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Abstract

This paper analyzes the economic effects of content-based import tariffs China imposed on imported auto parts. While China's policy penalized any firm that assembled cars with less than 60 percent Chinese content, the policy was most likely to affect foreign affiliated firms who were more likely to exceed the content ceiling. To assess whether foreign-affiliated firms differentially changed their input sourcing this paper uses Chinese product trade data for 1997 to 2009 which report trade transactions by firm ownership type. Compared with import transactions for other firms, the data show that foreign-affiliated firms appear to have mitigated the effects of the policy by reducing import transaction prices, and by reducing their import quantities on the extensive margin. While China's content-based auto import trade policy was repealed in 2009 after China lost its dispute case at the WTO, the extraordinary growth in China's global export of auto parts since 2005 suggests that China's short term trade policy may have contributed to enduring effects in global supply chains.

JEL-Code: F100, F140, F200.

Keywords: content-based tariff policy, imported intermediate inputs.

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Introduction

China's policies towards automotive sector imports received particular attention during China's WTO accession talks. For example, while the U.S. bilateral agreement with China included general tariff guidelines[2], the U.S. bilateral agreement with China was more explicit in its framework for four industries including automobiles. Here, the bilateral agreement noted the expectation that by 2006 China's import tariff on assembled cars was to be reduced from its pre-WTO level of 80% or 100% to 25%, while the diverse rates of tariff on auto parts were to be reduced such that the average tariff on auto parts declined to 10%.

The special attention paid to China's automotive sector was not entirely surprising, as the Chinese automotive market offers a new set of challenges and opportunities. In general, growth forecasts for the next few decades predict that economic growth will be centered in emerging economies. In this context, multinational firms that hope to expand their sales will need to learn how to serve customers in emerging markets such as China. Moreover, vehicle production in China has grown rapidly since it joined the WTO in 2001, in contrast with the plateauing of vehicle production in most other regions of the world.

Following China's WTO entry in 2001, China initiated the phase-in of auto sector tariff cuts according to the scheduled guidelines. However, in 2004 China announced new rules which prevented many assembly firms from utilizing the newly lowered tariffs on imported auto parts. Beginning in 2005, China's new regulations required all auto makers who used imported parts to register with China's Customs Administration. It also required automobile assemblers to provide a list of the imported and domestic parts used in each vehicle they produced, including information on the value and supplier for each part. If the assembler's use of imported parts caused the Chinese content of the assembled automobile to fall below 60 percent, the tariff applied to imported parts was to be that for assembled automobiles, rather than the tariff applied to the specific auto part. Such a change in the tariff designation represented a cost increase for impacted firms, since the Chinese tariff on assembled autos was fifteen percentage points higher than the average tariff levied on car parts.[3] The new regulations also specified that knock-down

[2] China agreed to reduce average tariffs to 9.4%, while the tariffs on priority products were to fall to 7.1%.
[3] See "United States Requests WTO Panel in Challenge of China's Treatment of U.S. Auto Parts" , posted 09/15/2006 at,[http://www.ustr.gov/Document_Library/Press_Releases/2006/September/United_States_Requests_WTO_Panel_in_Challenge_of_Chinas_Treatment_of_US_Auto_Parts.html].

car kits for assembly in China were to face the higher tariff rate, rather than the lower tariff rates that applied to individual parts.

Evidence from Chinese data on tariff payments indicates that tariff-reclassification under China's content-based tariff policy impacted some but not all assemblers' auto parts imports. For example, in 2005 the tariff rate applied to imported engines was 9%, while the tariff applied to assembled automobiles was 25%. Thus, the fact that the average tariff paid on imported engines [HS 840820] in 2005 was 17% indicates that a non-trivial share of auto producers failed to meet the content requirement and thus paid the 25% tariff on their engine imports. In addition, any assembler who failed to meet the content requirement, paid the tariff penalty surcharge, not just for engines, but on all of their parts imports, which by definition were more than 40 percent of the inputs in the completed product.

In the case of complex international production chains, as are seen in the auto sector, the reliance on imported parts is not surprising since firms often source parts that are specifically tailored for use in their models. As a result, if a firm sourced a part from outside of China at the time of the new policy announcement, there was the presumption that the firm would prefer to continue to import the part for its Chinese-based production, at least in the short-run. Thus, while the new tariff rule applied to all firms producing cars in China regardless of ownership, press accounts at the time suggested that the policy had a disproportionate effect on foreign-affiliated producers who were more likely to import a large percentage of their parts, and therefore to face the tariff-increasing reclassification of their imported parts.

In 2006 parties from the U.S., E.U. and Canada launched dispute cases against China with the Dispute Settlement Board of the WTO, because China's content-based tariff regulations were viewed as breaching China's WTO accession agreements, as well as common elements of country WTO obligations. In February 2008, the dispute settlement panel issued a preliminary ruling that the Chinese measures violated WTO rules, as they "accord imported auto parts less favorable treatment than like domestic auto parts" or "subject imported auto parts to an internal charge in excess of that applied to like domestic auto parts." Five months later, China lost its first WTO case as the final judgment of the WTO dispute settlement panel came to the same conclusion. In September 2008, China immediately announced its plans to appeal the WTO

decision. However, just following the circulation of the WTO report, the Dispute Settlement Body held a meeting on January 12, 2009. In this forum,

> "Canada, the EC and the US expressed their satisfaction with the findings ….. and the overall conclusion that the specific Chinese measures at issue violated GATT article III by imposing an internal charge and an administrative burden on imported auto parts that were not borne by domestic parts. They noted that the measures compelled auto producers to purchase auto parts from domestic producers and also to transfer technology to China to enable it to become a major player in the automobiles sector."[4]

Following the meeting of the Dispute Settlement Body, China agreed in February 2009 to bring its policies in line with the points raised by the dispute settlement board. While China agreed to comply with the WTO ruling, it argued that it needed time to implement the tariff modifications. On September 1, 2009 China returned to its accession-agreed tariffs, absent any conditionality based on content. This date coincided precisely with the WTO dispute framework that allowed the claimants to impose penalties on China if China maintained its content-based tariffs beyond that date.

To study how trade policy helped shape developments in a growing auto industry this paper starts by presenting a background on changes in the Chinese automotive sector. Next, I provide a model of parts procurement that highlights the changes in sourcing incentives rendered by China's changes in content policy. The model suggests that cost-minimizing foreign-affiliated firms had an incentive to avoid or reduce tariff surcharges by reducing their reliance on imported inputs as long as the fixed costs associated sourcing changes didn't exceed the overall tariff benefits generated by the sourcing changes. Firm sourcing changes favored by the content-based tariff policy implied that affected firms would reduce import quantities, and/or changing import prices through manipulation or sourcing changes. These model implications are tested on Chinese import trade transaction data for 1997-2009. In general, regressions based on import prices and import quantities at the extensive margin support the predictions of the model. The

[4] The WTO web site http://www.sto.org/english/news_e/news09_e/dsb_12jan09_e.htm, provides a summary of the involved party's opinions about the findings in the WTO cases DS339, DS340 and DS342.

paper concludes with interpretation of the results, and discussion of factors influencing the effects observed in the trade data.

2.0 Policy Environment and Background on the Chinese Automobile Market

Developments in the Chinese automotive industry are of great importance, since they are likely to affect the futures of automakers worldwide. This is because the predominant sources of growth in the auto industry for the next few decades are predicted to lie in emerging markets, such as China and India, rather than traditional developed country markets.[5] However, foreign multinational firms are worried about their ability to benefit from this growth, due to speculation that "In five years, China wants 60% of car parts in new Chinese vehicles to be locally made. This is alarming news for Germany, the leading European exporter to China thanks to car parts, machine tools and other widgets."[6] Thus, to provide a better understanding of the Chinese market, I begin by providing some information on the Chinese automotive market.

2.1 Chinese auto production and auto parts sector

Chinese national statistics reveal the importance of the automobile of industry in China. The China Statistical Yearbook reported that the sector "Manufacture of Transport Equipment", which encompasses the automobile industry, had 15,611 enterprises in 2009 and employed 4.5 million workers. The statistics also demonstrate that foreign firms were large employers in this sector. Of all urban workers engaged in the "manufacture of transport equipment", 67 percent were employed by firms in other types of ownership, as distinct from the 27.7 percent employed by SOEs, and 5.3 percent employed by Urban Collective-owned units.[7] As in other countries, the Chinese automobile industry is heavily concentrated geographically. Of China's 31 provinces, 22 had some auto production by 2009, a 50% rise above the 15 provinces with

[5] Weinert, Ogden, Sperling, and Burke (2008).
[6] The Economist, April 18th 2009, p59.
[7] Calculations based on Table 4.6 "Number of Employed Persons in Urban Units at Year-end by Status of Registration and Sector in Detail (2007)" in the China Statistical Yearbook.

automobile output in 2002. The top four provinces in terms of car production were Shanghai, Guangdong, Jilin and Chongqing provinces, with 16.4, 13.4, 11.5 and 8.4 percent of national production respectively.[8]

The growth in automobile production is especially dramatic, as it has been more rapid than the growth of per capita incomes. For example, automobile production output rose more than eight-fold between 2000 and 2007, while household income just about doubled.[9] The expansion Chinese consumer demand was met through growth at the extensive and intensive margins. Between 2002 and 2009 there was a proliferation of large auto producers in China. For example, in 2002, there were only two car production operations that exceed production volumes of 150,000 cars: the VW joint ventures with FAW and SAIC. Production output in 2002 already represented a large increase in output, as in 2001, only one venture exceeded 100,000 units. By 2009, sixteen different production ventures exceed 150,000 units, and they were joined by a large group of entrants. Thus, growth in Chinese production was driven both by expansions in production scale, and by entry of many new foreign and local producers.

Since many factors influenced the growth of China's car parts imports, it is difficult to isolate the effects of trade policy on parts imports decisions. This is especially true, due to the extraordinary rate of growth in Chinese trade generally, and the accompanying rise in automobile trade and production. For example, between 1999 and 2009, Chinese import of automobile parts rose by more than a factor of five. However, the growth in Chinese passenger car production was even more dramatic, as the number of autos produced in China rose more than 17-fold over the same interval. While the less rapid growth of automobile parts imports is consistent with trade policy effects, it could also be fostered by the growing importance of China-based producers who had a natural tendency to source a larger share of parts from Chinese parts producers than would their foreign counterparts.

[8] Shares calculated based on motor vehicle production data in Table 14-23 in the 2010 China Statistical Yearbook. The next largest producers, Beijing and Tianjin, were responsible for 7.2 and 7.1 percent of national production.
[9] Table 2-24 of the China Statistical Yearbook reports that household income in current prices was 3,632 Yuan in 2000 and 7,081 Yuan in 2007. For Urban households, the rise was from 6,850 Yuan in 2000 to 11,855 in 2007.

2.2 Additional Chinese policies influencing automobile production and parts imports

In considering the effects of China's content-based tariff policy, it is important to acknowledge that China had many other policies in effect that also had the potential to influence auto assemblers' global supply chains. In part, China's economic rise has been shaped and directed by government actions that have targeted sectors for favor, providing resources and an operating environment that were crafted to achieve desired goals. Among those sectors receiving such attention is the automotive sector. In the early 1990's government policy encouraged collaborative ventures between Chinese firms and international partners as a means of advancing Chinese auto sector capability.

More recently, Chinese policy has encouraged movements into the more advanced segments of the industry - research and product design in addition to the manufacture of automobiles - with the aspiration of producing world class Chinese automobiles under the auspices of Chinese companies and brand names. To this end, the State Development and Reform Commission and Ministry of Commerce released a revised investment catalogue that shifted the list of "encouraged" investments to more sophisticated auto sectors.[10]

[10] http://www.hg.org/articles/article_495.html.

3.0 Modeling the effects of China's Tariff Policy

When China reserved lower auto parts tariffs for firms that met minimum Chinese content standards, auto assemblers that failed to meet the content policy had the option of pursuing one of three different strategies. First, auto assembly firms could avoid or reduce their tariff surcharge penalties, by reducing their imports of auto parts from outside of China. Similarly, firms could avoid or reduce the tariff surcharges, by changing the prices of their imported parts imports through price manipulation, or the use of cheaper sources of import. Finally, firms could pay the tariff surcharge penalties as the cost of maintaining their established sourcing structure.

While China's content-based automotive tariff policy was targeted at a particular industrial sector, content policies are a common component of many free trade area agreements. This is because free trade areas often include provisions regarding content requirements and rules of origin that determine which products qualify for tariff preferences within the free trade area. For this reason, Lopez-de-Silenas, Markusen and Rutherford's (1996) model, which clarifies how the NAFTA affected the production and sourcing choices of auto assembly firms operating in the U.S., Canada or Mexico, can be adapted to describe the incentives generated by China's automotive tariff policies.

Lopez-de-Silenas, Markusen and Rutherford's (1996) framework is underpinned by the idea that auto production involves the assembly of a set of parts and components which are originally sourced from countries indexed by k. The value of parts VZ_{kc} has two subscripts: the first denotes the country (k) origin of the part, while the second represents the location (c) where the part is assembled into an automobile. In analyzing NAFTA production, c denoted whether assembly occurred in the U.S., Mexico, Canada or the rest of the world. In contrast, China's tariff policy applies specifically to production in China, and for this reason, the subscript c in the modified model denotes the use of the part for auto assembly in China. Depending on the part's origin, parts face a tariff TZ_{kc} assessed on the product's value. Here too, the tariff has the same set of subscripts, as the size and presence of the tariff depends on the part's origin.

China's trade policies, which were implemented in 2005, required automakers to produce cars which met the content requirement γ_c. Auto assembly firms were required to produce cars that contained at least 60% Chinese-origin parts and components if they wanted to qualify for the lower tariff on imported parts. In applying the tariff policy, content rules were evaluated firm by firm. However, to reduce notational clutter, the firm problem is presented without firm or year subscripts. China's content requirement is represented by equation (1)

$$(1) \qquad \frac{\sum_{k=c} VZ_{kc}^{j}(1+TZ_{kc})}{\sum_{k} VZ_{kc}^{j}(1+TZ_{kc})} \geq \gamma_c = 0.60$$

However, since no tariffs applied to auto parts or components sourced within China, the expression reduces to:

$$(1') \qquad \frac{\sum_{k=c} VZ_{kc}^{j}}{\sum_{k} VZ_{kc}^{j}(1+TZ_{kc})} \geq \gamma_c = 0.60$$

Auto assemblers who failed to meet the 60 percent Chinese content requirement, faced a higher tariff rate on their import of auto parts and components: rather than paying the scheduled tariff for the auto part, which averaged 10 percent, they were instead assessed the 25 percent tariff that applied to imported automobiles.

The first strategy firms could take was to comply with the content-based tariff policy. Compliance with the new content requirements implied that vehicle by vehicle, automakers would source inputs in a fashion that minimized production costs while meeting but not exceeding the content requirement, γ_c. The benefit of this strategy is that it qualified the firm to import parts at the lower tariff rate.

$$(2) \qquad (1-\gamma_c)[\sum_{k=c} VZ_{kc}^{j}] - \gamma_c[\sum_{n\neq c} VZ_{kc}^{j}(1+TZ_{kc})] \geq 0$$

In this firm problem the Lagrange multiplier on the sourcing requirement given by (2) reflects the shadow cost for meeting the content requirement. Due to differences in technology, global headquarters location and firm factors, the Lagrange multiplier μ^j_{kc} for assembling automobiles in China from inputs sourced from the array of countries k will differ by firm ownership type j. In the analysis, firm ownership types include Sino-foreign jointt ventures, state owned enterprises (SOEs) and private domestic firms.

The total value of imported parts (VZ) sourced from each country k, represents a composite of multiple parts z that are purchased from source country producers. Thus, if the transaction price for an imported part z that is sourced from origin country k and used in China is p_{zkc} the resulting shadow prices p_{zkc} for parts are as follows:

$$(3) \qquad p^j_{zkc} = \begin{cases} (1-(1-\gamma_c)\mu^j_{kc})\,p_{zk} & if \quad k = c \\ (1+\gamma_c\mu^j_{kc})(1+TZ_{kc})\,p_{zk} & if \quad i \in c, k \neq c \end{cases}$$

The decomposition in equation (3) illustrates the differential cost of sourcing parts within China (k=c) versus sourcing parts by import from another country, or the case where $k \neq c$. Since the purchase of an additional part from China helps to loosen the firm's binding cost of complying with China's tariff policy, the cost of purchasing parts from a Chinese supplier is below the price of the part itself, p_{zc}. As Lopez-de-Silenes, Markusen and Rutherford (1996) point out, this can be viewed equivalently as a subsidy rate of $(1- (1-\gamma_c)\mu^j_{kc})$ on the purchase of a content-qualifying input. In contrast, the import of additional parts for assembly imposes additional costs as the firm will have to reconfigure other sourcing decisions if it is comply with the sourcing requirement, while accommodating the new import. In this case, the shadow cost of imported parts exceeds the net of tariff import price by $(1+\gamma_c\mu^j_{kc})$, which works like a tax. The actual rate of tax or subsidy is influenced by the content requirement, and the firm's difficulty in meeting the requirement, as given by the lagrange multiplier. If the content requirement is not binding for the firm, there is no divergence between pure parts prices, and the shadow prices of parts by origin.

While there are no published reports that list the set of assemblers by model and year who met or failed to meet China's content requirement, we expect that the content requirement created a greater burden for Chinese auto assembly operations that were run by firms that included a foreign partner. This is due to the fact that auto assemblers generally use a greater share of parts sourced from their headquarters country.[11] In addition, the political economy of trade policy creation suggests that when policy-makers design policies, they will choose regulations that home firms can meet. At a minimum, these points suggest that the shadow cost of importing parts was lower for non-foreign assembly firms producing cars in China, and that if the policy was designed such that the content requirement was not binding for Chinese firms, Chinese firms would not have faced the implicit subsidy or tax, implied by the prices given by (3). In either case, the model implies that after China's imposition of the content policy, foreign-affiliated assembly firms in China faced a greater incentive to curtail their purchases of imported automotive parts.

The benefit of meeting the content requirement was the avoidance of the per-vehicle tariff penalty,

$$Penalty = \sum_z p_{zk} * (\tau_a - \tau_z) \quad \forall k \neq c ,$$

where τ_a was the tariff on assembled automobiles and τ_z was the rate of tariff for part z. From a firm perspective, it was sensible to comply with China's new content regulations if the sum total of penalties avoided (penalty per vehicle*vehicles affected by policy) did not exceed the fixed costs of changing the firm's operations to attain compliance with the policy.

A second option firms could pursue was to reduce or eliminate their tariff penalty by understating the costs of imported parts included in their vehicles. In cases where the firm reduced its stated parts price, but still failed to meet the content-requirement, the per-vehicle tariff benefit of understatement would be:

$$Penalty\,\mathrm{Re}\,duction = \sum_z (p_{zk} - p'_{zk}) * (\tau_a - \tau_z) \quad \forall k \neq c ,$$

[11] See Swenson (1997) and Blonigen (2001) provide evidence that the U.S. content of U.S.-based auto assembly was higher for U.S.-owned firms than it was for Japanese firms. In the case of multinational producers, this incentive would also influence the propensity of firms to purchase from their current global affiliates.

Where p'_{zk} is the price declared for the imported part. As long as the declared price p' was lower than the actual price p, the tariff penalty reduction is proportional to the degree of under-reporting. Under the second strategy, the firm would weigh the full benefit [(Penalty-reduction per vehicle)*Vehicles Sold] against the probability of being caught and the penalties it might face if policy-makers learned of the price manipulation. Under this strategy, the firm problem is analogous to that of transfer price manipulation. [12]

The final option for firms facing the tariff penalties was to retain their original sourcing pattern, and simply pay the tariff surcharge penalty for failing to meet the 60% Chinese content requirement. This choice was optimal when the costs of changing the sourcing structure was higher than the tariffs avoided and/or the tariff benefits generated by misstating import prices failed to compensate for the risks and penalties the firm would pay if its price manipulation was uncovered.

4.0 Estimation

4.1 Data

To evaluate the effects of China's content-based tariff policy on the volume, price and quantity of imported of auto parts, detailed Chinese import transactions data for the years 1997 to 2009 are studied.[13] Chinese trade data are especially well suited to the analysis of firm issues, since the 8-digit product-level trade transactions are reported at a fine level of detail that provides information on the firm's type of ownership (SOE, Foreign, Joint Venture, Private or Collective), as well as the location of the firm. The first step in the assembly of the data was to identify all international HS6 product codes that encompass automotive parts.[14] Based on these HS6 classifications, all Chinese trade transactions at the HS8 level were collected.

While car parts were imported under a number of trade regimes, China's content-based tariff policy did not have any effect on auto parts imported for use in processing trade. This is

[12] Swenson (2001), Fisman and Wei (2004) , Bernard, Jensen and Schott (2006), and Fisman, Moutarski and Wei (2007) present evidence that reported trade prices respond to tax and or tariff incentives.
[13] The trade data, which were reported in the Customs General Administration of the People's Republic of China for 1997-2009 record all export transactions at the HS 8 level of disaggregation. These data were used under license to the Center for International Data (CID) at the University of California, Davis.
[14] The HS6 codes and product titles used in this project are listed in the data appendix.

because processing trade, which requires re-export from China, is free of tariff. In addition, while China has rapidly expanded its export of automotive parts, China's export shipment of assembled automobiles is still very small. For these reasons, this project analyzes data on China's ordinary trade in auto parts, which was subject to the changes in tariff policy. The complete data set forms an unbalanced panel of ordinary auto parts imports for 1997 to 2009, which are disaggregated to the HS8 product, importing province, country source and firm type level.

The time evolution of these Chinese car part import transactions is presented in Table 1. Two aspects of the data are immediately apparent. First, automotive imports have grown exceptionally in both value and in diversity of unique transactions. Between 1997 and 2009, import values rose tenfold. Second, while China's new trade policy put foreign-affiliated auto firms at a disadvantage, the combined share of foreign and Sino-foreign joint venture (JV) imported car parts value did not decline following the new policy. In general, all firms continued to increase their imports of inputs, coincident with the growth of the Chinese auto industry.

To provide further information about the evolution of automotive imports, Table 2 presents the year by year counts of unique transactions handled by each of the firm types. Following the implementation of China's tariff policies, one would predict that foreign-affiliated assembly firms would have reduced their reliance on imported automotive parts. In this project, this would imply that import transactions by foreign joint venture firms in China should have declined relative to automotive assembly imports by other firms. Even if their import values did not immediately decrease, we expect that foreign-affiliated firms would reduce their introduction of new import suppliers into their global production chain supplying assembly in China. In line with differential effects under the tariff policy changes, the data in Table 2 show that the relative number of transactions by foreign joint venture firms slowed relative to import transactions by foreign invested firms.

4.2 Evidence from Import Dutiable Value

The analysis begins with dutiable import value as the dependent variable, as it is the closest analogue to the variable VZ_{kc} in the import demand model. For the first regressions, the

dependent variable is the log of dutiable import value $Ln(DValue)_{igt}$ of HS8 industry part [i] in year [t], aggregated by firm ownership type [g][15]. I use the following regression framework:

(4) $Ln(DValue)_{igt} = \alpha + \theta_1 * [Foreign\ JV * New\ Policy]_{igt} + \Sigma G_g + \Sigma GTrend_g + \Sigma \mu_t + \zeta_{igt}$

Foreign JV is an indicator variable that is one for trade transactions conducted by Sino-foreign joint ventures, while *New* Policy is an indicator variable that is set to one in the years when China imposed the content-based tariff policy. To search for evidence that Chinese firms with foreign JV ownership changed their behavior in light of China's new tariff policy, the coefficient of interest is θ_1: the model predicts that θ_1 will be negative if the content-based tariff policy caused foreign-affiliated firms to reduce their reliance on imported inputs.

In addition to the policy variable the regression includes a number of controls. First, since foreign affiliated firms may have a different propensity to rely on imported parts, the regression includes controls for firm ownership group type, G_g and ownership group time trends $GTrend_g$. The regressions also include time indicator variables μ_t to capture year to year changes in the macroeconomic environment, local infrastructure, or other factors that changed the relative attractiveness for all producers in sourcing parts from outside of China. Time variables are also important for capturing changes over time in Chinese parts quality. All regressions are estimated using fixed effects panel regressions.

In columns (1) and (2) of Table 3 the fixed panel effect of the error term is HS8 Product. While the first column includes all years, 1997-2009, the second column is restricted to 2001-2009, in case China's membership in the WTO resulted in new sourcing patterns by firm type and HS8 product. However, regardless of the time period chosen, the first two regressions yield positive but insignificant coefficients that fail to support the hypothesis of reduced import sourcing by foreign-affiliated firms after the implementation of the content-based tariff policy.

To account for the possibility of shifts in sourcing patterns over time, the dependent variable is further disaggregated to the HS8-Firm group-Source Country [s] level, in the next two columns of Table 3.

[15] The four firm groups are 1) SOE 2) Joint Venture, 3) Foreign Firm, and 4) Private Domestic.

(5) $\text{Ln(DValue)}_{igst} = \alpha + \theta_1 * [\text{Foreign JV} * \text{New Policy}]_{igst} + \Sigma G_g + \Sigma \text{GTrend}_g + \Sigma \mu_t + \zeta_{igst}$

As before, the regression is estimated using fixed effect panel techniques, which now include HS8-Source Country fixed effects in the error term. In this setting, the results are mixed. While the regression based on the full sample suggests that foreign JV-affiliated firms did not change the dutiable value of their imports relative to other firms in China, the sample based on years when China was a member of the WTO suggest foreign-JV affiliated firms reduced their car parts imports by 20 percent relative to other firms during the policy years.

For a final perspective on the dutiable value responses of firms, the regression was estimated using dutiable import value Ln(DValue)_{ift} of part i in year t by firmby, using the following regression framework: [16]

(6) $\text{Ln(DValue)}_{ift} = \alpha + \theta_{1*} [\text{Foreign JV} * \text{New Policy}]_{ift} + \Sigma \text{GTrend}_{fg} + \Sigma \mu_t + \zeta_{ift}$

In this regression, the error term ζ_{ift} is modeled as having a HS8 product-firm component, and an iid component. As with the previous regression, the coefficient on the Foreign JV policy term is negative, but the estimates are not statistically significant. Thus, the dutiable value regression results in Table 3 are mixed, with some, but not all of the coefficients coinciding with the main model prediction. While there is some evidence in the dutiable values that Foreign JV firms reduced their dutiable value of parts imports when China moved to its content-based tariff policy, the results are weak.

4.2 Evidence from Import Prices

Changes in dutiable import values reflect the combined effects of changes in import quantities and import prices. Due to the nature of automobile production, firms may find it difficult to changes parts import quantities quickly if local choices are less plentiful, or if firms take time making adjustments to meet the new policy. Thus, if adjustment costs are high, firms may instead choose to mitigate the effects of the content policy by modifying prices.

[16] As in Feenstra and Hanson (2005), a firm-analogue is identified in the trade data through the unique combination of firm type (SOE, FIE, JV, Domestic) and location identifiers.

Unfortunately, the trade data do not report whether the transactions involved arm's length transactions or transactions between related parties in a multinational firm's network, as a price manipulation strategy is only relevant for trade between related parties. In particular, in the case of related party import of auto parts, it is possible that firms maintained the same flow of imported parts, while declaring lower prices per unit. In this case, even if the firm's sourcing still failed to to meet the strict 60% content requirement, price manipulation would reduce the parts value on which it paid the higher duty. However, even in the case of transactions between unrelated parties it is also possible that prices declined due to foreign invested assembly firms in China negotiating lower mark-ups from their unaffiliated suppliers outside of China following the adverse tariff shock of the content policy. To test whether firms impacted by the content-based tariffs had differential movements in import prices, the analysis now moves to price as the dependent variable, where price [p] is measured by import unit values at the HS8 product, firm ownership type level.

$$(7)\ \text{Ln}(p)_{igt} = \alpha + \theta_1 * [\text{Foreign JV} * \text{New Policy}]_{igt} + \Sigma G_g + \Sigma \mu_t + \zeta_{igt}$$

The results of estimating equation (7) are displayed in Table 4. As the results indicate, the unit values of parts imports by foreign-affiliated JV firms declined when China's parts import policy was put into effect. While the point estimates differ slightly, the basic result is the same whether the designation of policy effects is defined as post-2004, or post-2005. Thus, it appears that firms responded to the policy, at least in part, through changes in declared import prices.

To further assesses the effects of the policy on declared prices, the unit value data are disaggregated to form a panel of observations at the HS8, Firm ownership type, Country-source level. The control variables include HS6 product terms. Further the regression is estimated with fixed effects panel regressions that include source-country-year fixed effects in the error term of (Table 5A) and source-country-HS4 fixed effects in the error term of (Table 5B).

$$(8\text{-}1)\ \text{Ln}(p)_{igst} = \alpha + \theta_1 * [\text{Foreign JV} * \text{New Policy}]_{igst} + \Sigma G_g + \Sigma H6_i + \zeta_{igt}$$

$$(8\text{-}2)\ \text{Ln}(p)_{igst} = \alpha + \theta_1 * [\text{Foreign JV} * \text{New Policy}]_{igst} + \Sigma G_g + \Sigma H6_i + \Sigma \mu_t + \delta_{igt}$$

While the regressions in Tables 5A and 5B report results from a number of specifications that allow for changes in the timing of the policy effect, and for the possibility that foreign importers also experienced changes in import prices, all the results indicate that foreign-JV import prices declined by 12 to 14 percent relative to other importing firms, while no measureable price decline was noted for foreign firms in China.

For a final perspective on prices, the price regression is run with prices for a panel of price data disaggregated to the HS8- firm level using source country-year fixed effects as the fixed effect in the panel error term, following:

$$(9)\ \text{Ln}(p)_{ifst} = \alpha + \theta_1 * [\text{Foreign JV} * \text{New Policy}]_{ifst} + \Sigma G_{fg} + \Sigma H6_i + \zeta_{ifst}$$

As was true for price data reported at the product-country source level, the results displayed in Table 6 indicate that the prices of parts imported by joint-venture foreign affiliated firms declined by 16 to 22 percent following China's content-based tariff policy. In these data, there is also evidence of a price reduction during the policy years for foreign firms importing car parts, though the magnitude of the reduction was smaller, and the price changes for the two groups are statistically distinct. Overall, the data on Chinese auto import prices reveal a negative relationship between auto parts imports prices and the implementation of China's policy, that is robust to changes in data aggregation or regression controls.

4.3 Evidence from Import Quantities

Firms had two potential avenues for changing firm import quantities. At the intensive margin, affected firms could reduce their import quantities of products already imported. If the firm maintained its output levels, this strategy meant the firm would replace some of the imported parts with Chinese-produced substitutes. However, firms could also react to the policy at the extensive margin, discontinuing the import of some parts, or not starting to import other parts, that were otherwise imported by Chinese producers who did not face a binding content constraint. The data from Chinese imports suggest that action at the extensive margin was consistent with changes in the tariff environment, while there is no evidence for adjustments at the intensive margin.

Intensive Margin

To check import quantity responses at the intensive margin, one option is to run product by product regressions which relate imports of HS8 products disaggregated to the firm type-year level, to see whether foreign-JV firms reduced their import quantities relative to other firms after the policies were implemented. However, when this experiment is tried with the Chinese trade data, the policy coefficients take on both positive and negative values, which are statistically insignificant in the majority of cases.

Alternatively, it is possible to run panel regressions which replace the price variables used as the dependent variables in specifications (7) – (9) with similarly disaggregated quantity variables. However, since dutiable value is price multiplied by quantity, quantity regressions are somewhat redundant. Further, while the policy variable takes on the predicted negative coefficient in some regressions, the estimated coefficient for the policy years is often positive for both joint venture and foreign imports of car parts. This is puzzling since it suggests that foreign-affiliated firms in China accelerated the pace of their parts imports during the period when Chinese policy imposed tariff penalties for excess reliance on imported inputs. One plausible possible explanation for these quantity changes is changes in consumer market demand for joint-venture produced automobiles, as a rise in the relative demand for joint venture produced automobiles provides a plausible reason why demand for parts used in joint-venture cars would have risen during the policy years relative to those used in non-joint venture Chinese operations. However, in the absence of data on sourcing at the firm and model level, it is difficult to evaluate whether differential demand growth by firm ownership type can explain the increased volume of imports by foreign-affiliated firms during the policy period.

Another possibility is that foreign-affiliated firms did not adjust their parts import quantities because they were unable to switch suppliers, at least in the short-run. If so, foreign-affiliated joint ventures would have imported parts commensurate with the production demands in their rapidly growing Chinese assembly operations. The decision to maintain parts imports after 2004 may have been further compounded by the concern in the early 2000's that Chinese parts were of much lower quality than those attained by import, and by the fact that suppliers need time to retool their facilities to provide the parts sought by the foreign-affiliated producers.

Extensive margin

The customs trade data do not provide information that would link firm identifiers in a way that tracks supply chain decisions by firms. However, auxiliary information on sourcing decisions can be used to study exit and entry decisions during the policy period. For this task, I take the import transactions data disaggregated to the HS8 product, firm ownership type and province level and create zero/one indicator variables that indicate whether the particular product-ownershiptype-province combination had active imports in the year or not. To study exit, I begin with the full universe of active import combinations in 2004. I then run a probit regression to test whether the active transactions of foreign-affiliated firms were more likely to end than were transactions conducted by other firms.

(10) Probit $(Exit)_{igp} = \alpha + \beta * \ln(TransactionDV\_2004)_{igp} + \Sigma G_g + \Sigma H6_i + \Sigma P + \Sigma H6_i + \kappa_{igp}$

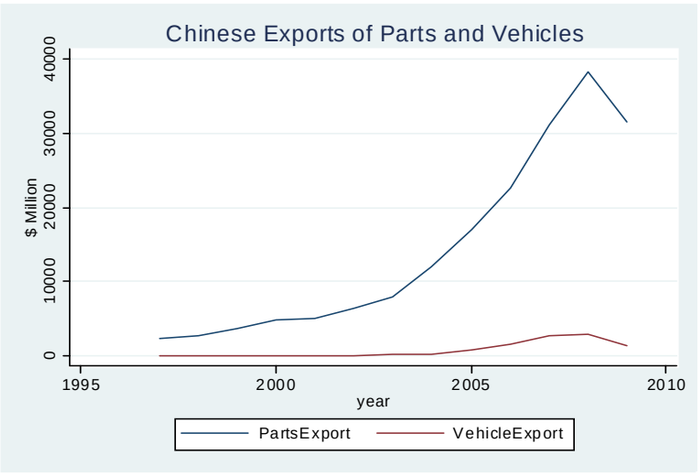
Controls include HS6 fixed effects ($\Sigma H6_i$) province fixed effects (ΣP) and the transaction dutiable value of the transaction in 2004. Separate firm-ownership group coefficients are also estimated. The model predictions is that the exit probability of foreign-affiliated firms should have exceed the exit probabilities of other firms by ownership type. Table 7 presents these results by analyzing the probability that 2004 import transactions ceased by either 2005 or 2006. Consistent with policy-induced changes, the data show that even after controlling for transaction size, foreign-JV firms were more likely to drop parts imports relationships than were foreign firms or private firms. Table 8 examines an analogous question by testing for the prevalence of firm types among new HS8-firm type-province transactions, initiated at the time of the content policy implementation. In this exercise, we study the complete panel of entry, as defined by the emergence of transactions that were not active in 2004. Since the data show that new transactions were less common for foreign-JV firms than they were for private or foreign firms, the data suggest that foreign-JV firms may have turned to local Chinese suppliers to support their growth in auto output, even in cases where outside sourcing was preferred by firms who made new purchases according to national differences in comparative advantage.

5.0 Discussion

Since trade data do not provide evidence of China's tariff policy curtailing the intensive margin quantities of auto parts imports by foreign producers, it might be tempting to conclude that the policy only had a limited influence on multinational production structures. Indeed, press accounts suggested that many parts suppliers felt compelled changes their supply choices due to tariff-content policy.[17] However, the effects of these policies may be stronger in the long run if the relocation of auto assemblers or their suppliers, or the switch to domestic Chinese suppliers took time. When Chung, Mitchell and Yeung (2003) studied parts sourcing by Japanese firms that located in the U.S. during the 1980's, they discover that once a Japanese firm sought inputs from a U.S. supplier, they would continue to purchase from the U.S. supplier for the entire model run of about four years. This finding suggests that firms may wait to the end of a current model run before making a supplier switch, but once the supplier switch is made, the switch is enduring.

Changes in China's parts Production Capability- Evidence from Exports

In the absence of direct evidence on the productivity of Chinese auto parts producers, or on the relative quality of Chinese auto parts, we can draw inferences about longer-run developments in the Chinese automotive sector capability by turning to Chinese data on automotive exports.



Note: Author's construction from Chinese Customs Data Base.

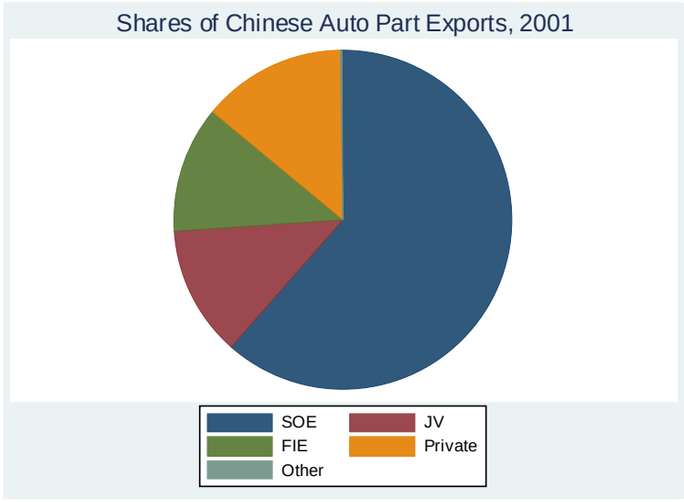
[17] See the June 22, 2005 article at http://www.atimes.com/atimes/China/GF22Ad02.html. Notably, Valeo stated its intention of attaining 70% of its parts in China, prior to the 2004 changes in trade policy.

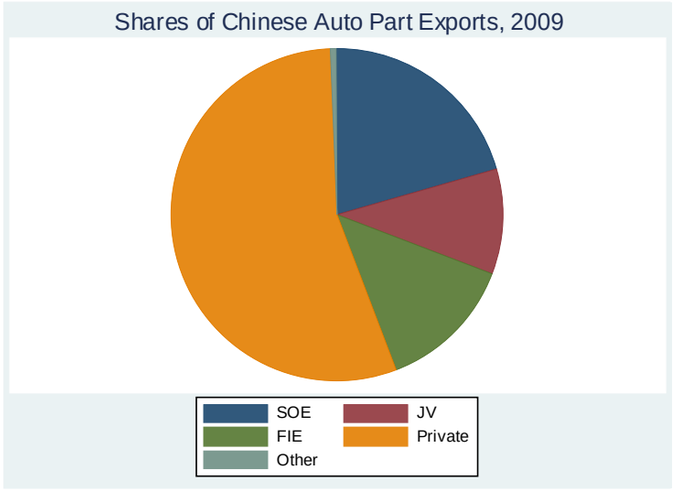
China's aggregate automotive exports reveal a wide gap between the evolution of China's automotive parts exports as compared with China's export of assembled vehicles. Thus, it appears that China's capabilities in the automotive sector have improved during the 2000's.

Since Chinese export data report firm ownership we can examine how China's growth in auto parts export was apportioned between foreign-invested firms, versus local firms, as this decomposition allows us to speculate about two potential post-policy effects. First, if joint venture firms preferred to purchase parts from their original suppliers, they would have been able to meet the content policy if they convinced their suppliers to relocate to China. If supplier firms entered China, one would expect to see an expansion in the exports of car parts by foreign affiliated firms that had reconfigured their global supply chains. Under this scenario, we would expect to see an expansion of exports by foreign-invested firms, or foreign-affiliated JV firms. Alternatively, Sino-foreign joint venture firms may have increased the Chinese-content of their production, by cultivating sourcing arrangements with local Chinese suppliers. Due to the expansion of the local industry, this would have fostered the ability of firms to change their sourcing in the longer-run when private Chinese suppliers were available. Indeed, between 2005 and 2009 the number of private enterprises in the transportation equipment sector more than doubled, while the number of foreign enterprises rose by 75%. Under this alternative, we expect to see expanded growth of export by private Chinese suppliers.

Turning to a comparison of 2001 and 2009 export data as displayed in the following figures, shows that growth in China's aggregate parts exports to the rest of the world was underpinned by the growth of private Chinese firms rather than growth by foreign invested enterprises and state-owned enterprises. Nonetheless, to further evaluate the role of growth in private domestic firms, it is useful to look at parts exports to the U.S. and Japan – countries that have large assembly operations of their own, who might have relocated part of their multinational supply chains to China in response to the tariff policies of the 2000's.

Chinese export of Auto Parts to the Rest of the World – 2001 to 2009

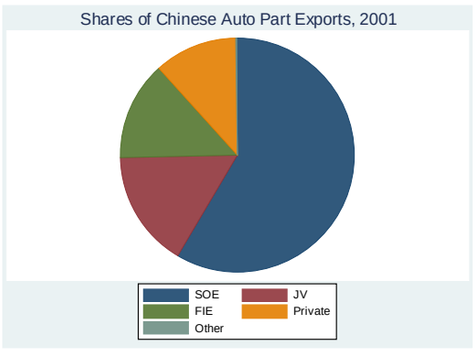


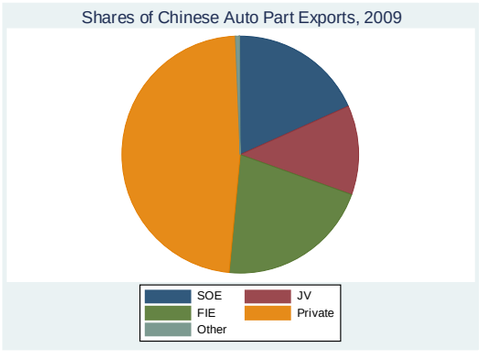


While the role of private Chinese firms is less strong in explaining the increase of automotive parts exports to Japan, than is the case for the U.S. the increased engagement of private firms is noticeable in both markets. Second, while foreign-invested firms are responsible for a small share of the expansion in the U.S. market, the expansion by foreign-invested firms is dwarfed by the expansion by private firms. One message from the export data is that the scale and composition of China's auto part production capacity has changed during the 2000's. The Chinese auto industry of 2001 is not the Chinese auto industry of 2009. For this reason, much caution is required when interpreting developments in parts imports during China's tariff policy

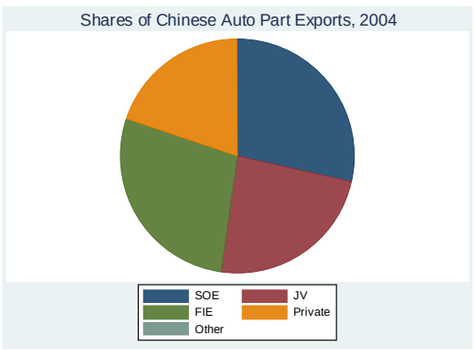
years. While export data do not prove that the content-based tariff policy improved the capabilities of local Chinese firms, the growth in exports is consistent with that conjecture.

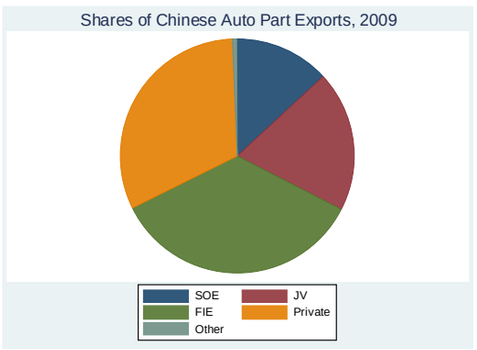
Chinese export of Auto Parts to the US – 2001 to 2009





Chinese export of Auto Parts to the Japan – 2001 to 2009





6.0 Conclusion

This paper uses 1997-2009 Chinese product trade data to analyze the effects of the China's content-based tariff policy on China's auto part imports. While economic models predict that China's changes in automotive tariff policy would have reduced the foreign sourcing of automotive parts by foreign-affiliated auto assemblers in China, econometric evidence on this topic is mixed. In particular, as predicted by a model of content areas, the data reveal that the dutiable value of automotive imports fell for foreign-affiliated firms. In the case of ongoing transactions, it appears that affected firms reduced their reported prices reduced dutiable values. In contrast, in the case of import quantities, there were no noticeable changes in import volumes in the case of ongoing trade relationships. However, at the extensive margin, it appears that firms responded to China's content policy, as foreign-affiliated firms were more likely to end import connections, and were less likely to enter into new import relationships.

One possibility is that intensive margin quantity decisions are muted in this study, because firms respond to sourcing incentives with a long lag. A lag of this sort is especially plausible in auto part sourcing which is viewed as requiring time consuming relationship-specific investments. Following sourcing choices, auto assemblers may be reluctant to change suppliers prior to model redesign. Nonetheless, industry participants speculate that the mid-2000's trade policies may have had enduring effects, as firms sought to source inputs inside China rather than from without.[18] Due to relocation by ongoing suppliers, and identification of Chinese-based suppliers, firms may have changed their supply chain, and thus, will not revert to previous sourcing patterns, even after the removal of the contested tariff policies.

[18] For example, see Keith Bradsher "Despite Trade Rulings, Beijing gains from Delay Tactics," August 31, 2009 New York Times.

Table 1: The Firm Composition of China's Auto Parts Imports

	Number of Parts Import Transactions	Value of Parts Imports ($billion)	SOE Share of Parts Import Value	Foreign Share of Parts Import Value	Foreign JV Share of Parts Import Value
1997	27,141	2.36	0.356	0.143	0.519
1998	26.059	2.57	0.336	0.166	0.487
1999	36,267	3.74	0.383	0.166	0.432
2000	42,014	5.17	0.311	0.175	0.500
2001	49,658	6.19	0.298	0.191	0.496
2002	60,009	7.86	0.287	0.218	0.464
2003	70,011	13.0	0.264	0.181	0.499
2004	80,697	16.0	0.230	0.224	0.479
2005	86,272	15.6	0.220	0.273	0.434
2006	97,641	19.5	0.176	0.276	0.470
2007	102,451	21.7	0.162	0.291	0.473
2008	111,289	23.7	0.177	0.301	0.447
2009	108,353	24.0	0.194	0.310	0.426

Note: Numbers include all HS2 imports in Chapter 87, as well as imports of auto parts from other HS2 industries.

Table 2: The Composition of China's Transportation Sector Imports.

	Number of Import Transactions by SOEs	Number of Import Transactions by Foreign	Number of Import Transactions by Foreign JV
1997	13,460	5,750	10,773
1998	12,933	6,168	10,122
1999	18,175	8,046	12,514
2000	20,771	10,184	14,347
2001	23,736	12,410	16,197
2002	26,945	16,600	18,089
2003	27,205	21,010	20,516
2004	25,402	26,245	21,961
2005	23,304	30,718	22,009
2006	22,419	37,025	23,273
2007	21,395	43,984	23,829
2008	20,610	50,085	25,281
2009	18,208	50,862	23,443

Note: Numbers include all HS2 imports in Chapter 87, as well as imports of auto parts from other HS2 industries.

Table 3: Post Policy Changes in Import Dutiable Value

	Dependent Variable					
	(1)	(2)	(3)	(4)	(5)	(6)
	Ln(DValue)	Ln(DValue)	Ln(DValue)	Ln(DValue)	Ln(DValue)	Ln(DValue)
Dependent Var Unit of Obser	FirmType-HS8 Dutiable Value ir	FirmType-HS8 Dutiable Value ir	FirmType-HS8- Source Country Dutiable Value ir	FirmType-HS8- Source Country Dutiable Value ir	HS8 Product- Firm(loc/type) Dutiable Value ir	HS8 Product- Firm(loc/type) Dutiable Value ir
	1997-2009	2001-2009	1997-2009	2001-2009	1997-2009	2001-2009
Policy Variable						
Joint Venture* [Tariff Policy in Effect]	0.2714 (0.1917)	.2611 (.2140)	0.0014 (0.0390)	-0.2032*** (.0236)	-0.0262 (0.0445)	-0.0119 (0.0508)
Firm Group FE	Yes	Yes	Yes	Yes	No	No
Firm Group Time Trends	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Panel Variable (rho)	HS8 Product (.640)	HS8 Product (.718)	HS8 Product- Firm Group (.794)	HS8 Product- Firm Group (.794)	HS8 Product- Firm (.9998)	HS8 Product- Firm (.9999)
R^2	.2065	.1061	.0773	.0773	.0000	.0004
Observations	6,607	4,913	85,774	71,120	193,467	155,033

Notes: Standard errors in parentheses. * p<0.05, ** p<0.01, *** p<0.001

Table 4: Post Policy Changes in Import Prices by Firm Type

	Dependent Variable			
	(1)	(2)	(3)	(4)
	Ln(Price)	Ln(Price)	Ln(Price)	Ln(Price)
Policy Variable	[2004]	[2005]	[2004]	[2005]
JV*[Policy in Effect]	-.2262*** (0.0553)	-.1807*** (0.0576)	-.2386*** (0.0597)	-.2285*** (0.0619)
Foreign*[Policy in Effect]			-.3054*** (0.0587)	-.2560*** (0.0610)
Firm Type				
Joint Venture	0.1133*** (0.0402)	0.0080** (0.0383)	0.1459*** (0.0410)	0.1058** (0.0389)
Foreign	-0.3159*** (0.0336)	-0.3154*** (0.0337)	-0.2148*** (0.0421)	-0.2367*** (0.0398)
Private	-0.2021*** (0.0344)	-0.2006*** (0.0344)	-0.2074*** (0.0343)	-0.2048*** (0.0344)
Year FE	Yes	Yes	Yes	Yes
Panel Variable (rho)	HS8-Product (.875)	HS8-Product (.875)	HS8-Product (.875)	HS8-Product (.875)
R^2	.0232	.0223	.0237	.0278
Observations	6,909	6,909	6,909	6,909

Notes: Standard errors in parentheses. * p<0.05, ** p<0.01, *** p<0.001. Dependent variable: price of imported parts measured at the HS8-Firmgroup-Year level.

Table 5A: Post Policy Changes in Import Prices by Firm Type and Import Source Country

	Dependent Variable			
	(1)	(2)	(3)	(4)
	Ln(Price)	Ln(Price)	Ln(Price)	Ln(Price)
Policy Variable	[2004]	[2005]	[2004]	[2005]
JV*[Policy in Effect]	-0.1331*** (0.0256)	-0.1474*** (0.0194)	-0.1342*** (0.0269)	-0.1473*** (0.0271)
Foreign*[Policy in Effect]			-0.0039 (0.0297)	-0.0125 (0.0290)
HS6 Fixed Effects	Yes	Yes	Yes	Yes
Firmgroup FE	Yes	Yes	Yes	Yes
Panel Variable	Source Country-Year	Source Country-Year	Source Country-Year	Source Country-Year
R^2	.667	.667	.667	.667
Observations	73,519	73,519	73,519	73,519

Table 5B: Post Policy Changes in Import Prices by Firm Type and Import Source Country

	Dependent Variable			
	(1)	(2)	(3)	(4)
	Ln(Price)	Ln(Price)	Ln(Price)	Ln(Price)
Policy Variable	[2004]	[2005]	[2004]	[2005]
JV*[Policy in Effect]	-0.1282*** (0.0268)	-0.1422*** (0.0272)	-0.1389*** (0.0282)	-0.1492*** (0.0285)
Foreign*[Policy in Effect]			-0.0396 (0.0318)	-0.0247 (0.0310)
Year Fixed Effects	Yes	Yes	Yes	Yes
HS6 Product FE	Yes	Yes	Yes	Yes
Firmgroup FE	Yes	Yes	Yes	Yes
Panel Variable	Source Country-HS4	Source Country-HS4	Source Country-HS4	Source Country-HS4
R^2	.135	.135	.135	.135
Observations	73,518	73,518	73,518	73,518

Notes: Standard errors in parentheses. * p<0.05, ** p<0.01, *** p<0.001 Dependent variable: price of imported parts measured at the HS8-Country Origin-Firmgroup-Year level.

Table 6: Post Policy Changes in Import Prices by Firm-HS8

	Dependent Variable			
	(1)	(2)	(3)	(4)
	Ln(Price)	Ln(Price)	Ln(Price)	Ln(Price)
Policy Variable	[2004]	[2005]	[2004]	[2005]
JV*[Policy in Effect]	-0.2023*** (0.0239)	-0.1671*** (0.0242)	-0.2266*** (0.0249)	-0.1850*** (0.0253)
Foreign*[Policy in Effect]			-0.1070*** (0.0301)	-0.0729*** (0.0290)
HS6 Fixed Effects	Yes	Yes	Yes	Yes
Firmgroup FE	Yes	Yes	Yes	Yes
Panel Variable	Source Country-Year	Source Country-Year	Source Country-Year	Source Country-Year
R^2	.4255	.4260	.4243	.4260
Observations	135,811	135,811	135,811	135,811

Notes: Standard errors in parentheses. * p<0.05, ** p<0.01, *** p<0.001

Table 7: Post Policy Differences in Exit Probability by Firm Type

	Dependent Variable			
	(1)	(2)	(3)	(4)
	Pr(Exit)	Pr(Exit)	Pr(Exit)	Pr(Exit)
	2004-05	2004-06	2004-05	2004-06
2004 Transactions Value—[HS8/Firm Type/Province]	-0.2567*** (0.0358)	-0.3040*** (0.0462)	-0.3041*** (0.0517)	-0.2612*** (0.0549)
Firm Type				
Joint Venture	-0.1141** (0.0584)	-0.1183** (0.0482)	-0.0281 (0.0553)	0.0016 (0.0605)
Foreign	-0.1969*** (0.0683)	-0.2020*** (0.0561)	0.0048 (0.0048)	0.0608 (0.0723)
Private	-0.3449*** (0.0617)	-0.2772*** (0.0502)	-0.2616*** (0.0568)	-0.2617*** (0.0627)
Province FE	Yes	Yes	Yes	Yes
HS6 Product FE	No	No	Yes	Yes
Log Likelihood	-1912	-2957	-2334	-1999
Observations	7,304	7,304	7,182	7,007

Notes: Probit regressions. Standard errors in parentheses. * p<0.05, ** p<0.01, *** p<0.001

Table 8: Post Policy Differences in Entry Probability by Firm Type

	Dependent Variable			
	(1)	(2)	(3)	(4)
	Pr(Entry)	Pr(Entry)	Pr(Entry)	Pr(Entry)
	2004-05	2004-06	2003-05	2003-06
Firm Type				
Joint Venture	0.2769**	0.1495***	0.2838***	0.1786***
	(0.0502)	(0.0457)	(0.0474)	(0.0452)
Foreign	0.5852***	0.5186***	0.6274***	0.5815***
	(0.0549)	(0.0486)	(0.0522)	(0.0485)
Private	0.4935***	0.4009***	0.8221***	0.6802***
	(0.0484)	(0.0444)	(0.0469)	(0.0449)
Province FE	Yes	Yes	Yes	Yes
HS6 Product FE	Yes	Yes	Yes	Yes
Log Likelihood	-1912	-2957	-2334	-1999
Observations	7,385	7,854	7,361	7,818

Notes: Probit regressions. Standard errors in parentheses. * $p<0.05$, ** $p<0.01$, *** $p<0.001$

Data Appendix

HS6 Products and Product Name:
401110 car tires; 410711 leather upholstery; 570292 auto carpet; 700711 auto toughened glass;700721 auto safety glass; 700910 auto mirror; 840732 small engine; 840733 medium engine; 840734 large engine; 840820 diesel engine; 840991 auto engine parts; 840999 carburetor; 842131 auto air filter; 842139 catalytic converter; 848310 "camshaft, crankshaft"; 848320 bearings; 848340 torque converters; 848350 "flywheels, pulleys"; 848410 gaskets; 850110 gauges; 851110 spark plugs; 851120 magnetos; 851130 engine coils; 851140 engine starters; 851190 points; 851240 wipers, defrosters"; 851290 head and tail lamps; 852729 auto radios; 854110 auto bulbs; 854430 ignition wiring; 870810 bumpers; 870821 seat belts; 870829 other body parts; 870831 brake linings; 870839 other brake parts; 870840 gear boxes; 870850 drive axels; 870860 non-driving axles; 870870 road wheels and parts; 870880 suspension systems; 870891 radiators and parts; 870892 mufflers and exhaust parts; 870893 clutches and parts; 870894 "steering wheels, steering columns, steering boxes"; 870899 "other including engine sensors, u joints"; 902910 speedo tach; 940120 auto seats and parts; 940190 auto seats and parts; 870600 "Chassis fitted with engines, for the motor vehicles of headings 8703"; 870010 "Bodies (including cabs), for the motor vehicles of headings 8703"; 870830 Brakes and servo-brakes; parts thereof; 870895 Safety airbags with inflater system; parts thereof.

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