefficients significantly different from zero at 5 and 1% level respectively.

more, i.e., a larger measure of (or longer) quality ladder.

We first test whether prices and markups of exports decrease following an increase in competition from Chinese products by estimating the following equations:

$$\ln p_{ijt} = \beta_1^p ChinaSh_{j,t-1} + \beta_2^p \omega_{it} + \zeta_{ij}^p + \delta_t^p + e_{ijt} \quad (4)$$

$$\ln mu_{ijt} = \beta_1^\mu \ln ChinaSh_{j,t-1} + \beta_2^\mu \omega_{it} + \zeta_{ij}^\mu + \delta_t^\mu + \nu_{ijt}, \quad (5)$$

where $\ln p_{ijt}$ is the log of the price in the export market of product j by plant i at time t, $ChinaSh_{jt}$ is the market share of Chinese products in all US imports of product j at time $t-1$ to reduce potential endogeneity, ω_{ijt} is total factor productivity of plant i at time t, ζ_{ij}^p and δ_t^p denote product-plant and year fixed effects for the price regression, ζ_{ij}^μ and δ_t^μ denote product-plant and year fixed effects for the markup regression, e_{ijt} is an error term for the price regression and ν_{ijt} is an error term for the markup regression. The theoretical framework suggests that β_1^p and β_1^μ are negative, i.e., an increase in the market share of Chinese products in the US decreases prices and markups of Mexican exports.

Table 5 reports the results concerning changes in producer prices (columns 1 and 2) and markups (columns 3 and 4) due to changes in the share of Chinese products, corresponding to equations (4) and (5). As in all the following tables, standard errors in parentheses are clustered at the product level in order to allow the unobserved errors to be correlated across plants and over time within each product and to match the variation of our main variable of interest.[2] The regressions are significant as a whole, even the markup regressions with relatively low F statistics values, and the within R-squared is about 0.23 for the price regressions and between 0.00 and 0.005 for the markup regressions.

The results confirm the predictions of our theoretical framework, in particular with regards to the relationship between markups and the China share. The coefficient estimate for lagged China share is negative in all four regressions, but it is significantly different from zero only in the markup regressions. A one percentage point increase in the China share leads to a 0.3 percent decrease in markups, but it does not seem to lead to a decrease in prices. Given that between 1994 and 2007 the share of Chinese products in the US market went up from 0.05 to 0.15, this would imply a 3 percent decrease in markups for Mexican producers in the US market over this period.

In order to test the model's second prediction, i.e., whether the decrease in prices and markups following an increase in competition from Chinese products is smaller for products with a longer quality ladder, we estimate the following reduced-form regression for prices and markups in the export market:

$$\ln p_{ijt} = \beta_1^p ChinaSh_{j,t-1} + \beta_2^p ChinaSh_{j,t-1} * Ladder94_j + \beta_3^p \omega_{it} + \zeta_{ij}^p + \delta_t^p + e_{ijt} \quad (6)$$

$$\ln mu_{ijt} = \beta_1^\mu \ln ChinaSh_{j,t-1} + \beta_2^\mu ChinaSh_{j,t-1} * Ladder94_j + \beta_3^\mu \omega_{it} + \zeta_{ij}^\mu + \delta_t^\mu + \nu_{ijt}, \quad (7)$$

where $Ladder94_j$ is the quality ladder of product j in year 1994. Therefore, we just include the interaction variable between the China share and the quality ladder as an additional regressor. The theoretical framework above suggests that the coefficients β_1^p and β_1^μ on the share of Chinese products remain negative, while the coefficients β_2^p and β_2^μ are positive. That is, it is expected that the negative impact of an increase in competition

[2]We also test the sensitivity of our results by using bootstrapped standard errors, also clustered at the product level. All the following results go through both qualitatively and quantitatively and are available upon request.

Table 6: Price and markup responsiveness to competition from Chinese products by quality ladder

Dependent variable	*Log price*		*Log markup*	
China Share, lag	0.09	0.03	-0.91***	-0.66***
	(0.17)	(0.17)	(0.25)	(0.25)
China Share, lag *	-0.12	-0.06	1.00***	0.73**
Ladder94	(0.19)	(0.19)	(0.31)	(0.29)
Log Total Factor Productivity		-0.08***		0.38***
		(0.02)		(0.04)
Product-plant fixed effects	yes	yes	yes	yes
Year fixed effects	yes	yes	yes	yes
No of obs.	9286	9286	9286	9286
R^2 (within)	0.28	0.28	0.01	0.10
F statistic	89.87	83.89	2.32	6.97

Notes: The dependent variable is the log of the price of exports in columns 1 and 2 and the log of the markup of exports in columns 3 and 4. The table trims observations with markups and quality estimates that are below the 5th and above the 95th percentiles within each sector and in both domestic and export markets. Standard errors clustered at the eight-digit product level are shown in parentheses. ** and *** indicate coefficients significantly different from zero at 5 and 1% level respectively.

from Chinese products on prices and markups is lower for products with a longer quality ladder at the beginning of the period.

Table 6 reports the regression results corresponding to equations (6) and (7). All four regressions are significant as a whole and the within R-squared values are between 0.28 for the price regressions and between 0.01 and 0.10 for the markup regressions.

The results confirm the predictions of our theoretical framework for the markup regressions. The coefficient estimate for the China share is negative, between -0.66 and -0.91, and significantly different from zero only in the markup regressions. This implies that an increase in the China share decreases markups.

Moreover, the decrease in markups is lower for products with a long quality ladder, as implied by the positive and significantly different from zero coefficient on the interaction term between lagged China share and the quality ladder. Considering that the value of the quality ladder is about 0.8 points for the third quartiile, the change in markups due to an increase in competition from Chinese products almost disappears and even turns positive for varieties with a value of the quality ladder above that of the third quartile.

6 Conclusion

An intutive impact of rising product market competition is reduction in measured variable markups. We find strong evidence that Mexican exporters reduce their markup in response to rise of China in the US market. However, the competitive pressure is attenuated in industries that offer more scope for quality adjustment, as measured by their longer estimated quality ladders. But does Mexican exporters actually adjust quality of their exports in response to rise of China and how does that impact their markups and prices? In the next stage of our research we will empirically model these simultaneous endogeneous decisions of firms in a joint regression framework.

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