Market Structure, Imperfect Tariff Pass-Through, and Household Welfare in Urban China[*]

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Abstract

This paper investigates the Chinese tariff pass-through mechanism. We estimate how market structure, specifically the size of the private sector, affects the transmission of prices from the border to consumers by using household survey data from urban China. Our results suggest that changes in trade policy are not perfectly transmitted to the consumers and imperfections in the local market partially isolate households from the effects of trade policies. Incorporating the price changes of tradable and nontradable goods, we investigate how trade liberalization affects household welfare through changes in the cost of consumption. Our results show that trade liberalization, particularly China's WTO accession, brings welfare gains to almost every household across the per capita expenditure spectrum, and that the distributional effect is strongly pro-poor.

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1. Introduction

Trade liberalization along the border could affect households and individuals through two main channels. First, in the income channel, trade policies affect household welfare through wages and employment, and second, in the consumption channel, trade policies affect household welfare through the prices of goods consumed by the household (United Nations, 2012). Although income effect has been intensively explored in the literature (i.e., Goldberg and Pavcnik, 2003; Zhu and Trefler, 2005; Hanson, 2007; Verhoogen, 2008; Topalova, 2010; Han, Liu and Zhang, 2012), consumption effect of trade liberalization through price changes is understudied.[1]

Recent studies have suggested, however, that price effect might be essential in estimating the welfare gains of trade. Broda and Weinstein (2008) and Broda, Leibtag, and Weinstein (2009) show that, contrary to common beliefs, adjusting income and poverty measures to account for prices paid by each individual, reveals that Americans in every income group are substantially better off than they were before. Faber (2012) finds that access to cheap US inputs reduces the relative price of higher quality products, and thus, leads to a significant increase in Mexican real income inequality. The current paper contributes to the literature by using Chinese urban household survey data to study empirically the welfare gains of trade liberalization through changes in consumer prices.

Reductions in import tariff rates may reduce domestic prices, and improve consumer welfare if markets can transmit the price changes from the border to consumers. However, imperfections in the market mechanism often lead to imperfect pass-through rates. Whether or not a household benefits from trade liberalization depends on the structure and the efficiency of

[1] The literature has examined the impact of trade liberalization on labor income (Hanson, 2007), on wage inequality, (Han, Liu, and Zhang; 2012; Helpman, Itskhoki, Muendler and Redding, 2013; Verhoogen, 2008; Zhu and Trefler; 2005), on poverty (Hasan et al. 2007; McCaig, 2011; Topalova, 2010), and on employment (Goldberg and Pavcnik, 2003). See Winters, McCulloch and McKay (2004) and Goldberg and Pavcnik (2007) for surveys of the literature.

the product market in which the consumption goods are being produced and sold. The literature on tariff pass-through focuses on trade costs related to the geographic characteristics of localities, such as the distance to the border (Nicita, 2009; Atkin and Donaldson, 2012), or the relative isolation of markets in rural versus urban settings (Ural Marchand, 2012). This paper contributes to the literature by offering novel evidence on the role of market structure, specifically the size of the private sector, in the domestic economy, that determines the tariff pass-through.

If domestic industries are imperfectly competitive, changes in tariffs may be absorbed by profit margins or markups (Campa and Goldberg, 2002). In this case, prices may not decrease to reflect the full extent of tariff reductions, even in the absence of other frictions in the market. Atkin and Donaldson (2012) have further shown how the market power of intermediaries in domestic industries affects the mark-ups and hence results in different rates of tariff pass-through within sub-Saharan Africa. In the case of China, a more relevant market imperfection is the share of state-owned enterprises (SOEs) in the domestic industries. A heavily regulated domestic industry that is dominated by the state would have limited flexibility to adjust to the changing cost conditions (Szamosszegi and Kyle, 2011). In contrast, a rising private sector has created markets and accelerated competition in China (Naughton, 1994; Jin and Qian, 1998; Park, Li, and Tse, 2006). This should improve the ability of domestic markets to transfer the tariff reductions to consumers.

The substantial Chinese trade liberalization, accompanied by the reform of SOEs, provides a unique setting to analyze the role of private sector in the tariff pass-through, and to assess the welfare gains of trade liberalization through price changes. First, China has been consistently opening its economy since the early 1990s, as exemplified by its World Trade Organization (WTO) accession in 2001. Figure 1 presents the trends in the average tariff rates for

major tradable goods in China, namely, Food and Beverage, Clothing and Household Equipment. Each category has experienced profound tariff cuts from 1992 to 2008. Particularly, the average tariff cut due to WTO accession was 38% from 2000 to 2002. Second, China has been transforming from a centrally-planned into a market-oriented economy since the early 1990s (Fan and Wei, 2006; Han, 2006; Brandt and Rawski, 2008). A unique feature of the transition process in China is the reallocation of resources from SOEs to enterprises outside the state sector (Brandt, Hsieh and Zhu, 2008). The relative size of the private sector in urban China has increased from 24% in 1992 to 50% in 2008 (see Figure 2). This paper contributes to the literature by studying how the substantial tariff reductions affect households through price changes, and more importantly, how the tariff reductions interact with the expansion of the private sector.

The empirical approach in this paper is based on the methodology used in Deaton (1989), Porto (2006), Nicita (2009), and Ural Marchand (2012). This paper first investigates the Chinese tariff pass-through mechanism and estimates how market structure (specifically the share of the private sector) affects the transmission of prices of tradable goods from border to consumer by using urban household survey data. Second, nonradable services have gradually become an important part of the household consumption basket in urban China. Hence, this paper incorporates nontradable services into our welfare analysis by estimating how the prices of nontradables respond to the price changes of tradables in general equilibrium. Finally, the paper uses household survey data to estimate the welfare effects on each household according to the importance of these tradable and nontradable goods in their consumption basket. The paper further investigates the distribution of these welfare estimates across the expenditure spectrum to assess whether the trade reforms in China have been regressive or progressive.

Our results suggest that reductions in tariffs are not perfectly transmitted to consumer prices. The pass-through rate is found to be higher in cities with a higher share of the private sector. A 10 percent increase in the size of the private sector is associated with 4.1 percent higher tariff pass-through. A city with an average size of the private sector has an approximate tariff pass-through rate of 35 percent. In comparison, a city in which all enterprises are state-owned has a tariff pass-through rate of only 16 percent. When the differences of market structure across cities are considered, the results show that tariff pass-through rates vary substantially across Chinese cities, ranging from 18 to 47 percent. The estimates for these elasticities are relatively lower in inland cities, and for relatively homogenous goods, such as Food and Beverages. Our results also suggest that changes in traded good prices do influence the prices of some nontraded services such as Health, Transportation and Housing, but to a limited extent.

Even with the relatively restrictive price transmission, we show that China's accession to the WTO has a pro-poor impact on household welfare. The poorest households at the left end of the distribution experience a 15 percent gain in their welfare relative to their initial expenditure levels. This effect monotonically decreases along the per capita expenditure distribution until it is insignificantly different than zero for the better-off households at the right end of the distribution. In addition, households are affected mainly through the prices of traded goods, rather than nontraded services, because nontraded prices are not substantially affected and the expenditure shares of these services are relatively low.

The paper is organized as follows. In Section 2, we discuss the literature and outline the empirical methodology. In Section 3, we provide empirical evidence on the role of market structure in tariff pass-through. In Section 4, we estimate the price elasticities of nontradable

goods. In Section 5, we assess the consumption effects of trade liberalization in urban China. Section 6 concludes the paper.

2. Literature and methodology

In most countries, changes in trade policy are not fully reflected in domestic consumer prices. The literature has emphasized imperfect competition among foreign exporters, and a tariff-induced change in a country's terms of trade as the major reasons for tariff pass-through rates that are less than unity (Feenstra, 1989 and 1995). However, there are only a few papers in the literature that have studied how domestic factors affect the pass-through of tariff rates. These studies focus on the role of trade costs, particularly the distance of households from the border or nearest port (Nicita, 2009; Atkin and Donaldson, 2012), and the relative isolation of households from functioning product markets in rural versus urban areas (Ural Marchand, 2012).

These papers document how trade policy influences households varies greatly across different regions, even though tariffs are reduced at the national level. Nicita (2009) finds that tariff pass-through was significantly higher in the Mexican states closest to the United States border, and thus households living in these states benefited relatively more from the reductions in tariffs. Atkin and Donaldson (2012) find that intra-national trade costs in Africa are extremely high, which leads to welfare loss for isolated locations. Pass-through estimates in India also suggest that reductions in tariffs increased domestic consumer welfare more in states that are closer to major ports and in urban areas (Ural Marchand, 2012). However, there are no studies that investigate the role of market structure in the domestic market. The current paper contributes to the literature by estimating how the change in market structure, specifically the changing size of the private sector, influences tariff pass-through.

In general, the theory of tariff pass-though is based on an extensive literature that investigates the extent to which movements in exchange rates affect import prices of goods. The profit maximization of a monopolist exporter implies that there is a symmetric response of import prices to changes in exchange rates and changes in tariffs (Feenstra, 1989), and thus exchange rate pass-through estimates have implications for trade policy (see Goldberg and Knetter (1997) for literature review). Most of the literature find incomplete pass-through, suggesting that there are mechanisms that make domestic prices less volatile than exchange rates. In OECD countries, the pass-through has been estimated as 46 percent in the short run, while country-specific estimates vary significantly (Campa and Goldberg, 2005).

The exchange rate pass-through literature provides various theories on the role of market structure. Studies that use Cournot oligopoly pricing conclude that the market power of foreign firms in the domestic industry results in an exchange rate pass-through that is less than unity. Bernhofen and Xu (2000) derive a pricing equation using a homogenous product imperfect competition model to estimate the link between market structure and exchange rate pass-through. They conclude that firms that exercise significant market power results in an imperfect exchange rate pass-through onto domestic prices. Other studies have focused on the market power of domestic firms and examined its implications for exchange rate pass-through. Lee (1997) investigates the exchange rate pass-through to import prices in Korea, and finds that the domestic market concentration of each industry reduces the pass-through rate.

Most recent literature that estimate the effect of a price change on household welfare uses the approach developed by Deaton (1989). In this framework, the welfare gain is estimated as the negative compensating variation, i.e. the negative of the amount the household would need to maintain their welfare level prior to the policy change. A major advantage of this framework is

the ability to maintain heterogeneity across households in terms of their consumption baskets and locations, which allows us to investigate the factors that enhance or mitigate the welfare impacts of the trade policy. Porto (2006) extends Deaton's framework to study the welfare impact of Mercosur free-trade zone on Argentinian households. He concludes that households do not significantly benefit from a reduction in cost of consumption, but rather from an increase in their wage incomes. Other studies that incorporate imperfect tariff pass-through (Nicita 2009; Ural Marchand 2012), and linkages between production and consumption decisions by households (Seshan, 2005) show that trade liberalization generally increases real incomes of households and reduces poverty rates.

In this paper, we apply this methodology to estimate the effect of trade liberalization on household welfare in urban China. Specifically, we offer the first study that estimates the welfare gains through changes in consumer prices in urban China. First, we estimate the imperfect pass-through of tariff cuts on the prices of tradable goods, and provide new evidence on the role of local market structure. Second, we incorporate the nontradable goods into our welfare analysis by estimating how the prices of nontradable goods respond to the price changes of tradable goods. Last, we provide estimations on the consumption effects of tariff cuts in urban China. Detailed discussions on each step are presented in the following three sections.

3. Market structure and imperfect tariff pass-through

To understand the consumption effect of trade liberalization on Chinese households, we first explore how tariff cuts along the border are transmitted to domestic consumption prices. The standard framework to estimate the tariff pass-through is as follows (Feenstra, 1989; Porto, 2006; Nicita, 2009; and Ural Marchand, 2012):

$$lnp_{ict} = \alpha_0 + \alpha_1 \, ln(1 + \tau_{it}) + \alpha_3 P_{it}^{w} + \alpha_4 TC_{ct} + \delta_c + \gamma_t + \lambda_i t + \varepsilon_{ict} \quad (1)$$

where p_{ict} is the domestic consumer price of traded good i in city c at time t; τ_{it} is the ad-valorem tariff rate of good i and time t; P_{it}^{w} is the U.S. export price of good i at time t; and TC_{ct} is the trade costs in city c at time t. δ_c indicates city fixed effects that control for city-level shocks common to all commodities. γ_t indicates time fixed effects that control for the economy-wide shocks common to all cities and all commodities. $\lambda_i t$ represents commodity specific trends to account for changes that affect producer cost of each good, such as availability of imported inputs, reduced factor prices or improved technology. In this standard framework, α_1 is the coefficient for the average tariff pass-through elasticity, which is the same for all cities in urban China. α_1 is expected to be positive and less than 1, which indicates the imperfect pass-through that has been documented in the literature (Feenstra, 1989; Porto, 2006; Nicita, 2009; and Ural Marchand, 2012).

The current paper differs from the standard pass-through framework by estimating how the changes in the market structure at the city level affects the transmission of tariff cuts into local consumption prices. Specifically, we study the effect of the relative size of the private sector on the rate at which tariff reductions are transmitted to the consumers. This is a particularly important question for China as the country has been transforming from the centrally-planned economy to a market-oriented one since 1978 (Fan and Wei, 2006; Han, 2006; Brandt and Rawski, 2008). At the outset of reform in 1978, the state sector accounted for 80 percent of urban employment and 76 percent of industrial output (Brandt, Hsieh and Zhu, 2008). Along with the restructuring of the SOEs (particularly after 1997 when the 15th Congress of the

Chinese Communist Party formally sanctioned ownership reforms of the state-owned firms and legalized the development of private enterprises), the share of the SOEs has substantially decreased. Meanwhile, the share of domestic private enterprises and foreign-invested enterprises has increased substantially. The share of total urban employment in private domestic and foreign enterprises increased from 8 to 24 percent between 1998 and 2007 (Zhu, 2012).

The link between the private sector share and market competition has often been proposed in the literature. Naughton (1994) finds that the entry of non-state-owned industrial firms plays a crucial role in China's reform process by creating markets and competition. Jin and Qian (1998) analyze the public and private firms in the rural area. They find that the proportion of public firms (township-village enterprises, or TVEs) to private enterprises is higher when the influence of the central government is larger, the community government power is stronger, and the level of market development is more delayed. Park, Li, and Tse (2006) regard the decentralization of government control and ownership restructuring as important institutional changes to implement market liberalization in China.

As privatization moves the economy towards a relatively more competitive equilibrium, the ability of domestic markets to translate the tariff reductions to the consumers should improve. In this case, the market share of private firms is expected to increase the pass-through rate. In China, the transition towards a more competitive market-oriented economy did not occur uniformly across the country. There was substantial variation across regions due to the different degrees of reform implementation. The privatization rates, for example, varied between 8.1% in Guizhou and 42.2% in Jiangsu during 1999 to 2004 (Bai, Lu and Tao, 2009). This finding motivates our approach of incorporating across-city variation to assess the impact of tariff reductions on domestic prices.

Let κ_{ct} define the fraction of the private sector in each city c at time t. Given our interest in the pass-through coefficients and how κ_{ct} affects these pass-through coefficients, we interact κ_{ct} with tariff rates. Thus, our estimating equation is as follows:

$$lnp_{ict} = \alpha_0 + \alpha_1 ln(1+\tau_{it}) + \alpha_2(\kappa_{ct} * ln(1+\tau_{it})) + \alpha_3 P_{it}^{w} + \alpha_4 TC_{ct} + \alpha_5 \kappa_{ct} + \delta_c + \gamma_t + \lambda_i t + \varepsilon_{ict} \quad (2)$$

The estimated pass-through elasticity is:

$$\frac{\partial \ln(p_{ict})}{\partial \ln(1+\tau_{it})} = \hat{\alpha}_1 + \hat{\alpha}_2 \kappa_{ct} \quad (3)$$

where a positive $\hat{\alpha}_2$ indicates that the higher share of the private sector will enhance the degree of pass-through at the local level. The more privatized the local market, the larger the elasticity of tariff pass-through.

Similar to previous studies (Porto, 2006; Nicita, 2009; and Ural Marchand, 2012), domestic price levels are computed from household surveys. Specifically, domestic consumer prices are calculated as the unit values using the Chinese Urban Household Survey (UHS).[2] In the UHS, respondents were asked to provide information about expenditures and quantities of

[2] We use the data from the Chinese UHS to create measures of household consumption price. The surveys are conducted by the Urban Survey Organization of the National Bureau of Statistics of China (NBS). The data provide detailed information on the consumption patterns of households. The sample of households in UHS is drawn through stratified random sampling to ensure the representativeness of the households in urban China. We obtained the household survey data for five provinces (namely, Liaoning, Guangdong, Shaanxi, Sichuan, and Zhejiang) and one municipality (Beijing) between 1992 and 2008 from the NBS. The six provinces/municipalities included in our analysis are representative of China's different regions. Beijing is a rapidly growing municipality in North-Central China, while Guangdong and Zhejiang are dynamic economic provinces in the southern coastal region. Liaoning is a northeast province with numerous industries. Shaanxi and Sichuan are less developed provinces in the northwest and southwest of China, respectively.

more than 50 commodities, among which 35 can be matched into 4-digit Standard International Trade Classification (SITC) codes in the tariff data. We use the ratio of expenditure to quantity to measure the unit price for each commodity consumed by each household. Then, we use the city-level averages of these unit prices as the dependent variable in our pass-through regression (2). An important advantage of our specification is to exploit a large variation of the unit prices of 35 tradable goods across cities and years to identify tariff pass-through elasticity.

Chinese tariff reduction since the 1990s is part of a broad set of external reforms culminating in WTO accession (Branstetter and Lardy, 2008; Brandt and Morrow, 2013). The tariff reduction thus provides us exogenous variations to estimate the pass-through rate. Tariff data are obtained from the World Integrated Trade Solution (WITS) by 4-digit SITC categories. We hand-matched each 4-digit SITC good category to each category of tradable household consumption good in the UHS data. Details of this match are provided in Appendix Table 1. In the concordance, we have 224 SITC categories matched to 35 consumer goods. When one consumption good is matched to multiple SITC categories, the weighted-average tariff rates are used in which the weights are the amount of imports in each industry. For world prices, we use U.S. export unit values for each 4-digit SITC categories provided by the USITC.[3] These unit values are then matched to the categories of consumer goods in the UHS data with the same procedure as the tariff rates.

We use the relative size of the private sector to capture the change of the market structure in Chinese cities. This information is readily available in the UHS data. Based on each

[3] Although U.S. export prices are widely used as a proxy for world prices, a number of studies directly use world prices if the U.S. is not a major trading partner (Ural Marchand, 2012). We use the U.S. export prices for two reasons. First, after trade liberalization, China started to trade heavily in manufactured products. However, WTO world prices are available mostly for primary products. A disproportionate representation of primary products may lead to biased estimates. Second, the U.S. is the largest trading partner of China, and thus, its export prices are most relevant for Chinese trade. The United States International Trade Commission (USITC)'s FAS Value/First Unit Quantity definition is used as the world price.

individual's working status, we calculate the proportion of workers in foreign or privately-owned enterprises, which can be used to evaluate the relative size of the private sector in each city.[4] Figure 2 presents the variation of this measure across cities and years, with the fitted line indicating the average city-level shares for each year. The figure shows that while the private sector only comprised 22 percent of the economy in 1992, it constituted a significant part (nearly 50 percent) of the economy in 2008. The relative size of the private sector also varies considerably across cities in our sample. These variations provide sources of identification to estimate the geographical heterogeneity of tariff pass-through within China.

Table 1 presents the benchmark results of the pass-through regression (1) and (2). For each regression, we report two specifications. In columns (1) and (2), we use city fixed effects to control for any city-specific factors that might affect consumer prices, and city-level GDP to control for any time variant demand and cost factors at the city level. In columns (3) and (4), we use city-year fixed effects to control for any time variant factors at the city level that might affect consumer prices.[5] First, we find consistent evidence that tariff pass-through is imperfect. The estimated average elasticity is 0.31, indicating that a 10 percent reduction in tariffs reduce consumer prices by 3.1 percent. Second, and more importantly, we find that the transmission of tariff reduction depends significantly on the relative size of the private sector at the city level. The estimated coefficient of the interaction term between the tariff cut and the size of the private sector is significantly positive. A 10 percent increase in the size of the private sector is associated

[4] Brandt, Hsieh and Zhu (2008) and Zhu (2012) use the share of urban employment in domestic private enterprises and foreign-invested enterprises to capture the transition of Chinese economy from central-planning to market orientation.

[5] In the reported specifications, we use city-year fixed effects to control for any city-year level demand and cost factors that might influence consumer prices. In several robustness tests, we use specific city-year level variables such as distance, square meters of paved road, and telephone availability to control trade costs at the city level directly. Such choice does not change the estimated coefficients of the tariff pass-through variables. However, we believe that using city-year fixed effects provide more stringent controls for other city-year level factors that might affect local consumer prices.

with 4.1 percent higher tariff pass-through. A city that has an average sized private sector has an approximate tariff pass-through rate of 35 percent.[6] By contrast, a city in which all enterprises are state-owned has a tariff pass-through rate of only 16 percent. Finally, the city-level pass-through rates and their standard deviations are presented in the first two columns of Table 6. Due to the differences in the degree of privatization, tariff pass-through rates in our sample vary substantially across cities, ranging from 18 percent to 47 percent.[7]

Our estimated pass-through elasticity is lower than those estimated for developed countries, but within the range of those estimated for developing countries. For example, Campa and Goldberg (2002) find that the magnitude of pass-through varies from 40 percent in the U.S. to 70 percent in Germany. Nicita (2009) finds that the pass-through in Mexico is about 33 percent for agricultural products and about 27 percent for manufacturing. Ural Marchand (2012) finds that consumers in urban India are affected by tariff reductions with a pass-through elasticity that ranges from 64 to 68 percent. Our findings confirm that tariff pass-through elasticity varies considerably within a country. In particular, the degree of pass-through in urban China is affected by the degree of privatization at the local level.

Although we control for city fixed effects or city-year fixed effects in the regressions, structural differences (such as trade costs) may exist between coastal and inland cities. Table 2 presents the results for coastal cities that are within 500 km from the nearest port, and inland cities that are beyond 500 km from the nearest port. Surprisingly, the pass-through coefficients turn out to be smaller for coastal cities, without considering the market structure effect. This result indicates that trade costs alone cannot fully explain the regional differences in tariff pass-

[6] In 2006, the average share of private sector employment is 45%. Given that the data on the share of private sector employment in 2006 cover more cities (the data for 2008 have more missing values), we opt to use the 2006 data as the baseline to calculate the magnitude of the estimates.

[7] The coefficients of the control variables suggest that the domestic consumer prices of traded goods are negatively correlated to the size of the private sector, and positively correlated to world prices.

through. If trade costs work as expected from the theory, the tariff pass-through should be larger in coastal cities than in inland cities (Atkin and Donaldson, 2012). This observation motivates us to consider further the impact of the local market structure. Once the size of the private sector is added to the regressions, we find that the coefficients of their interaction terms are both significantly positive for coastal and inland cities. More importantly, the interaction coefficient for coastal cities is significantly larger than that for inland cities. This shows that the responsiveness of consumer prices in coastal cities to tariff cuts is largely driven by the local privatization of the product market.

Moreover, there may be differences in pass-through elasticities across different industries as shown by Nicita (2009). We thus run regressions (1) and (2) separately for three major categories of tradable goods: Food and Beverages, Clothing, and Household Equipment. The results are presented in Table 3. Without considering the local market competition, the estimated pass-through elasticities were 18 percent for Food and Beverages, 129 percent for Clothing, and 61 percent for Household Equipment. This indicates that the consumer prices in the manufacturing sector were more responsive to changes in tariff rates. The coefficients of the interaction terms between tariff cuts and the size of the private sector are positive for Food and Beverages and Household Equipment, but not robustly estimated for Clothing. This indicates that the size of the private sector at the city level does increase the pass-through rate in Food and Beverage and Household Equipment sectors. Nicita (2009) finds that, while the pass-through of tariff cuts on manufacturing prices is different across Mexican regions, there are no regional differences of the pass-through on agricultural prices. Compared to his findings, our results show that there is indeed regional difference of the pass-through on the prices of both agricultural and some manufacturing goods due to the different sizes of the private sector across Chinese cities.

4. Price changes of nontradable goods

To evaluate the overall consumption effects of trade liberalization, we need to understand how the prices of nontradable goods respond to the price changes of tradable goods in general equilibrium. In this section, we estimate the following model to examine the general equilibrium effects on nontradable prices (Porto, 2006):

$$lnp_{jct} = \beta_0 + \sum_{i=1}^{T} \beta_{ij} lnp_{ict} + \gamma_t + \delta_c + \chi_c t + \varphi_{ct} \quad (4)$$

where p_{jct} is the price of nontradable good j at city c in year t, p_{ict} is the price of traded good i at city c in year t, γ_t represents the year fixed effects, δ_c is the city fixed effects, and $\chi_c t$ is the city-specific trend. This model is estimated for each of the nontradable goods j separately. β_{ij} thus indicates elasticity of nontraded price j to traded price i. In this paper, we offer two specifications to estimate these elasticities. Fist, we start with the above regression using price levels, in which we rely on the fixed effects and trend to control for any spurious correlations between the price of nontradable goods and that of tradable goods. However, fixed effects alone may not fully control for the time-series correlation between the price levels. Therefore, we estimate the above regression in first differences using Arellano-Bond estimation method to account for the dynamics of price adjustment (Arellano and Bond, 1991; Mileva, 2007).[8]

[8] Specifically, we use the Arellano-Bond difference GMM estimation method to estimate the following regression:

$$\Delta lnp_{jct} = \beta_0 + \beta_1 \Delta lnp_{jc,t-1} + \sum_{i=1}^{T} \beta_{ij} \Delta lnp_{ict} + \Delta\gamma_t + \chi_c \Delta t + \Delta\varphi_{ct}$$

Compared with Porto (2006), the main advantage of our estimation is to explore both time and city variations of price indices to estimate the price changes of non-tradable goods. We extract the Consumer Price Index (CPI) for various categories of tradable and non-tradable goods at the city level from various volumes of provincial statistical yearbooks. Specifically, we have price indices for three traded goods: Food and Beverage, Clothing, Household Equipment, and four nontraded goods: Housing, Transport and Communication, Health and Education. This classification of goods is determined solely by the availability of the price index data at the city level from the provincial statistical yearbooks.

Table 4 provides descriptive statistics of these price indices, averaged across cities for each year.[9] Note that the price data we use here are price indices (with the last year as reference year). On average, the overall price levels in urban China demonstrate an upward trend, which varies across different categories. Food and Housing prices increased by about 50% during the sample period from 1998 to 2008. Clothing and Household Appliances prices declined primarily because of the large production capacity of Chinese manufacturers. Health and Education price indices fluctuated but did not increase substantially, as the government exerted considerable efforts to subsidize these sectors. The decline in the price of Transport and Communication primarily arose from increased competition in telecommunication services (Loo, 2004).

Table 5 presents the estimation results in levels and first differences. Both specifications offer quite consistent estimations for price elasticities. The price of Health is negatively related to the price of Food and Beverages. Moreover, the price of Transport and Communications is negatively related to the price of

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We add the lagged log price of nontradable goods *j* to reflect the dynamic determination of the nontradable prices. Then, we use the lag 2 of Δlnp_{jct} and all the other covariates in the regression as instruments for $\Delta lnp_{jc,t-1}$ (Mileva, 2007).

[9] Note that the price indices data on tradable and nontradable goods at the city level are only available for 1998 to 2008. Thus, all our estimation in this section ares based on data for 1998 to 2008.

Household Equipment. The price of Housing responds positively to the price changes of Food and Beverages. However, evidence suggests that the Education prices do not respond significantly to the price changes of tradable goods.

As pointed out in Porto (2006), these elasticities reflect the complex responses of nontradable prices to tradable prices in general equilibrium. We offer one possible interpretation of these elasticities based on the classical trade theory, the Stolper-Samuelson Theorem (Dixit and Norman, 1980). That is, different sectors have different intensity in factor usage (such as skilled versus unskilled labor), and thus, the price of one good will affect the price of another good through the factor market. Assume that Food and Beverages are intensive in unskilled labor relative to Household Equipment. Similarly, suppose that Health, Transport and Communications, and Education are intensive in skilled labor relative to Housing. As such, increases in the relative prices of Food and Beverages would result in an increase in the relative wages of unskilled labor, and thus, a decrease in the price of Health and Transport and Communication but an increase in the price of Housing. Conversely, an increase in the price of Household Equipment would generate an increase in the relative wage of skilled workers and thus an increase in the price of Transport and Communication. Overall, our findings are consistent with the general predictions of the Stolper-Samuelson Theorem. Nevertheless, our main objective here is not to offer an empirical test of the theory. Instead our objective is to use these estimated elasticities of the prices of nontradable goods to offer a welfare analysis of the consumption effects of trade liberalization.

5. Estimating the consumption effects of trade liberalization

The empirical results in the previous sections provide us with tariff pass-through estimates for tradable goods and the price elasticities of nontradable goods with respect to the price of tradable goods. Next, we estimate the overall consumption effects of the tariff reductions due to trade liberalization. The consumption effect of the tariff cut for each household *h* in city *c* is computed as follows (Porto, 2006; Nicita, 2009; and Ural Marchand, 2012):

$$\widehat{W}_h = -\left(\sum_{i=1}^{T} Q_{ih} + \sum_{j=1}^{NT}\sum_{i=1}^{T} Q_{jh}\hat{\beta}_{ij}\right)(\hat{\alpha}_1 + \hat{\alpha}_2\bar{\kappa}_c)\, dln(1+\tau_i) \qquad (5)$$

where Q_{ih} and Q_{jh} are the expenditure shares of tradable goods i or non-tradable goods j for household h. $\hat{\alpha}_1$ and $\hat{\alpha}_2$ represent the estimated tariff pass-through elasticities from Equation (2). $\hat{\beta}_{ij}$ is the estimated price elasticities of non-tradable goods from Equation (4). $\bar{\kappa}_c$ is the relative size of the private sector in city c.[10] $dln(1+\tau_i)$ measures the tariff cut due to trade liberalization. In our baseline estimation, we utilize one single exogenous tariff cut due to China's accession into the WTO, i.e., tariff changes between 2000 and 2002. During this period, tariff cuts on tradable goods were approximately 38% on average.[11]

$\widehat{W}_h$ provides an estimate of the negative compensating variation as a percentage of initial expenditure. In other words, this estimate provides the negative of the amount household h must be compensated to maintain their welfare level prior to the policy change. A reduction in tariffs

[10] In the baseline results we use the share of private sector employment for each city in 2006 as the data from 2006 cover more cities (2008 data has more missing values). However, using data in other years or using average share of private sector does not change the main implications of our findings.

[11] We also experiment with different tariff reductions to estimate the total consumption effects on Chinese households. For example, we experiment with the tariff reduction between 1995 and 2002 because the Chinese government started to cut tariff to commit to the WTO standard in 1995 (Branstetter and Lardy, 2008). We also tried the overall tariff reduction between 1992 and 2008. These sensitivity analyses do not change our baseline findings except that we find an even larger consumption effect of tariff cuts on Chinese households.

presumably yields welfare gains, so that $\widehat{W}_h$ will be positive (provided that the pass-through coefficients are positive). The overall consumption effect given by Equation (5) can be decomposed into two parts, which are welfare changes due to the consumption of tradable goods, and welfare changes due to the consumption of nontradable goods. Households experience heterogeneous welfare effects that are caused by three factors: 1) households have different expenditure shares for each tradable and nontradable good; 2) each good experiences a different tariff reduction due to trade liberalization; and 3) these tariff reductions are transmitted differently to the domestic market depending on the extent of privatization in each city.

We use Chinese Urban Household Surveys to estimate the consumption effect of trade liberalization for each household. In these Surveys, each household is required to report the amount of expenditure on several categories of goods and services. In 2008, Chinese households spend an average of 47 percent on traded goods, which comprise 36 percent on Food and Beverage, 7 percent on Clothing, and 4 percent on Household Equipment. They spend about 22 percent on nontradable goods, which include 6 percent on Health, 3 percent on Transport and Communication, 4 percent on Education, and 9 percent on Housing. The consumption pattern in urban China is quite similar to other developing countries such as India and Mexico where households still spend a large portion of their income on food. However, this pattern is less similar to developed countries such as the U.S. where households spend only about 10 percent on food.

Furthermore, the consumption of nontradable goods has been growing, and becoming a non-negligible portion of the Chinese household expenditure. It is thus important to incorporate nontradable consumption in household welfare analysis. The overall pattern in the consumpation of tradable and nontradable goods is highly heterogeneous across households. Households at the

lower end of the per capita expenditure distribution tend to spend more on food and other tradable items. Alternately, households at the higher end of the distribution spend more on nontradable services such as health and education. We incorporate this heterogeneity in household consumption into our welfare analysis.

To estimate the distributional effects of trade liberalization through the consumption of tradable and nontradable goods, we estimate a series of nonparametric local linear regressions of the consumption effect across the log per capita expenditure.[12] In the regressions, we use the Epanechnikov kernel function. This method obtains a consistent estimator of the average consumption effect by using the information in the neighborhood around each evaluation point across the per capita expenditure distribution.

Figure 3 presents our findings, which show the total consumption effect (also decomposed into the consumption effects through tradable and nontradable goods) of WTO accession across the entire distribution of log per capita expenditure. We find that WTO accession generates welfare gains through the consumption channel for Chinese households almost across the entire distribution. In particular, we find that poorer households experience more welfare gains from tariff reduction than wealthier households. The average compensating variation for poor households can be as high as 12 percent of the initial expenditure, whereas for rich households the gains are around 2 percent. At the highest end of the expenditure distribution, the effect is not significantly different from zero. As poorer households spend a higher proportion of their income on tradable goods such as food, clothes and household appliances, the tariff reduction passes through to lower consumption costs of these products, which allows poorer households to benefit more from globalization. Overall, our finding indicates that the

[12] We also examine the distributional effects of trade liberalization along income percentiles. We find consistent evidence that trade liberalization is pro-poor through the consumption channel.

distributional effect of China's WTO accession is pro-poor, based on changes in the cost of consumption.

In addition, Figure 3 indicates that almost all welfare gains are driven by the direct impact of tariff cuts on the consumption of traded goods. The welfare effect through the consumption of nontradable goods is close to zero. There are two possible explanations for the small magnitude of the welfare effect through the consumption of nontradable services. First, the expenditure shares of these goods are still small even though it has been increasing significantly since the early 1990s. Second, the prices of nontradables, particularly Education, are not very responsive to the changes in tradable prices as shown in Section 4. This could be due to government regulations in non-tradable sectors, such as Education (Mok, 2005).

Our paper extends the findings from the existing literature on other developing countries. Porto (2006) provides evidence on the pro-poor consumption effects on the tradable goods for Argentinian households. However, he finds pro-rich consumption effects on nontradable goods. Nicita (2009) finds overall pro-rich distributional effects although these effects are primarily driven by the income channel instead of the consumption channel. Ural Marchand (2012) finds pro-poor distributional effects through the consumption of tradable goods for rural and urban India. In the case of China, we provide the first evidence on the pro-poor distributional effect of trade liberalization through consumption of both tradable and nontradable goods.

In this paper, we focus on estimating the price effects of trade liberalization through consumption. We find that tariff cuts due to China's WTO accession has been partially transmitted to domestic consumption prices, and thus, benefits the average Chinese household, particularly the poor. Other papers in the literature have focused on examining how trade liberalization affects individuals/households through the income channel, such as wage and wage

inequality (i.e., Zhu and Trefler, 2005; Goldberg and Pavcnik, 2007; Verhoogen, 2008; Topalova, 2010; and Han, Liu and Zhang, 2012). For example, Han, Liu and Zhang (2012) find that China's WTO accession increases wage inequality in urban China. Our findings complement these previous findings to illustrate a more complex picture of the distributional impact of trade liberalization. They indicate that trade liberalization can potentially affect household welfare through different channels, and that the distributional effect of globalization may vary across these channels.

We next present evidence on the heterogenous welfare gains across different Chinese cities. Table 6 presents the calculated average consumption gains for each city based on Equation (5). To examine the sources of the total consumption gains, we present the city-level tariff pass-through elasticities, average expenditure shares and average consumption effects for both tradable and nontradable goods. Consistent with the findings shown in Figure 3, all welfare gains are positive for all cities in the sample. On average, the total welfare gain due to China's accession into WTO is approximately 8 percent. More importantly, these welfare gains are distributed unevenly across cities. To summarize the geographical distribution of the welfare gain, we classify these cities in our sample into two groups: coastal cities (i.e., cities located within 500 km from the nearest port) and inland cities (i.e., cities located beyond 500 km from the nearest port). We find that households in coastal cities gain more from the WTO accession compared with households in inland cities. Higher welfare gains for coastal cities are largely driven by the higher tariff pass-through ratios in coastal cities relative to inland cities, and not by the different consumption patterns between coastal and inland cities.

Our findings on the geographical variation of tariff pass-through and welfare gains confirm and extend the findings in the previous literature. For example, Nicita (2009) shows that

the pass-through rates of tariffs and welfare gains increase as Mexican households live closer to the US-Mexico border. Atkin and Donaldson (2012) find that the costs of intranational trade are extremely high in remote locations in Africa, and high trade costs reduce the consumer surplus in isolated locations. Ural Marchand (2012) finds that the transmission elasticities and welfare gains are higher in urban areas than that in rural areas. In this paper, we provide new evidence that this geographical variation can be driven not only by distance but also by the market structure of the local economy. This highlights that, in understanding the imperfections in the price transmission mechanism, the structure of the local economy may be as important as the geographical frictions that affect trade costs. In China, the coastal regions have higher pass-through rate (about 37 percent on average) due to the higher shares of foreign or privately-owned enterprises. Therefore, these coastal cities enjoy higher welfare gains due to the decrease in consumption prices. On the other hand, inland cities lack the market dynamics, and thus, have lower pass-through rate of tariff (about 29 percent on average). Therefore, these cities experience lower welfare gains through the consumption channel.

6. Conclusion

China's twin policies of liberalizing trade and reforming its state-owned enterprises enhance the level of competition and efficiency within the domestic economy. However, the existing literature has yet to study how tariff reductions affect households, and more importantly, how trade liberalization interacts with the growth of the private sector. This paper contributes to the literature by documenting that the increased share of private sector enhances the ability of markets to transmit tariff reductions onto domestic prices, and consequently, increases the extent by which households benefit from trade liberalization.

By allowing different pass-through elasticities across Chinese cities, this paper shows that domestic prices decrease more in cities with a higher share of the private sector. The average tariff pass-through elasticity is estimated to be quite small, around 16 percent, in a city in which all enterprises are state-owned. The tariff pass-through elasticity increases by 4 percentage points for each 10 percentage point increase in the share of the private sector. When the changes in the market structure across cities are considered, the increase in household welfare induced by the trade policy at the city level, varies between 15 and 37 percent. Furthermore, incorporating the price changes of tradable and nontradable goods, the paper shows that China's WTO accession has reduced the cost of consumption for all households. The distributional effect through this channel is highly pro-poor as low-expenditure households experienced the highest welfare gain due to tariff reductions.

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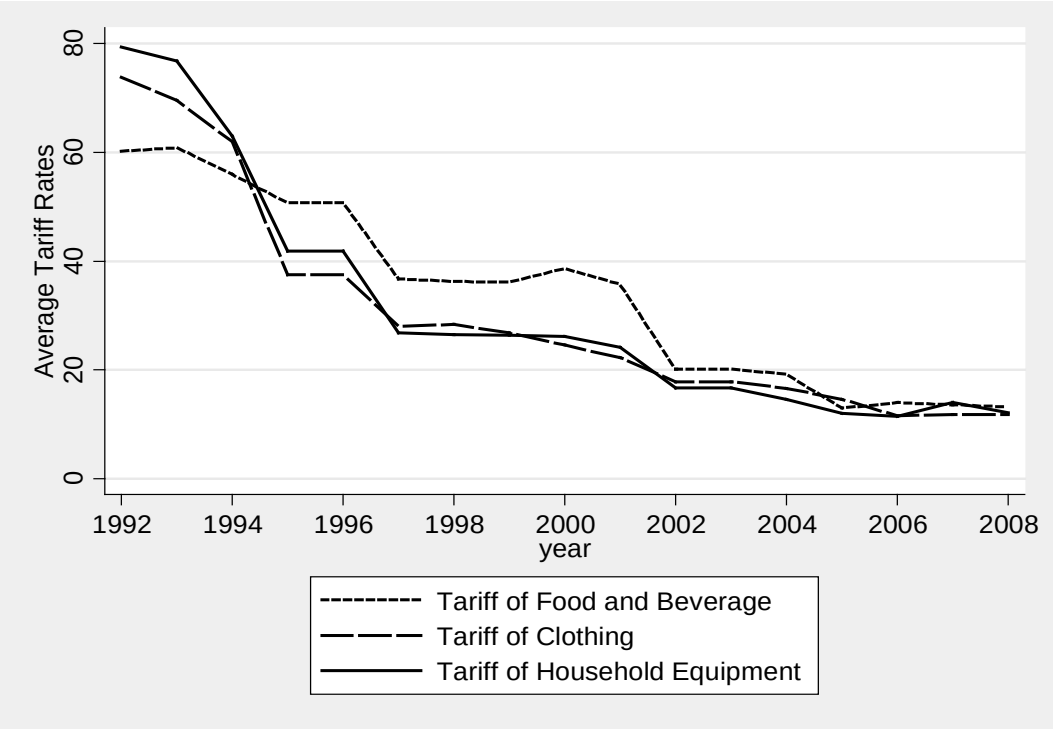
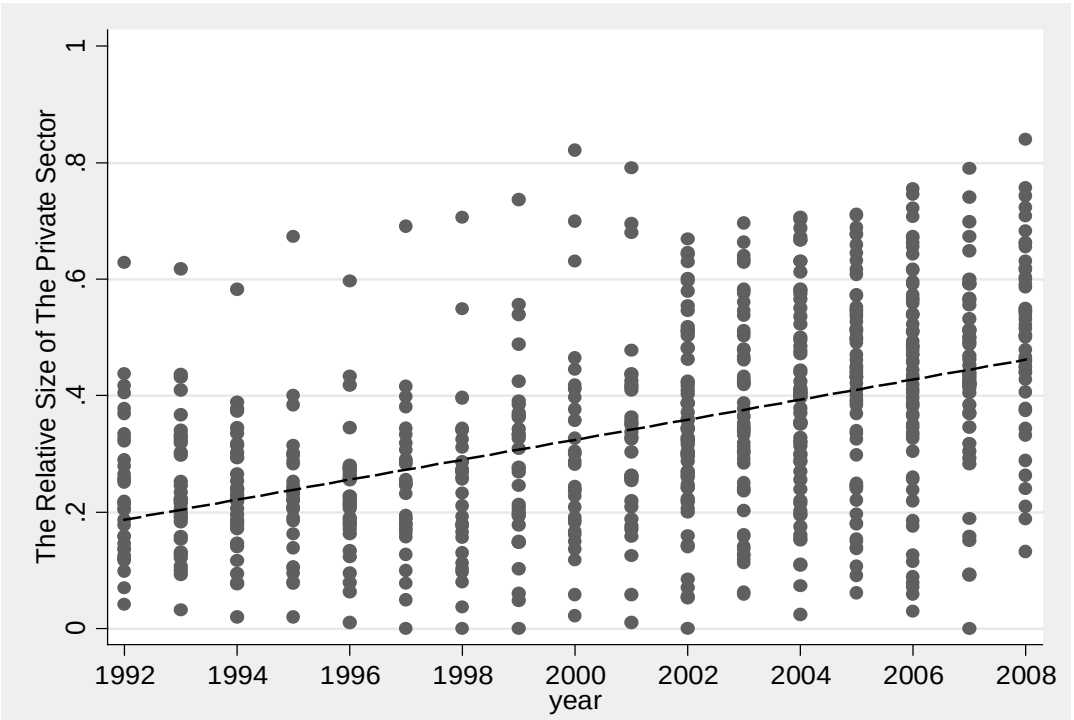
Figure 1: Average Tariff Rates for Major Tradable Goods



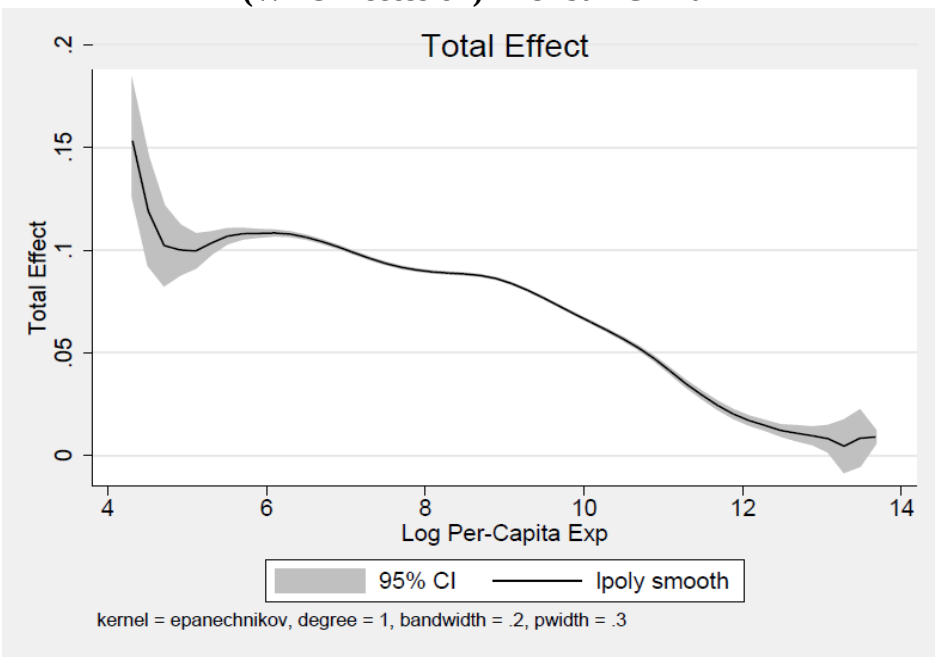
Notes: This figure presents the average Chinese effective tariff rates for three major tradable goods for years 1992-2008. Tariff rates at the 4-digit SITC level are extracted from WITS and then aggregated to the three major categories of tradable goods using the concordance provided in Appendix Table 1. Import values are used as the weight for the aggregation.

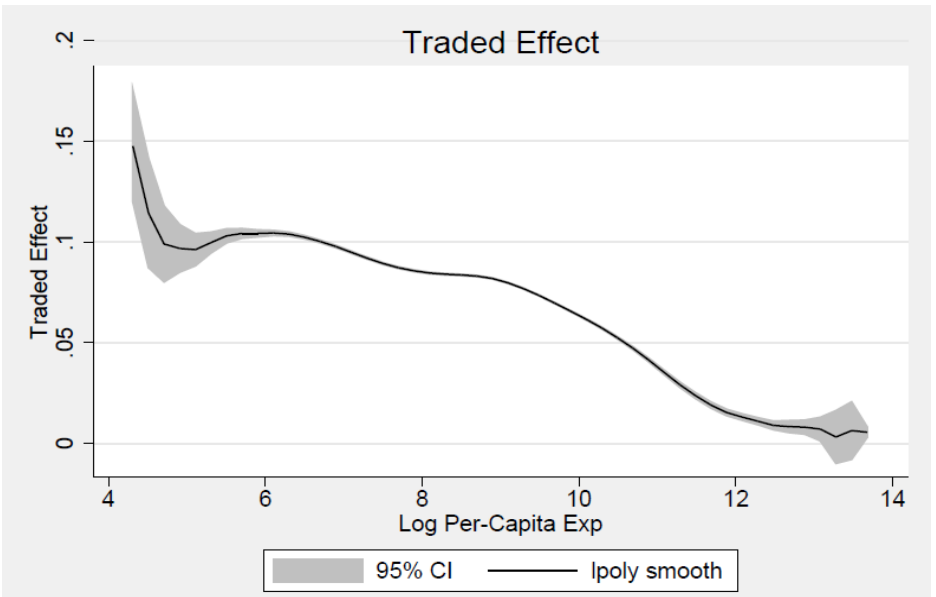
Figure 2: The Relative Size of The Private Sector in Chinese Cities 1992-2008



Notes: This figure presents the relative size of the private sector in urban China for years 1992-2008. The share of the private sector employment is calculated at the city-year level using the Chinese Urban Household Survey data.

Figure 3: The Consumption Effect of Trade Liberalization (WTO Accession) in Urban China





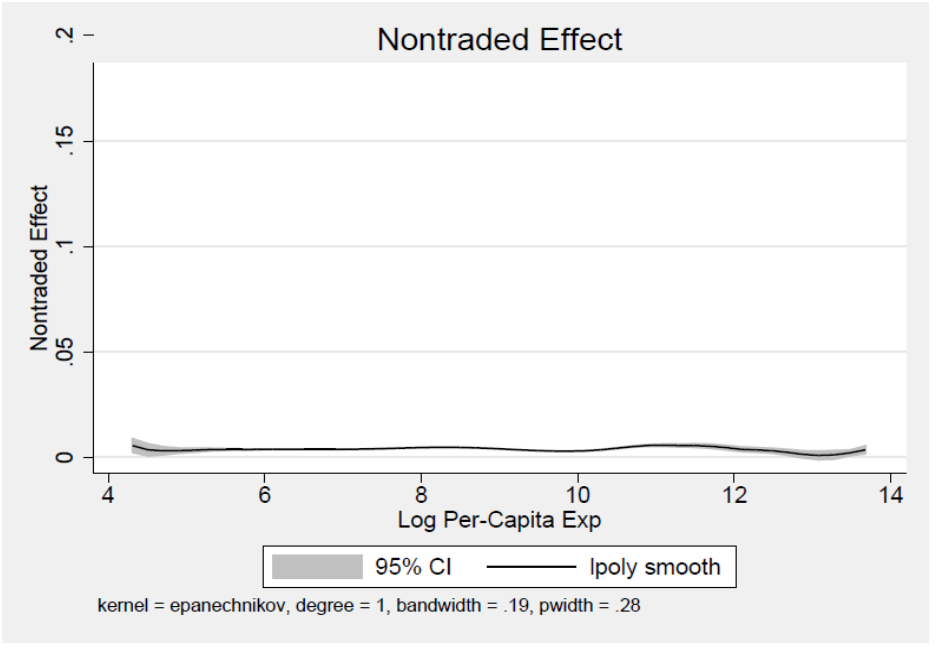


Table 1: Imperfect Tariff Pass-Through and the Size of the Private Sector

VARIABLES	(1)	(2)	(3)	(4)
Tariff	0.311***	0.206***	0.311***	0.162***
	(0.010)	(0.025)	(0.010)	(0.034)
Tariff × Private Sector		0.292***		0.413***
		(0.063)		(0.087)
Private Sector		-0.906***		
		(0.178)		
World Price	0.224***	0.223***	0.224***	0.223***
	(0.004)	(0.004)	(0.004)	(0.004)
City GDP	0.017	0.014		
	(0.036)	(0.036)		
City Fixed Effects	Yes	Yes		
Year Fixed Effects	Yes	Yes		
Commodity Trends	Yes	Yes	Yes	Yes
City-Year Fixed Effects			Yes	Yes
Observations	18,972	18,945	18,972	18,945
R-squared	0.628	0.629	0.631	0.632

Notes: The dependent variable is the logarithm of domestic consumer prices of goods i at city c in year t. Estimated coefficients are reported with robust standard errors, clustered at the city level, in parentheses. ***, **, * indicates statistical significance at the 10, 5, and 1 percent, respectively.

Table 2: Imperfect Tariff Pass-Through and the Size of the Private Sector for Coastal and Inland Cities

	Coastal Cities				Inland Cities			
VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Tariff	0.295***	0.109***	0.295***	0.031	0.344***	0.293***	0.344***	0.256***
	(0.012)	(0.037)	(0.012)	(0.044)	(0.015)	(0.027)	(0.015)	(0.032)
Tariff × Private Sector		0.452***		0.643***		0.202*		0.344***
		(0.101)		(0.118)		(0.103)		(0.111)
Private Sector		-1.260***				-0.912***		
		(0.277)				(0.209)		
World Price	0.227***	0.226***	0.227***	0.225***	0.218***	0.218***	0.218***	0.217***
	(0.005)	(0.005)	(0.005)	(0.005)	(0.006)	(0.006)	(0.006)	(0.006)
City GDP	0.041	0.037			-0.013	-0.016		
	(0.034)	(0.038)			(0.070)	(0.065)		
City Fixed Effects	Yes	Yes			Yes	Yes		
Year Fixed Effects	Yes	Yes			Yes	Yes		
Commodity Trends	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
City-Year Fixed Effects			Yes	Yes			Yes	Yes
Observations	12,755	12,728	12,755	12,728	6,217	6,217	6,217	6,217
R-squared	0.643	0.644	0.646	0.647	0.592	0.593	0.595	0.595

Notes: The dependent variable is the logarithm of domestic consumer prices of goods i at city c in year t. Estimated coefficients are reported with robust standard errors, clustered at the city level, in parentheses. ***, **, * indicates statistical significance at the 10, 5, and 1 percent, respectively.

Table 3: Imperfect Tariff Pass-Through and the Size of the Private Sector for Major Tradable Goods

	Food and Beverage				Clothing				Household Equipment			
VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Tariff	0.180***	0.107***	0.180***	0.094***	1.290***	1.347***	1.287***	2.169***	0.607***	0.441***	0.618***	0.434***
	(0.008)	(0.022)	(0.009)	(0.029)	(0.061)	(0.095)	(0.072)	(0.193)	(0.045)	(0.114)	(0.051)	(0.144)
Tariff × Private Sector		0.202***		0.239***		-0.159		-2.442***		0.421*		0.486*
		(0.049)		(0.070)		(0.215)		(0.414)		(0.225)		(0.291)
Private Sector		-0.619***				0.441				-1.930***		
		(0.152)				(0.658)				(0.715)		
World Price	0.028***	0.028***	0.028***	0.028***	0.307***	0.307***	0.307***	0.299***	0.435***	0.433***	0.439***	0.436***
	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.006)	(0.006)	(0.017)	(0.017)	(0.019)	(0.020)
City GDP	0.027	0.025			0.006	0.011			-0.060	-0.054		
	(0.034)	(0.033)			(0.058)	(0.053)			(0.079)	(0.081)		
City Fixed Effects	Yes	Yes			Yes	Yes			Yes	Yes		
Year Fixed Effects	Yes	Yes			Yes	Yes			Yes	Yes		
Commodity Trends	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
City-Year Fixed Effects			Yes	Yes			Yes	Yes			Yes	Yes
Observations	12,694	12,676	12,694	12,676	2,197	2,194	2,197	2,194	4,081	4,075	4,081	4,075
R-squared	0.156	0.157	0.161	0.162	0.881	0.882	0.900	0.903	0.426	0.428	0.483	0.483

Notes: The dependent variable is the logarithm of domestic consumer prices. Estimated coefficients are reported with robust standard errors, clustered at the city level, in parentheses. ***, **, * indicates statistical significance at the 10, 5, and 1 percent, respectively.

Table 4: Average Price Indics in Urban China 1998-2008

		Tradable			Nontradable			
Year	All	Food and Beverage	Clothing	Household Equipment	Health	Transport and Communication	Education	Housing
1998	99.3	97.0	100.1	98.4	102.5	95.5	97.8	104.6
	(1.249)	(1.953)	(2.339)	(1.461)	(3.426)	(3.752)	(3.662)	(6.840)
1999	98.9	97.9	96.9	96.3	98.1	94.1	99.0	103.1
	(1.815)	(4.116)	(5.230)	(3.580)	(7.868)	(4.767)	(3.979)	(3.329)
2000	100.5	98.9	97.6	96.8	98.1	94.4	99.4	106.1
	(1.956)	(3.819)	(5.346)	(3.407)	(8.011)	(4.515)	(4.246)	(4.035)
2001	99.7	101.0	97.1	97.0	95.7	98.6	101.2	101.8
	(1.712)	(3.174)	(5.636)	(3.454)	(6.588)	(3.308)	(4.463)	(3.164)
2002	99.9	101.8	96.7	96.7	95.8	98.2	100.3	102.4
	(1.687)	(2.825)	(5.561)	(3.361)	(6.562)	(3.282)	(4.530)	(2.979)
2003	101.0	104.3	95.6	95.9	98.5	97.1	100.6	103.7
	(1.717)	(3.932)	(7.315)	(5.224)	(6.342)	(3.112)	(4.854)	(4.003)
2004	102.8	107.6	98.1	98.2	99.3	98.3	100.6	103.0
	(1.240)	(3.314)	(3.674)	(2.670)	(3.098)	(1.947)	(2.450)	(2.247)
2005	101.4	103.0	97.6	99.5	99.3	98.8	101.4	103.7
	(0.821)	(1.830)	(3.780)	(2.236)	(1.651)	(1.563)	(3.393)	(2.380)
2006	102.2	104.6	99.1	101.4	101.7	99.7	99.1	103.1
	(1.864)	(4.760)	(2.906)	(2.225)	(2.112)	(1.858)	(1.634)	(3.156)
2007	104.7	111.9	98.6	101.8	101.9	99.2	99.2	104.7
	(1.316)	(3.192)	(2.733)	(1.965)	(2.018)	(1.492)	(1.454)	(1.961)
2008	105.0	113.0	96.1	102.5	103.4	98.3	99.3	104.5
	(0.843)	(2.154)	(4.480)	(2.119)	(2.359)	(2.006)	(1.548)	(2.045)

Notes: This table reports the average Consumer Price Indices of the main categories of comsumption goods (both tradable and nontradable goods) across 56 cities in our sample. The reference year for calculating price indics is last year (i.e., last year=100). The price index data is extracted from various volumes of provincial statistical yearbooks.

Table 5: The Responses of the Prices of Non-tradable Goods in Urban China

	Health		Transport and Communications		Education		Housing	
	(1)	(1')	(2)	(2')	(3)	(3')	(4)	(4')
Food and Beverages	-0.313***	-0.139*	0.030	-0.137***	0.154	0.106	0.231***	0.376***
	(0.098)	(0.082)	(0.056)	(0.040)	(0.101)	(0.081)	(0.045)	(0.041)
Clothing	0.252*	0.122	-0.000	0.049	-0.035	-0.092	-0.079	-0.066
	(0.143)	(0.111)	(0.057)	(0.049)	(0.089)	(0.067)	(0.047)	(0.050)
Household Equipment	0.282	0.086	0.180*	0.283***	0.055	0.087	0.058	-0.082
	(0.180)	(0.100)	(0.099)	(0.070)	(0.115)	(0.108)	(0.080)	(0.066)
L.Dependent Variable		0.616***		0.316***		0.448***		0.106***
		(0.042)		(0.052)		(0.049)		(0.035)
City Fixed Effects	Yes		Yes		Yes		Yes	
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
City Trend	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	616	504	616	504	616	504	616	504
R-squared	0.583		0.397		0.358		0.324	

Notes: Specifications (1)-(4) are estimated in price levels. Specifications (1')-(4') are estimated in first differences using Arellano-Bond estimation method. Estimated coefficients are reported with robust standard errors, clustered at the city level, in parentheses. ***, **, * indicates statistical significance at the 10, 5, and 1 percent, respectively.

Table 6: The Consumption Effects of Trade Liberalization (WTO Accession) at the City Level

	Tradable goods						Non-tradable goods				Total consumption effects	
	Tariff pass-through		Expenditure shares		Consumption effects		Expenditure shares		Consumption effects			
City	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.
Coastal Cities	*0.372*		*0.459*		*0.083*		*0.225*		*0.005*		*0.088*	
Beijing	0.310	0.032	0.452	0.155	0.067	0.024	0.217	0.136	0.002	0.005	0.069	0.025
Anshan	0.353	0.041	0.492	0.152	0.083	0.026	0.231	0.128	0.006	0.006	0.089	0.027
Benxi	0.348	0.040	0.454	0.127	0.077	0.023	0.209	0.106	0.004	0.004	0.081	0.024
Chaoyang	0.338	0.038	0.491	0.141	0.080	0.025	0.268	0.129	0.006	0.006	0.086	0.026
Dalian	0.389	0.049	0.494	0.153	0.094	0.031	0.206	0.120	0.004	0.005	0.098	0.031
Dandong	0.369	0.044	0.473	0.143	0.087	0.028	0.266	0.128	0.007	0.006	0.094	0.029
Fushun	0.332	0.036	0.477	0.148	0.077	0.025	0.192	0.118	0.003	0.004	0.080	0.026
Fuxin	0.393	0.049	0.467	0.140	0.091	0.029	0.241	0.128	0.005	0.006	0.096	0.030
Huizhou	0.326	0.035	0.454	0.150	0.072	0.025	0.195	0.113	0.004	0.005	0.076	0.026
Jinzhou	0.353	0.041	0.508	0.155	0.088	0.028	0.206	0.119	0.005	0.005	0.092	0.030
Liaoyang	0.382	0.047	0.498	0.152	0.093	0.030	0.193	0.115	0.004	0.005	0.097	0.031
Shenyang	0.369	0.044	0.503	0.159	0.090	0.030	0.217	0.124	0.004	0.005	0.094	0.032
Tieling	0.232	0.015	0.476	0.159	0.053	0.019	0.212	0.120	0.002	0.004	0.056	0.020
Yingkou	0.413	0.054	0.479	0.135	0.097	0.029	0.237	0.126	0.006	0.008	0.103	0.030
Hangzhou	0.403	0.051	0.462	0.151	0.091	0.032	0.208	0.125	0.004	0.006	0.095	0.033
Huzhou	0.391	0.049	0.457	0.157	0.087	0.032	0.199	0.113	0.004	0.005	0.090	0.034
Jiaxing	0.450	0.062	0.431	0.148	0.095	0.035	0.229	0.131	0.004	0.007	0.099	0.036
Jinhua	0.395	0.050	0.435	0.154	0.083	0.031	0.215	0.133	0.004	0.006	0.087	0.033
Lishui	0.342	0.039	0.424	0.142	0.069	0.026	0.242	0.129	0.004	0.006	0.073	0.027
Ningbo	0.436	0.059	0.450	0.153	0.096	0.035	0.195	0.122	0.004	0.005	0.101	0.037
Quzhou	0.359	0.042	0.440	0.154	0.076	0.029	0.243	0.131	0.003	0.007	0.080	0.030
Shaoxing	0.435	0.058	0.421	0.155	0.088	0.034	0.210	0.131	0.004	0.006	0.092	0.035
Taizhou	0.381	0.047	0.456	0.153	0.084	0.030	0.250	0.145	0.005	0.007	0.089	0.031
Wenzhou	0.358	0.042	0.470	0.159	0.084	0.030	0.216	0.125	0.005	0.006	0.089	0.031
Zhoushan	0.432	0.058	0.438	0.152	0.092	0.034	0.197	0.114	0.004	0.006	0.096	0.035
dongguan	0.429	0.057	0.409	0.137	0.086	0.031	0.280	0.150	0.006	0.007	0.092	0.031
Foshan	0.466	0.065	0.378	0.134	0.088	0.032	0.249	0.133	0.007	0.007	0.095	0.034
Guangzhou	0.356	0.042	0.451	0.159	0.081	0.030	0.186	0.100	0.005	0.005	0.086	0.031
Meizhou	0.329	0.036	0.480	0.124	0.080	0.022	0.245	0.106	0.006	0.005	0.086	0.023
Shantou	0.319	0.034	0.473	0.135	0.077	0.024	0.235	0.091	0.006	0.004	0.083	0.026
Shaoguan	0.302	0.030	0.469	0.143	0.071	0.023	0.231	0.115	0.005	0.005	0.076	0.025
Shenzhen	0.359	0.042	0.402	0.149	0.070	0.027	0.238	0.125	0.007	0.007	0.077	0.028
Yulin	0.304	0.030	0.490	0.153	0.076	0.025	0.200	0.103	0.004	0.004	0.080	0.026
Zhaoqing	0.413	0.054	0.499	0.138	0.106	0.031	0.256	0.105	0.008	0.006	0.114	0.034
Zhuhai	0.470	0.066	0.398	0.123	0.093	0.031	0.259	0.123	0.006	0.007	0.099	0.033
Inland Cities	*0.287*		*0.476*		*0.067*		*0.214*		*0.003*		*0.071*	
Chengdu	0.362	0.043	0.521	0.168	0.093	0.032	0.197	0.123	0.005	0.006	0.098	0.033
Guangyuan	0.337	0.038	0.512	0.143	0.084	0.025	0.232	0.111	0.005	0.005	0.090	0.027
Leshan	0.370	0.044	0.508	0.161	0.092	0.031	0.184	0.109	0.005	0.005	0.097	0.032
Mianyang	0.311	0.032	0.481	0.139	0.072	0.022	0.230	0.117	0.004	0.005	0.076	0.023
Nanchong	0.322	0.034	0.506	0.162	0.080	0.027	0.181	0.107	0.003	0.004	0.084	0.029
Neijiang	0.374	0.045	0.481	0.144	0.089	0.028	0.213	0.106	0.005	0.004	0.094	0.030
Panzhihua	0.266	0.023	0.493	0.138	0.065	0.019	0.207	0.110	0.002	0.004	0.067	0.020
Zigong	0.423	0.056	0.502	0.149	0.106	0.034	0.183	0.102	0.005	0.005	0.111	0.035
Luzhou	0.317	0.033	0.487	0.151	0.076	0.026	0.200	0.114	0.004	0.005	0.079	0.027
Ankang	0.250	0.019	0.460	0.136	0.055	0.018	0.201	0.114	0.003	0.004	0.058	0.018
Baoji	0.236	0.016	0.429	0.132	0.048	0.016	0.241	0.115	0.003	0.004	0.051	0.017
Hanzhong	0.265	0.022	0.505	0.143	0.065	0.020	0.190	0.101	0.003	0.003	0.068	0.021
Shangluo	0.184	0.005	0.448	0.161	0.039	0.015	0.175	0.108	0.002	0.003	0.040	0.015
Tongchuan	0.197	0.008	0.479	0.135	0.046	0.014	0.252	0.126	0.002	0.003	0.048	0.015
Weinan	0.258	0.021	0.455	0.133	0.055	0.016	0.233	0.115	0.003	0.004	0.057	0.017
Xian	0.294	0.028	0.458	0.141	0.065	0.021	0.234	0.136	0.004	0.005	0.069	0.022
Xianyang	0.192	0.007	0.441	0.142	0.040	0.013	0.230	0.132	0.002	0.003	0.042	0.014
Yanan	0.207	0.010	0.397	0.136	0.038	0.013	0.266	0.162	0.003	0.005	0.041	0.015
All Cities	*0.342*		*0.465*		*0.078*		*0.221*		*0.004*		*0.082*	

Notes: This table presents the pass-through elasticities, the average expenditure share, and the average consumption effects of trade liberalization - tariff cuts due to the WTO accession - for each of the cities in our sample. The estimates presented in this table are based on 2006 Chinese Urban Household Survey.

Appendix Table 1: Concordence between UHS Consumption Categories and SITC

UHS Consumption Items	4-Digit SITC 3rd Revision Categories
Rice and Grain	411; 412; 421; 422; 423; 430; 441; 449; 451; 452; 453; 459
Edible Oil	4113; 4211; 4212; 4213; 4214; 4215; 4216; 4217; 4218; 4221; 4222; 4223
Pork	13; 122; 161; 175
Beef	11; 111; 112; 176; 179
Lamb	12; 121
Chicken	14
Egg	251; 252; 253
Fish	341; 342; 344; 345; 351; 352
Vegetable	541; 542; 544; 545; 546; 547; 548; 561; 564; 566; 567
Seasoning	751; 752; 984
Sugar	611; 612
Cigarette	1211; 1212; 1213; 1222; 1223
White Wine	1124
Fruit Wine	1122; 1121
Beer	1123
Cola	1110
Tea	741; 743
Coffee	711; 712; 713
Fruit	571; 572; 573; 574; 575; 576; 579
Nuts	577
Cake	484; 485
Milk	221; 222
Menwear	8411; 8412; 8413; 8414; 8415; 8416; 8431; 8432; 8437; 8438
Womenwear	8421; 8422; 8423; 8424; 8425; 8426; 8427; 8428; 8441; 8442; 8447; 8448
Cloth	2613-2682; 6511-6574
Shoes	8511; 8512; 8513; 8514; 8515; 8517; 8519
Furniture	8211; 8212; 8213; 8215; 8218
Washing Machine	7751
Refrigirator	7752
Air Conditioner	7758
Television	7611; 7612
Radio	7621; 7622; 7628; 7633
Record	7638
Camera	8811; 8812; 8813
Watch	8853; 8854; 8855

Notes: This table reports the household consumption items in Chinese Urban Household Survey that can be matched to SITC codes. There are some household consumption items in Chinese Urban Household Survey, such as, sewing machine, video, freezer and electric fan, that can not be matched into SITC codes. They are not covered by this table.