How Do Households Adjust to Trade Liberalization? Evidence from China's WTO Accession

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Abstract

We investigate the impacts of trade liberalization on household behaviors and outcomes in urban China, exploiting regional variation in the exposure to tariff cut due to WTO entry. Regions that initially specialized in industries facing larger tariff cuts experienced relative declines in wages. Households responded to this income shock in several respects. First, household members work more, especially at the non-tradable sector. Second, household size increased because more young adults co-resided with parents. Third, households save less. These behaviors significantly buffer the negative wage shock induced by trade liberalization. (*JEL*: F14, F16, J20, R23)

Keywords: Household adjustments, Trade Liberalization, WTO

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1 Introduction

It is generally recognized that trade liberalization can bring about substantial adjustments in the labor market. Many studies have consistently shown that regions or industries exposed to import competition induced by trade liberalization experienced relative declines in labor market conditions such as wages and employment.[1] It is natural to ask how people adjust to such labor market shocks. However, most of the existing literature on this topic focuses on the responses of individual workers, paying little attention to the adjustments of households. Many important economic decisions, such as labor supply, living arrangements, and saving, are made jointly by household members. Understanding how these behaviors adjust to trade liberalization has direct implications on the impact of trade on household welfare.

In this paper, we systematically examine the impact of trade liberalization on local labor market outcomes and household behaviors, including wages, labor supply, living arrangements, income, consumption, and savings, etc. We believe that China is a suitable case to conduct such a study. First, China entered the WTO in December 2001, which provides arguably exogenous tariff changes to identify the effects of trade liberalization. Second, China's urban household survey data cover all prefectures in China during the period before and after WTO entry, providing extensive information at both individual and household levels, and thus enable us to investigate household responses in rich dimensions. Third, given the persistent attention in the literature on the distributive effects of trade liberalization in the developing countries, investigating China provides valuable evidence by itself.

We adopt the "local labor market approach" that is recently popularized in the literature.[2] The identification is based on the variation of tariff changes across industries, and the variation of pre-WTO industry employment composition across Chinese cities. Consistent with the existing literature, we find that regions that initially specialized in industries facing larger tariff cut experienced

[1] Industry-level studies include Revenga (1997); Attanasio et al. (2004); Goldberg and Pavcnik (2005). Regional-level studies include Topalova (2010); Kovak (2013); Hakobyan and McLaren (2016); Dix-Carneiro and Kovak (2015, 2017a,b).

[2] See Edmonds et al. (2010); Topalova (2010); McCaig (2011); Autor et al. (2013); Kovak (2013); Dix-Carneiro and Kovak (2015, 2017a,b); Costa et al. (2016); Hakobyan and McLaren (2016).

relatively larger wage declines. However, the relative decline of consumption is much weaker. We find that households take a series of measures to smooth consumption reduction caused by trade liberalization. First, household members increase labor supply, especially in the non-tradable sector. Such response is most pronounced for women and for the elderly, consistent with the "added worker effects" in the labor literature that the labor supply of wives and the elderly will respond to the wage shocks of the major wage earner. In addition, employment shifts from the tradable sector to the non-tradable sector, particularly for male workers. Second, there is increased probability of parental co-residence, i.e. young adults co-reside with their parents for expenditure sharing. Third, households save less. Back of envelope calculation suggests that these behaviors significantly buffer the impact of the trade-induced wage shocks on consumption. If households had not taken these behaviors, regional consumption reduction due to trade liberalization would be 30-50% larger.

We conduct a series of robustness checks to address potential problems of the identification. First, to deal with the endogeneity issue of the tariff cut, we use the maximum allowable tariff rates as an IV for actual tariffs. Second, we control for a wide range of confounding variables, including non-tariff barriers, FDI restrictions, export expansion, minimum wages, and housing prices, etc. Third, we conduct placebo tests to ensure the results are not driven by spurious pre-trends. Finally, we deal with migration issue and find that regional migration is not significantly affected by tariff cuts.

Our work contributes to the emerging literature on the regional impact of trade liberalization, such as Topalova (2010); Kovak (2013); Dix-Carneiro and Kovak (2015, 2017a,b); Hakobyan and McLaren (2016). Our main contribution is to extend the focus of interest from labor market variables to a wide range of household-level behaviors and outcomes. The broad scope of analysis allows us to give a systematic portrait of how households adjust to trade liberalization. In addition, we emphasize the role of households in insuring individuals against the labor market risks brought by trade liberalization, a point which is largely ignored in the previous literature.

Our work is also related to a flourishing literature on estimating the economic impact of China's

trade liberalization, especially due to WTO entry. On one hand, different from the current literature examining the consequential effects on labor markets of the rest of the world such as US (Autor et al., 2013; Pierce and Schott, 2016) and Europe (Utar, 2014), we investigate how China's own labor market responds to this event and show that the adjustments costs of trade liberalization through tariff reduction are also pervasive. On the other hand, despite of the established literature on the impact of WTO entry on China itself (Brandt et al., 2017; Yu, 2015; Fan et al., 2015), which mostly focuses on firm-level outcomes, we stand out by exploring household behavioral responses and outcomes.

Finally, these findings also contribute to the ongoing labor and household literature on how households respond to income shocks (Blundell et al., 2008; Kaplan, 2012; Gorbachev, 2016; Blundell et al., 2016). We add up the current literature by exploring the adverse labor market conditions caused by trade liberalization as exogenous shocks. We consistently find that the household behaviors play an important role in consumption smoothing.

The rest of the paper is organized as follows. Section 2 describes the data and constructs regional tariff measure. Section 3 conducts descriptive analysis and provides graphical evidence. Section 4 introduces empirical strategy and presents the main estimation results. Section 5 conducts robustness checks. Section 6 conducts back of envelope calculation to quantify the role of households in insuring individuals against the labor market risks induced by trade liberalization. The last section concludes.

2 Data and Preliminary Analysis

2.1 Urban Household Surveys

The data used in this study are from Urban Household Surveys (UHS) conducted by China's National Bureau of Statistics. The UHS is based on a probabilistic sample and stratified design. We use the UHS data for several reasons. First of all, the UHS is the official source of the basic indicators of the urban households in China. The aggregated data of the UHS is published in China

Statistical Yearbook. It covers all prefectures in a long period both pre- and post- WTO accession. In addition, it provides detailed individual level information, including demographic information such as gender, age, education level, as well as employment information such as working status, occupation, industry, working hours, and wage.

Furthermore, the UHS also provides the information on the relationship of each household member with the head, which enables us to investigate the household structure and to identify whether household head lives with their children or parents. Finally, the UHS also provides detailed information about the household characteristics, household income, and consumption expenditures. The data are collected over the course of the year. Households are asked to keep a record of their income and expenditures, which is collected every quarter by a surveyor. For each household, the final data are aggregated at year level.

Since China entered the WTO in December, 2001, we use the data collected during 1999 to 2008. And we only keep the household members with ages 20 and above. The sample we use are repeated cross-sectional data covering 179 prefectures/cities in 18 provinces.[3] In total, the sample contains over 590 thousand individuals and 210 thousand households.

Table 1 reports the summary statistics for the key variables in 1999-2008. Panel A shows the mean and standard deviation for individual level variables. Specifically, 71 percent of the individuals are working, among which 17 percent are working at tradable sector while 53 percent at non-tradable sector. However, for those aged below retirement age (i.e. 60 years old for men and 55 for women), the working proportion is 85 percent, which is much higher than those past retirement age.

At the household level, the average size is slightly below 3, as shown in Panel B. We define a parental co-residence dummy which equals 1 if adult children or their spouses live with their parents. The incidence of the parental co-residence is 31 percent on average. Because of different co-residence patterns among households, we further divide the sample by household age. Among

[3]The 18 provinces are: Beijing, Shanxi, Liaoning, Heilongjiang, Henan, Sha'anxi, Gansu, Shandong, Shanghai, Jiangsu, Anhui, Zhejiang, Jiangxi, Hubei, Guangdong, Sichuan, Chongqing, Yunnan. These provinces cover China's eastern, middle, and western areas and account for 75% of China's urban population in 2008.

the households with head's age above 50, almost half of them are parental co-resident ones and almost all these household heads live with their adult children. By contrast, among other households, the rate of parental co-residence is much lower. Among these co-resident households, half household heads are co-residing with their parents and the other half with their children.

In the sample, annual household income per capita is 11.2 thousand *yuan*, which is significantly higher than annual consumption per capita of 7.4 thousand *yuan*. This implies an average saving rate of 28 percent.

2.2 Regional tariff construction

The key independent variable used in our subsequent analysis is the regional tariff. We construct regional tariff for each prefecture city and year as follows:

$$Tariff_{ct} = \sum_{j \in \Omega_{Tr}} \lambda_{jc,1998-2001} \tau_{jt} \tag{1}$$

where subscriptions c, j, and t represent city, industry, and year, respectively. τ_{jt} is the tariff rate of industry j in year t.[4] $\lambda_{jc,1998-2001}$ is the share of industry j in tradable sector employment of city c during the pre-WTO years (i.e. 1998-2001).[5] The results are consistent if we use different weighing schemes, such as employment weights in 2001, and the labor-share adjusted weights as in Kovak (2013).[6]

We define an industry at the 4-digit CIC level (453 industries). To calculate these employment weights, we use the Annual Survey of Industrial Firms (ASIF) from the National Bureau of

[4]We define a local labor market as a prefecture city. The majority of China's regional policies, including transportation planning, are conducted at prefecture city level.

[5]Following Kovak (2013), we only include the tradable sector (mining and manufacturing) in the regional tariff construction. Regional tariff in earlier works such as Topalova (2010) includes the non-tradable sector and sets the tariff changes in the non-traded sector to zero. Kovak (2013) argues that when the price of non-traded goods respond to the price changes of the tradable goods, a more theoretical consistent way of constructing the regional tariff is to exclude the non-traded good sector and calculate the employment weights using only the traded goods sector.

[6]Results are shown in robustness section. Another concern of using the initial weights is that industry's employment share may change with trade liberalization after WTO accession. In results upon request, we regress an industry's employment share in a city against the industry-level tariff, and find that industry employment share does not vary systematically with tariffs. This is consistent with ample evidence of lack of labor reallocation across manufacturing industries in other developing countries (Goldberg and Pavcnik, 2007).

Statistics.[7] Tariff data between 1998-2007 is from China's Customs. The original data is at HS 8-digit level. We map them to 4-digit CIC industries. Table A1 shows that tariff cuts vary substantially across industries. The largest tariff cuts happened in industries such as beverage, furniture, tobacco, and textile manufacturing, while industries such as mining had almost no tariff changes.

It should be emphasized that the measure weighting the tariffs by local industry employment share only captures potential labor market effects of tariff while ignores the effects of tariffs by affecting product prices and thus the cost of living (Porto, 2006; Fajgelbaum and Khandelwal, 2016; Han et al., 2016). However, unless the consumption structure and production structure are systematically correlated across cities, we can still consistently estimate the impact of tariff through the labor market channel.

Figure 1 shows the median and various percentiles of the regional tariffs during 1998-2007. The median regional tariff went down from 15 percent in 1998 to 9 percent in 2007, a 67% drop. The largest tariff cut occurred in 2002, the year right after China's WTO entry. Tariff continued to decline in the next two years but kept almost unchanged afterwards. As is the case in many other developing countries, the dispersion of tariffs also declined, as the cities with higher initial tariff experienced larger tariff cuts.

Figure 2 shows the geographical distribution of regional tariff cuts from 1998 to 2007. Tariff cuts exhibit substantial heterogeneity across cities, ranging from 1.2 percentage points in Qi Tai He to 23.6 percentage points in Shi Yan, as shown in Table A2 in the appendix. This heterogeneity stems from the variation of tariff cuts across industries and the variation of pre-WTO industry mix of employment across cities. The cities specialized in the industries with large tariff cut would experience larger regional tariff reductions. The wide distribution of regional tariff cuts provides valid variation for accurate identification.

In our baseline specification, we set the tariff rate during 1998-2001 to be constant at their

[7]The Annual Survey of Industrial Firms covers all state-owned firms and all non-state firms above sales revenue 5 million Yuan in China's industrial sector, which includes mining, manufacturing, and utilities. The firms covered in the survey account for 91% of China's aggregate output in the industrial sector in 2004, in which year we can compare the aggregates of the ASIF with the industrial census data. The data reports firm's city code, industry affiliation at 4-digit CIC classification, and total employment. We aggregate the data to city-industry-year level to calculate the employment share used to construct the regional tariffs.

year average because the pre-WTO tariff during 1998-2001 has very little changes and is more subject to endogeneity issues. However, using actual tariff does not bring any material changes. Our results are robust to different specifications of tariff rates.

3 Descriptive Evidence for the Effects of Regional Tariff

We present both graphical and econometric evidence to examine the notion that regional tariff has significant effects on individual and household outcomes such as labor supply, wage, and household consumption. This section provides the descriptive analysis and the next section provides formal econometric analysis.

To get a sense of the relationship between tariffs and our main outcome variables, we plot the city-level changes in outcome variables between 2002 and 2006 against the changes in regional tariff between 2001 and 2005. A significant correlation provides suggestive evidence on the effects of regional tariff. The outcome variables examined here include labor market outcomes such as wage and labor supply, household structure including household size and parental co-residence, and household finance including household income and consumption per capita.

Wage. It has been extensively established in the literature that trade liberalization in terms of lower tariff rates affects the labor market outcomes. We first examine the correlation between regional tariff and wage rate among working population and present it in Panel A of Figure 3. The circle area represents the sampling size of each city in the UHS data. The pattern in Figure 3a shows that larger regional tariff cut is associated with relatively lower wage growth. The slope suggests that one percentage point decrease in regional tariff leads to a 2.9 percent decline in wage rate. These results are consistent with the evidence found in other developing countries such as India and Brazil (Topalova, 2010; Kovak, 2013; Dix-Carneiro and Kovak, 2017a).

Labor Supply. It is also extensively documented in the labor literature that individual/household labor supply responds to income shocks, either at the extensive margin (labor force participation)

or the intensive margin (working hours) (Blundell et al., 2016; Gorbachev, 2016). By contrast, evidence on how labor supply responds to trade liberalization is scarce (Arkolakis and Esposito, 2014). Given the substantial effects of tariff cuts on wages, it is naturally to ask how labor supply responds to tariff cuts as well. To examine this, we create a dummy variable for individual working status which equals 1 if the individual is working at survey, and 0 otherwise. Then we conduct the parallel analysis as Panel A.

Interestingly, we find that larger tariff cut is associated with more people working, suggesting a larger increase in labor supply. The slope of linear fitted line suggests that a percentage point cut of regional tariff is significantly associated with a 0.42 percentage point increase in the probability of working.

Generally, that trade liberalization lowers wages indicates a negative shock in labor demand. On the other hand, it is possible that people tend to work more in response to lower wage rate as well. For example, female labor supply (usually wife) may increase in case of negative wage shocks of the males (usually husband), which is known as "added worker effect" in the labor literature (Stephens, 2002; Gorbachev, 2016; Blundell et al., 2016). Therefore, it is an empirical question how the trade liberalization in terms of lower tariff affects regional labor supply. The pattern in Panel B suggests the latter is the major driven force.[8]

Note that the increased labor force participation as found in our paper does not contradict with the increased unemployment in response to trade liberalization documented in the existing literature (Autor et al., 2013; Dix-Carneiro and Kovak, 2017a) because unemployment does not include people who are not in the labor force. However, it is important to specifically investigate the pattern shown in Panel B. For example, who increased labor supply in the episode of trade libalization? In which sector did the labor supply increase? We will get back to these questions in the next section.

Household Structure and Living arrangements. Young adults often need to decide whether to live with their parents. The literature on co-residence typically finds that the option to co-reside

[8]In unreported regressions, we find that regional unemployment rate is not significantly affected by regional tariffs.

with the parents provides an important insurance against labor market risks (Kaplan, 2012). This is especially important in China given a high parental co-resident rate. Since youths are more likely to live with their parents to share expenditure in case of adverse labor market conditions, it is natural to expect that the income shocks induced by trade liberalization would also affect people's parental co-residence decision as well.

Therefore, we construct two variables to examine the co-residence decision. The first variable is log household size, which is the number of family members aged above 20. The second variable is a co-residence dummy, which equals one if parents and adult children live in the same household.

Following the same strategy, we further examine these outcomes. Because of different living arrangement patterns between younger and older households shown in summary statistics, we only keep those households with heads' age being 50 years or above. Among these households, larger regional tariff cuts are significantly associated with relatively larger households and a higher proportion of parental co-residence, as shown in Panels C and D, respectively. This suggests that trade liberalization has significant impact on co-residence behaviors and structure among these households. As a comparison, we also conduct the analysis for the households with younger heads and do not find any significant correlations. We will be back on this and discuss in detail in the regression analysis section.

Household Finance. We also examine the correlations of tariff cuts with household income and consumption per capita. Specifically, the slope of the fitted lines suggests that a percentage point cut in regional tariff is associated with 0.83 percent and 0.72 percent decline in household income and consumption, respectively. The slope for household consumption is smaller, suggesting that households lowered their saving rate to smooth consumption.

To get a more complete picture, we will further examine the other household finance outcomes in the next section such as private transfers, borrowing and lending behaviors.

By examining the individual/household behavioral responses to regional tariff cuts, we primarily have an impression that the households adjust to the adverse labor market shocks caused by

trade liberalization by altering their labor market participation decisions, household co-residence, and household finance behaviors. However, the simple correlation may not be convincing enough due to many other confounding factors. In addition, we only use the data from two years and thus it is a question whether the effects are consistent in the whole sample. We also need a more complete analysis before any conclusive statements, as many questions remain to be answered.

4 Econometric Evidence for Household Adjustment

4.1 Empirical Strategy

We conduct the following regression to investigate the effects of regional tariff:

$$Y_{ict} = \alpha + \beta * Tariff_{c,t-1} + \gamma D(city_c, year_t, age_{it}, gender_i, educ_i) + \varepsilon_{it} \tag{2}$$

We conduct the regressions at individual or household level. The subscriptions i, c, and t, represent individual or household, city, and survey year, respectively. The dependent variable is the interested outcomes mentioned above, such as wage, labor supply, household size, co-residence indicator, household income per capita, or household consumption per capita.

$Tariff_{c,t-1}$ stands for the regional tariff level of prefecture/city c in year $t-1$. Our main identification is based on differential exposure of cities to tariff cut after WTO entry. The coefficient, beta, is of central interests, because it captures the effects of regional tariff on outcome variables.

The covariates $D(.)$ include the temporal, geographical, and demographic controls, including dummies of prefecture, survey year, gender (male/female), and education levels (junior high or below, senior high, and college or above). In addition, it also includes interactions between year and age to allow heterogeneity across birth cohorts. Moreover, we include gender dummy interact all the covariates with it to control for the male-female differences. For household level regressions, we use the demographic characteristics of the household head. The standard errors are clustered at the prefecture level.

Two important points about interpretation should be noted. First, because the constructed re-

gional tariff measure captures the labor market effects, the identification strategy captures the impact of tariff cuts on outcomes through the labor market channel. Our estimation equation should be viewed as a reduced-form relationship between various household outcomes and wage shocks caused by lower tariff. Second, since our identification is based on a difference-in-differences (DID) framework, the identified effects should be interpreted as relative effects across different regions rather than overall effects at the national level.

4.2 Caveats about identification

Several caveats about identification strategy need to be emphasized.

Heterogeneous trends. First, unbiased estimation relies on the assumption that the time trends of outcomes in regions with larger tariff cuts would parallel those in other regions had China not entered the WTO. For example, if individual wages are expected to fall relatively because of unobserved factors that are correlated with regional tariff cut, our estimates would overestimate the effects of regional tariffs. Although we cannot rule out this possibility completely, we plot the time trends of the outcome variables before and after the WTO entry in regions with both larger and smaller tariff cuts and find the time trends of outcomes parallel before the WTO entry. In addition, the changes in outcomes prior to WTO entry are insignificantly associated with local tariff cuts across cities afterwards. These findings help to alleviate the concern. We will return this in Section 5.

Confounding factors. In addition, some confounding factors should be dealt with. First of all, it is not only tariff changes when China entered the WTO. Meanwhile, exports to other countries expanded dramatically and FDI increased rapidly. The effects of tariff cuts will be biased if regional tariffs are correlated with these shocks. To address this issue, we include proxies for export expansions and FDI restrictions in our regressions and find no material changes on the effects of tariffs.

China also experienced many changes in domestic economic policies and conditions during this period. Among these changes, minimum wage and housing price should be most relevant and salient ones for our study. If minimum wages increased more in the regions with smaller tariff cuts, the identified effects may pick up the effects of the wage policy. Alternatively, if booms in regional housing prices are associated with tariff cuts, it is also difficult to conclude the identified effects in equation (2) are merely from tariff. Therefore, to alleviate these concerns, we also include the regional minimum wage level and housing prices at city-year level in the regressions for additional controls and find the results are robust. Section 4 shows more details about this.

Endogeneity of tariff cuts. Tariffs might be endogenous because of political considerations and contemporary economic conditions (Grossman and Helpman, 1994). This is not a big concern for China's context since the Chinese government had very little policy discretion in the extent of tariff cut in each industry. The tariffs across all tradable industries are required to reduce to a certain level after entering the WTO. To see this, Figure 4a plots the regional tariff changes between 1998 and 2007 and initial tariff rate in 1998. It shows that there exists an almost one-to-one relationship between the regional tariff change and the initial tariff rate in 1998. In other words, the post-WTO tariff rates converged to the same low level regardless of the initial tariff level.

To further address the endogeneity issue, we follow Brandt et al. (2017) and use maximum allowable tariff rate as an IV for the actual tariff rate. We then create an IV for regional tariff rate using pre-WTO employment share. China's WTO accession agreement specifies entry tariff rate, target rate and target year, and most of these were mainly determined in 1999. Entry rate is the tariff rate at the time of accession. Target rate is the reduced rate that must be achieved in the target year. Our IV assumes that after entry, China could keep the entry rate until it switched to target rate in the target year.[9] Figure 4b plots the accession tariff changes at prefecture level against the changes of actual tariff before and after the WTO entry. It shows a strong positive correlation (rho = 0.96). It suggests that China consistently follow the initial agreements to reduce the tariff. In our

[9]The accession tariff data are available only since 2002. We set the accession tariff during 1998-2001 as the 2002 value.

paper, we provide results from both OLS and two-stage least squares (2SLS).

Expectation formed before WTO entry. It took a long period for the Chinese government to negotiate with other WTO countries about its entry. Especially, the target tariffs were determined in 1999, three years before actual entry. Therefore, it is possible that the firms and households in China expect the tariff cuts. We argue that this could not be the first order issue here. First, if regions with larger tariff cuts formed accurate expectation and start to adjust to expected lower tariff before the WTO entry, we would underestimate the effects by conducting regressions as equation (2). In addition, if firms and households start to alter their behaviors before the WTO entry, it is likely to see the outcome changes before joining WTO would be associated with actual tariff cuts after 2002. However, we do not find significant evidence for this.

Migration. Migration would be a concern if households or individuals with higher income tend to move to regions with smaller tariff cuts. The effects of tariff would be caused the moving migrants rather than actual effects on wage among those stayers. To rule out this possibility, we examine whether the migration flows are correlated with regional tariff cuts and only find the association is rather weak. In addition, we also confine our analysis based on the households who stayed in the local prefecture since 2001, the year before WTO, and find no material change in our results.

4.3 Effects on Labor market outcomes: Wage and Labor Supply

We start our empirical analysis with the impact of tariff reduction on wages. We estimate equation (2) at the individual level. The dependent variable is log individual real yearly wage. In Column (1) of Table 2, we get a positive and significant coefficient of the regional tariff variable. The magnitude suggests that one percentage point reduction in regional tariff is associated with 1.8 percent reduction in wages. Based on this estimate, wage growth of the city at the 25th percentile of the tariff cut distribution is 7 percentage points (1.76*0.04) lower than that of the city at the 75th

percentile of the tariff cut distribution during 1999-2008.

In Column (2) and (3) we estimate the wage effects for workers in tradable and non-tradable sector separately. As expected, the effects are larger in the tradable sector, with a coefficient around 2. For the non-tradable sector, tariff cuts also lead to wage reduction, but the magnitude is only about two thirds of the tradable sector. The significant wage effects in the non-tradable sector is consistent with the recent evidence documented for other countries such as Brazil and US (Kovak, 2013; Hakobyan and McLaren, 2016; Dix-Carneiro and Kovak, 2017a). It also suggests that labor may reallocate between tradable and non-tradable sectors in response to trade reform, as we will show shortly. Panel B reports the IV results. The previous conclusions still hold qualitatively, though the magnitude is a bit larger than the results using OLS.

To strengthen the validity of our wage results and to explore the possible mechanisms underlying the wage adjustment, we investigate the response of firms to tariff cuts, using the Annual Survey of Industrial Firms. The details are reported in Appendix A3. We find that in industries or regions with larger tariff cuts, firms have lower wages, investments, sales, and profits. These results suggest that import competition from tariff cuts induced short-run negative impact on firms, which finally transmitted to workers through lower wages. These results corroborate our findings from the household survey data that regional tariff reduction reduced regional wages.

The next three columns examine the effects on working status. Besides whether the individual is working or not, we further distinguish whether the individuals are working at tradable sector or working at non-tradable sector. By construction, the coefficients in columns 5 and 6 add up to the coefficient in column 4.

Panel A and Panel B report the estimation results from OLS and 2SLS, respectively. In column 4 of Panel A, the coefficient for the "working" dummy is negative (-0.42) and statistically significant at the 1 percent level. However, the coefficient of the "working at tradable" dummy is positive (0.43), while that of the "working at non-tradable" dummy is negative (-0.85). The estimation results with 2SLS show a similar pattern. Taking together, these results suggest the following. First, regional tariff reduction in general increased regional labor participation relative to other regions.

Second, employment in the tradable sector contracted, whereas employment in the non-tradable sector expanded. This employment shift may due to either reallocation of existing workforce from tradable sector to non-tradable sector, or net entry of new workers into the non-tradable sector.[10]

In column 7 we investigate the intensive margin response of labor supply, i.e. how working hours respond to trade reform. We regress the log of working hours in the last month against the regional tariff, and consistently find that regional tariff cut also leads to an increase in working hours.

To investigate who are more likely to work in case of lower regional tariff, we estimate the labor supply and wage response separately for each gender and each age group (20-29; 30-39; 40-49; 50-59; 60+) in Table 3. In summary, we find the following: (1) regional tariff reduction in general leads to larger wage losses for males, but stronger labor supply increase for females. The labor supply coefficients of females are 2-5 times larger than those of males, depending on age group. This is consistent with the "added worker effects" in the labor literature that wives' labor supply increase in response to husband's negative wage shocks (Stephens, 2002; Gorbachev, 2016; Blundell et al., 2016). (2) The employment adjustment of the males exhibits more "churning", that is, the reallocation from the tradable to non-tradable sector. This can be seen from columns 3 and 5 in that the contraction of the tradable sector employment and the expansion of non-tradable sector employment are often of similar magnitude, leading to less net labor supply increase in Column 1. For females, on the contrary, labor supply adjustment is mainly characterized by new entry into the labor market, as can been from columns 2 and 4 that the employment expansion of the non-tradable sector is much larger than the employment contraction of the tradable sector, resulting in large net entry in column 2.

To provide more direct evidence on "added worker effect", Appendix Table A4 estimate how the regional tariff affects labor supply pattern for husband and wife. Consistently, the results show that larger regional tariff cut is associated with fewer households with only husband working while more households with both husband and wife working, suggesting that more wives participate in

[10]Existing works, such as Dix-Carneiro and Kovak (2017b) and Costa (2016), also find employment shifts from the tradable sector to the non-tradable sector in response to intensified import competition in the tradable sector.

the workforce.

The aforementioned results on labor supply have several important implications. First, our results suggest wage reduction and labor supply change should be considered together. For example, the wage reduction in non-tradable sector may be caused by not only lowered price as suggested in previous literature (Kovak, 2013) but also increased labor supply among the female. It is important to distinguish between the two because of totally different welfare implications. Second, the increased labor supply has direct implications to understand the impact of trade liberalization on household income and consumption. It is an important channel taken by household members to offset the negative income shocks caused by import competition. We will demonstrate this later.

4.4 Effects on Household Size and Parental Co-residence

This section investigates how the regional tariff affects household structure. Table 4 reports the regression results for household structure on regional tariffs. Consistent with the pattern in Panels C and D in Figure 3, we find that lower regional tariff is associated with higher probability of parental co-residence as well as larger household size. According to the estimate of column 1 in Panel A, one percentage point regional tariff cut increases the probability of co-residence by 0.5 percentage point, and the household size by 0.27%. Considering different living arrangement between households with younger and older heads, we split the sample into two groups by whether the household head is aged 50 and above in the next two columns. The impact of tariff on household size and co-residence is much smaller in the households with younger household head.

Because parental co-residence could be either household head living with their children or their parents, the last two columns distinguish the two. The results suggest that lower regional tariff only affects the co-residence of household heads and their adult children. As household heads are defined as those who play the major role in household decision making, more households heads living with their adult children suggests that it is the children who move to co-reside together with parents, not vice versa. Therefore, consistent with Kaplan (2012), these results show that youths are more likely to stay in their parents' home when facing tougher labor market conditions induced

by trade liberalization.

However, there are also other possibilities. For example, if fertility behaviors are affected because of trade liberalization and young couples move to live with their parents so that the elderly could help to take care of the children. Although we cannot rule out all the other possibilities, we try to make further clarification by investigating how the regional tariff affects the age structure in Appendix Table A5. The results suggest insignificant effects on proportion of those aged below 16 in the households. Meanwhile, lower regional tariff leads to a lower proportion of those aged over 60, which is consistent with more adult children co-residing with their parents.

The consequential effects of trade liberalization on household structure are important in understanding the consumption behaviors within households. For example, because of larger households and economy of scale, the impact of regional tariff on household income and consumption should be partly explained by the changed household structure. It is especially important when interpreting the results. For example, the lower consumption per capita caused by lower regional tariff, as shown in Panel F in Figure 3, could be caused by larger households and lower demand. Because of this, in the next section where we discuss the effects on household income and consumption, we provide results with and without household structure (including size, coresidence, and age structure) controlled.

4.5 Household income, consumption, and saving

We estimate how household income and consumption respond to trade liberalization in Table 5. In the first two columns we regress log real household income per capita against regional tariffs. We find a coefficient of 1.17 in Column (1) of Panel A, which is smaller than wage effects in Table 2 (coefficient for wage effects is 1.76).

Columns 3 and 4 estimate the consumption effects, with the dependent variable being log real household consumption per capita. Column 3 in Panel A shows a positive coefficient of 1.03. As expected, regional tariff cut causes an relative decline in household consumption per capita through the labor income channel. In summary, the magnitude of the consumption effects is much

smaller than the wage effects (coefficient 1.76), and also smaller than the household income effects (coefficient 1.17).

By definition, income equals consumption plus saving, thus the smaller magnitude of the consumption effects than the household income effects imply that the households must have reduced their saving to smooth consumption. In Column (5) and (6), we regress household-level saving rate (saving/household income) against regional tariffs. Indeed, we find saving rate declines in response to tariff cuts, although the estimated coefficients are only statistically significant with 2SLS.

We also investigate other incomes and expenditures in Appendix. Appendix Table A6 shows the estimation results of the transfers. Note that transfer income from the government or other households could be an important source of insurance against negative income shocks. However, we do not find any evidence that any transfers from the government off set the relatively negative wage shocks. To the opposite, public transfer income exacerbates the negative wage shock rather than reduces it. One explanation is that during our sample period, China has yet to establish a complete welfare system and trade-adjustment assistance programs that are common in developed countries still do not exist in China today. Another explanation is the increased labor supply from the elderly. Because more old people participate in the labor force and earn labor income to smooth household consumption, they receive less pension from the government. In an unreported regression, we find that individual working status could explain much of the effects of tariff on received public transfers. Appendix Table A7 examines the effect of tariff cuts on household-level borrowing and lending because households can also insure against negative income shocks by borrowing more from or lend less to other households. However, we do not find any significant evidence. Because wage income captures over 70 percent of household income and transfers 20 percent, these results suggest the lowered household income is mainly driven by lowered wage income of the households.

5 Pre-trends Examination and Robustness Checks

In this section we first conduct placebo tests to rule out the possibility that the results are driven by spurious pre-trends. Then we run a bunch of robustness checks to ensure our results are insensitive to confounding policies, measurement of regional tariffs, alternative samples, and migration issues.

5.1 Pretrends examination

Our main identification is based on the variation of regional tariff across cities over time. Unbiased estimation of the difference-in-differences framework requires that the time trends of outcome variables in regions with larger tariff cuts would be parallel with those in other regions if China had not lowered tariffs. However, this may not be taken for granted. We conduct the pre-trends examination as follows.

First, we use the UHS data for 1997-2001, calculate the changes in outcomes variables at city level between 1997 and 2001, and then plot these changes against the tariff changes between 2001 and 2005. The outcome variables include labor supply, wage, parental co-residence, household income per capita, and household consumption per capita. It would be a concern if the outcome changes between 1997 and 2001 are significantly different between the cities experienced larger tariff cut and others.

Figure 5 shows there is no such a pattern for these outcomes. Specifically, the correlations between the pre-WTO outcome changes and the post-WTO tariff changes are rather weak. These results suggest that the outcome trends between larger tariff cut cities and others would not significantly differ had there not been WTO accession.

We further investigate the pre-trends in Figure 6 by examining how the outcome difference between the cities with different tariff exposure evolves over time. Specifically, we create a dummy variable indicating whether regional tariff cut is large or small, according to the median of the regional tariff reduction. We regress the outcome variable against the interaction between this dummy variable and year dummies, and plot the coefficient for each year in Figure 6. The coef-

ficients reflect the outcome difference between the large tariff cut regions and the small tariff cut regions in each year compared to the reference year (1999). We can see that the patterns we documented in the previous sections only occurred after WTO entry. For example, wages, household income and consumption started to fall in the large tariff cut regions relative to other regions only after 2002, and labor supply, co-residence and household size also started to rise only after 2002. This further precludes the possibility of spurious pre-trends in driving our results.

5.2 Controlling for potentially confounding factors

Non-tariff barriers. In addition to tariff reduction, China also substantially reduced various non-tariff barriers (NTBs). One potential confounding factor in our analysis is the relaxation of import license control. Every year China Customs announced a list of products requiring an import license. Because the total number of licenses is subject to government control, the license essentially serves as a quota. Drawing on annual circulars of the Ministry of Foreign Trade and Economic Cooperation and the Ministry of Commerce, we construct a city-level measure of import license control as the share of products produced in this city that are under import license control. The details of the measure construction is described in Appendix A2. The average city level measure of import license declined by 6.5 percentage points during 1998-2007. We include this measure in the regression to control for the impact of import licenses.

FDI restrictions. Another major form of liberalization accompanying the WTO entry is the FDI liberalization policies. The FDI restrictions took various forms, such as higher initial capital requirements, less favorable tax treatment, more complicated business registry and approval procedures, and in the case of joint ventures, requirement of majority shareholding by a Chinese party. These restrictions were largely removed right after China's WTO accession.

Based on the FDI restriction data from Catalogue for the Guidance of Foreign Investment Industries issued by the Ministry of Commerce of China.[11] We construct city-level FDI restriction

[11]The Catalogue is a major source of reference for the government in approving foreign investment projects. The Catalogue lists the industries of "encouraged", "restricted" or "prohibited" categories. The unlisted industries are

measure as the share of industries that are either "prohibited" or "restricted" in the Catalogue. See details in Appendix B. Notably, since the Catalogue covers all industries, including services, our city-level FDI restriction measure captures the FDI liberalization not only in tradable but also non-tradable sector. The average city-level FDI restriction declined by 2 percentage points during 2001-2006.

Export shocks. China's WTO entry is also associated with remarkable export boom. Economists have found that tariff uncertainty reduction resulting from the US granting permanent normal trade relations (PNTR) to China after China's WTO entry has substantially increased Chinese exports (Handley and Lim?o, 2017; Pierce and Schott, 2016). We construct regional level tariff uncertainty measures to capture the export effects. See Appendix B for details. We interact this variable with a post-WTO dummy which equals 1 for years later than (including) 2002. Theoretically, cities facing larger tariff uncertainty pre-WTO will experience larger reductions in tariff uncertainty after China's WTO entry. Therefore, we expect exports to grow faster in these regions in the Post-WTO years.

Minimum wage policies. Another confounding factor is the minimum wage policy. The prefecture governments set the minimum wage on a yearly basis, which may impact the wage and consumption of the households. If larger tariff cut is associated with slower minimum wage growth, the identified effects in our previous estimation may be biased. We collect the minimum wage from all the cities after 1998 from City Statistical Yearbooks.

Housing prices. Housing prices affect many dimensions of household behaviors, including labor supply, co-residence, consumption, and savings. To ensure our results are not driven by changing housing prices, we control for an index of housing prices at city level obtained from Fang et al. (2016).

considered "allowed". Investments are completely banned in the "prohibited" industries while are subject to various forms of restrictions mentioned above in "restricted" industries. The Catalogue is amended every 3 to 5 years. For our sample period, we use the Catalogue issued in 1997, 2002 and 2004.

Other unobservable local shocks. As a final check of the confounding variables, we include the interaction terms between province dummies and a post-WTO dummy. These interaction terms absorbs all time-varying shocks at the provincial level, thus the identification of the tariff effects is based on the cross-city variation of tariff exposure within a province.

In Pane A of Table 6, we conduct the robustness checks with all these potentially confounding policy variables. We report the OLS estimation result of the tariff variable when a policy variable is included in the regression. Column (1), for example, shows the estimated impact of tariff on log wage with import license as an additional control variable in the regression. We can see that the estimated coefficient is still statistically significant at the 5 percent level. Other results reported in Panel A are qualitatively similar to the baseline results in the previous tables, although the magnitude of the coefficients may be different. These exercises indicate that our results are not sensitive to the inclusion of policy control variables.

5.3 Alternative measures of regional tariffs

We also experiment with several alternative regional tariff measures. First, to account for the effect of both output tariff and input tariff, we calculate regional-level effective rates of protection (ERP). The regional ERP is constructed as employment-weighted average of the industry-level ERP.[12] (2) Second, we use the theory-consistent measure of regional tariffs as in Kovak (2013), where the employment weights are adjusted for labor cost share. Third, we use the employment weights in 2001, i.e. the year just prior to China's WTO entry, instead of using the average employment weights over 1998-2001. Fourth, in our baseline regression, we set the tariff level in 1998-2001 to be constant over time. Now we allow the tariff level to vary during this period. As can be seen from the Panel B of Table 6, all the baseline results still hold with these alternative regional tariff measures.

[12]The industry level ERP is constructed as follows: $ERP_i = \frac{outputtariff_i - MS_i \times inputtariff_i}{1 - MS_i}$, where $outputtariff_i$ is output tariff in industry i, and is input tariff. MS_i is the share of intermediate input costs over total output.

5.4 Alternative samples

We now conduct more robustness checks with alternative samples. First, not all cities exist throughout the whole period between 1999 and 2008 in the sample. To deal with the potential selection issue, we re-estimate everything using a balanced sample of cities that stay in our sample every year during 1999-2008.

The estimation results are shown in the Panel C of Table 6. The estimated effect of tariffs on wages, labor supply, household size, co-residence, household income per capita, and household consumption survived almost all these tests.

5.5 Migration issues

A challenge to the regional approach in this paper is that labor may migrate across regions in response to trade shocks, thus arbitraging away any cross-regional wage differences. We deal with the migration issue in several ways. First, we only keep the individuals who lived in the current city before 2002 and conduct our baseline regressions on various outcome variables with this new sample. The last row of Table 6 shows that restricting the sample to people who lived in the current city before 2002 does not affect our conclusion about the effects of tariff cut on the various outcomes.

Second, the UHS provides information on when the individual started to live in current place, which enables us to directly examine how the tariff affects the migration decision. Column (1) of Table A8 in the Appendix shows that whether an individual moving to the current city after 2002 is not significantly affected by the regional tariff. Lastly, using Chinese population census data in 2000 and 2005, we calculate the log change of working age population in each city and regress it on the regional tariff change between 1999 and 2004. Column (2) of Table A8 shows that the change of working age population in the city is not significantly associated with regional tariff change.

Taken together, these results suggest that migration decision is not affected by trade liberalization shocks, and excluding migrants does not bring material changes to our previous results.

6 Discussion

The previous analysis shows households would increase labor supply, enlarge household size, and reduce saving rate in presence of worse local labor market caused by lowered regional tariff. A natural question is that how much these behaviors buffer the negative income shock and this section tries to answer it.

Increased labor supply. Given the estimates in Tables 2 and 3. One percentage point increase in regional tariff leads to a 0.42 percentage points increase in labor supply and a 1.8 percent decrease in wage. Since 71 percent individuals are working on average, the increased labor supply would offset the negative income shock by 15-30 percent.[13]

Changed household structure. Above analysis also suggest young adults will move to co-resident with their parents when regional tariff is lowered. Because of scale of economy, larger households would reduce living cost per capita and consumption demand would be lowered as a result. Consistently, columns 3 and 4 in Table 5 show that about 13-16 percent of the effect of tariff on household consumption could be explained by changed household structure.

Less saving. This may be self-evident as shown in Table 5, as the coef. in consumption are smaller than that in income. The estimates suggest 13-35 percent of shock in income could be offset by saving.

7 Conclusion

The extant literature finds substantial adjustments in the labor market due to trade liberalization. However, insufficient attention has been paid to how households adjust to such trade-induced labor

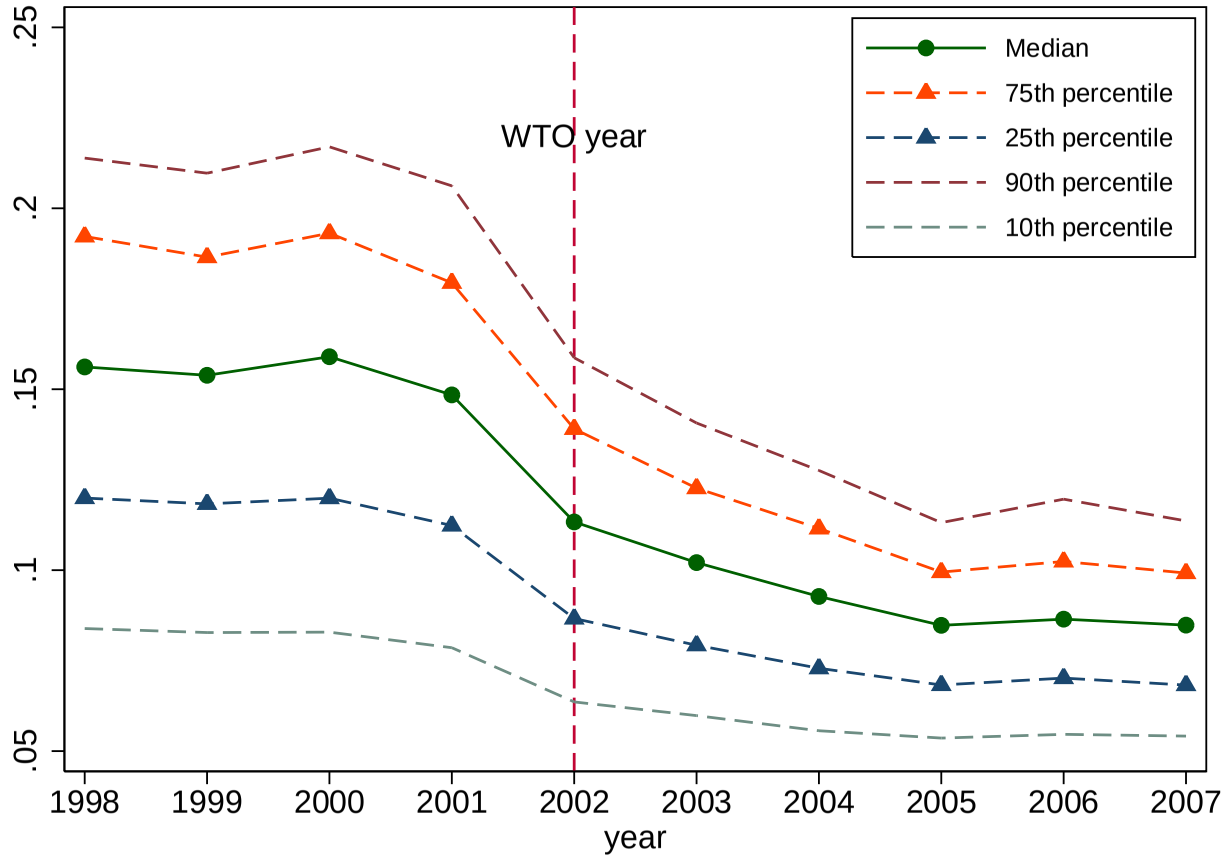
[13]The mean level of tariff cut is 7 percent points. Suppose initial wage is w_0. Local income change = $(0.7+0.028)*(1-0.123)w_0$ - $0.7w_0 = -0.0615w_0$. If no labor supply increase but wage decrease the same, local income change would be $0.7(1-0.123)w_0$ - $0.7w_0 = -0.0861w_0$. Therefore, increased labor supply offset 29%. This is an up bound estimation because we assume the elasticity of wage respect to labor supply is zero. If we relax this assumption and set the elasticity -0.5, the increased labor supply would offset 15%.

market shocks. Using a comprehensive household survey in urban China, we systematically examine how trade liberalization affects household behaviors and outcomes, including labor, living arrangements, income and consumption. We explore the regional variation in the exposure to tariff reduction caused by China's WTO accession.

Our results suggest that regional tariff cuts caused relative declines in local wages. However, households conduct a set of behaviors to buffer such income shocks. First, household members work more, especially in the non-tradable sector. The increase in labor supply is larger for females and the elderly, consistent with the "added worker effects" in the labor literature. Second, more young adults move to live with their parents for expenditure sharing. Finally, households also lower their saving rate to smooth consumption. Based on our estimates, the reduction of consumption due to trade liberalization would be 30-50% larger if households do not take these behaviors. Therefore, we conclude that households play an important role in insuring the individuals against the labor market shocks induced by trade liberalization.

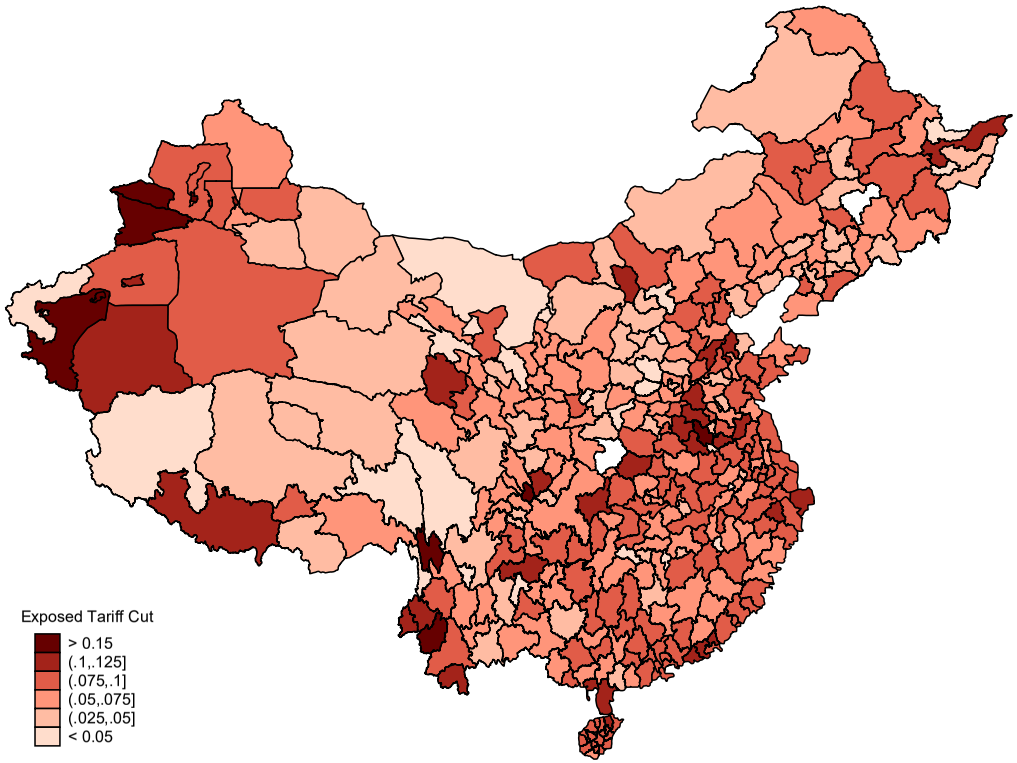
Our findings contribute to several on-going literatures and provide important policy implications. First of all, our results build up the current literature on the regional impact of trade liberalization by investigating various margins of household responses. Investigating the household behaviors enriches our understanding on how the economy adjusts to trade liberalization, and on the welfare implications of trade liberalization. Second, the impact of trade liberalization on household structures would have important implications for earning trajectory of the young people, living arrangement of the seniors, and design of the social insurance. The increased household size or more parental co-residence may lead to lower demand of household goods consumption per capita. Finally, by investigating the exogenous shocks of labor market caused by trade liberalization, we provide new evidence on how people respond to them to smooth consumption, which has important welfare implications.

Figure 1: Regional Tariff, 1998-2007



Note: The figure shows the median and various percentiles of the regional tariffs during 1998-2007.
Data source: author's own calculation based on Annual Survey of Industrial Firms (ASIF) and tariff data.

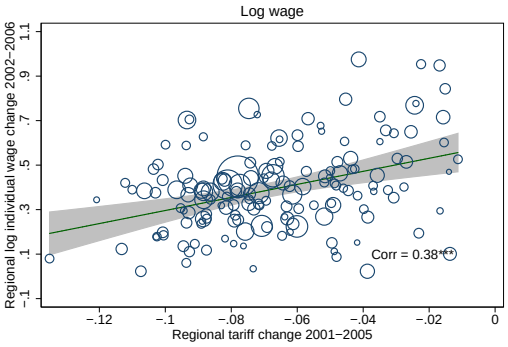
Figure 2: Geographical distribution of Regional Tariff Cut between 1998-2007 in Mainland China



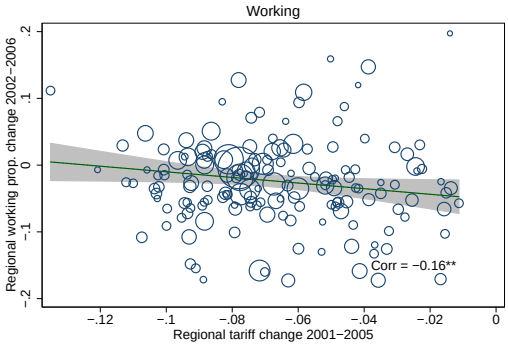
Note: The figure shows the geographical distribution the changes in regional tariffs during 1998-2007.
Data source: Author's own calculation based on Annual Survey of Industrial Firms (ASIF) and tariff data.

Figure 3: Relationship between changes in regional tariff and changes in outcomes

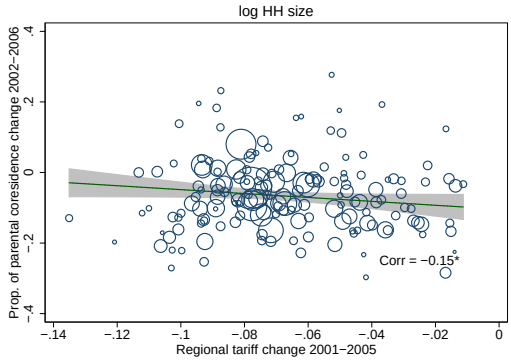
(a) Wage



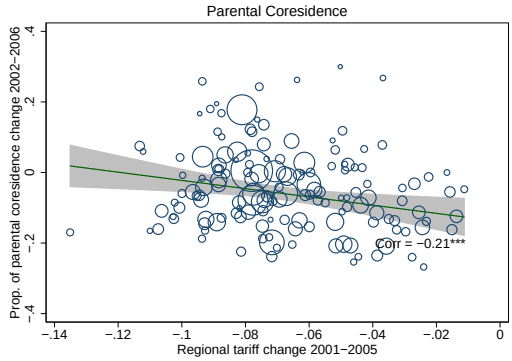
(b) Working



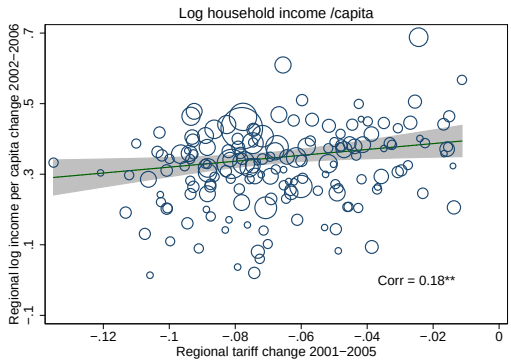
(c) Household size



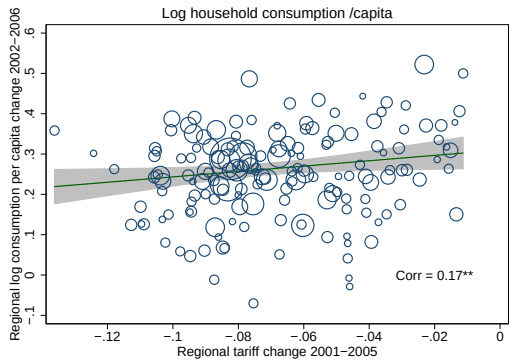
(d) Parental co-residence



(e) Household income



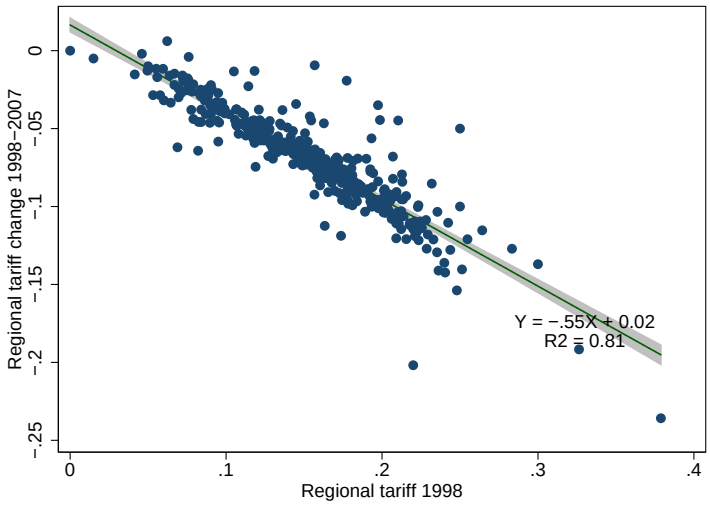
(f) Household consumption



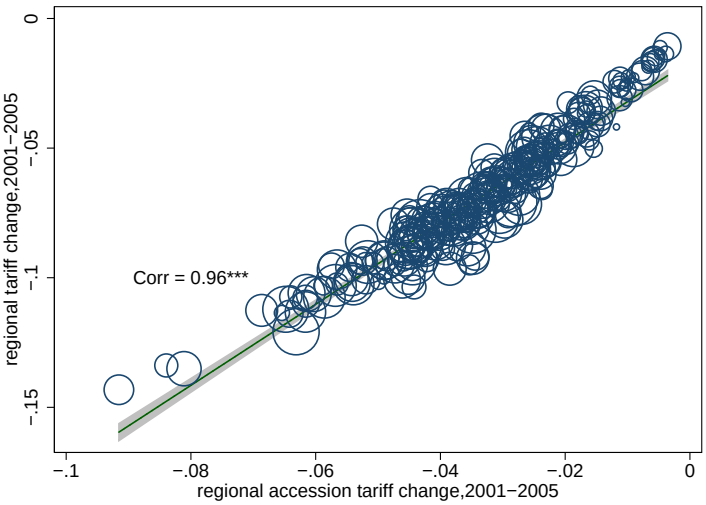
Note: Each circle represents a city. Circle size represents sampling size of the city in UHS. X-axis: regional tariff change between 2001-2005. Y-axis: the change between 2002-2006 for (a) proportion of working people (b) log wage (c) proportion of households with parental co-residence (d) real household income per capita (e) real household consumption per capita.
Data source: Author's own calculation based on UHS and tariff data.

Figure 4: Relationship between regional WTO accession tariff and actual tariff

(a) Tariff cuts over initial tariff level

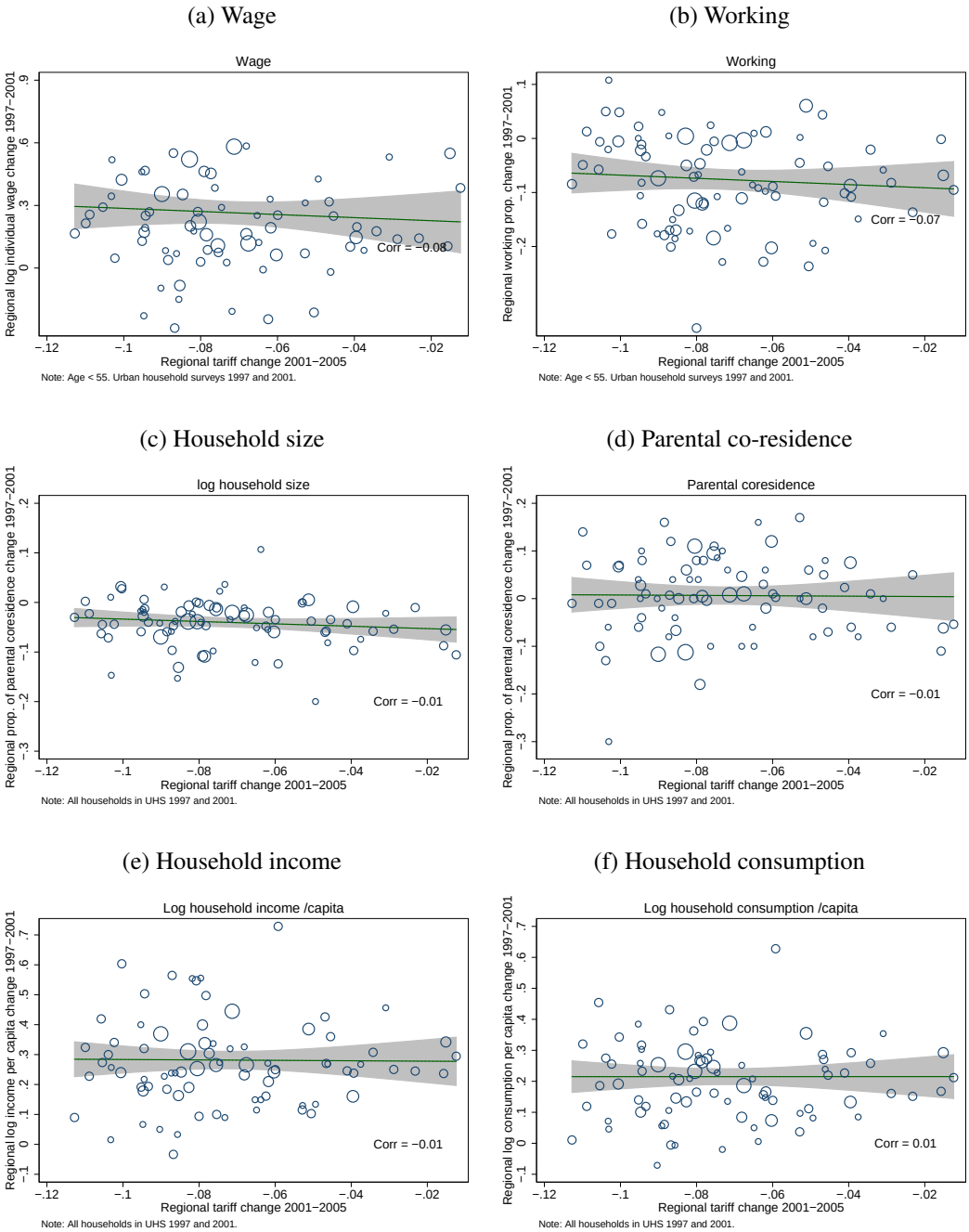


(b) Changes in Actual tariff v.s. Changes in Accession tariff



Data source: author's own calculation based on Annual Survey of Industrial Firms (ASIF) and tariff data.

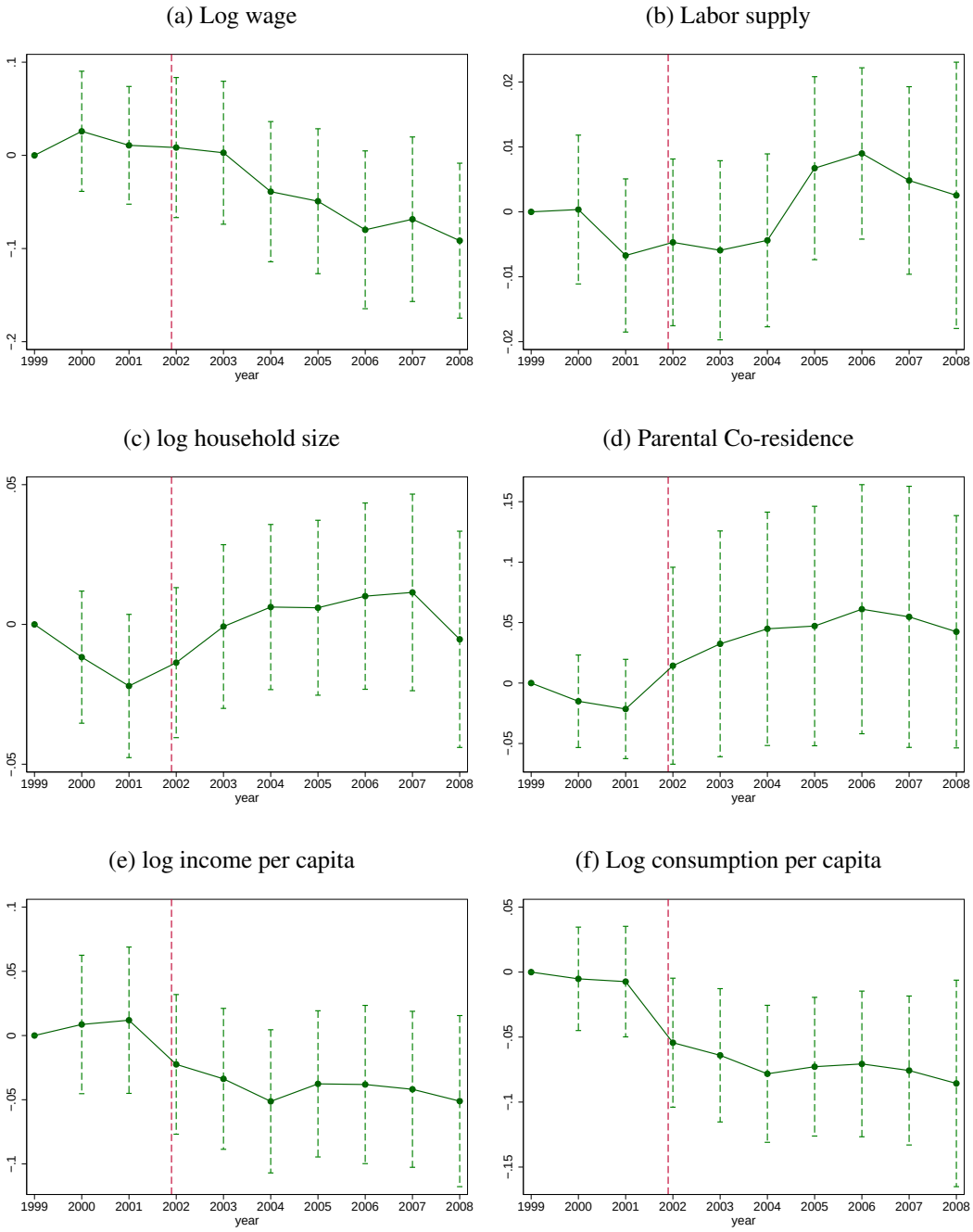
Figure 5: Pre-trends examination



Note: Each circle represents a city. Circle size represents sampling size of the city in UHS. X-axis: regional tariff change between 2001-2005. Y-axis: the change between 1996-2001 for (a) log wage (b) proportion of working population (c) log household size (d) proportion of households with parental co-residence (e) log real household income per capita (f) log real household consumption per capita.

Data source: Author's own calculation based on UHS and tariff data.

Figure 6: Difference between larger tariff cut regions and others over time



Note: We replace the tariff variable in equation (2) by a dummy variable for prefectures with larger tariff cuts and its interactions with year dummies and report the corresponding and confidence intervals here. The dependent variables are (a) log wage (b) working (c) log household size (d) parental co-residence (e) log real household income per capita (f) log real household consumption per capita.
Data source: Author's own calculation based on UHS and tariff data.

Table 1: Summary statistics

	(1)	(2)	(3)
Panel A: Individual level variables			
Sample	Full sample	Age < Retire age	Age >= Retire age
Working (Yes = 1)	0.71	0.85	0.17
	(0.45)	(0.36)	(0.37)
Working at tradable sector	0.17	0.22	0.01
(Yes = 1)	(0.38)	(0.41)	(0.11)
Working at non-tradable sector	0.53	0.63	0.15
(Yes = 1)	(0.50)	(0.48)	(0.36)
Working hours (Monthly)	119.1	145.1	16.0
	(91.9)	(80.9)	(52.1)
Log(wage)	4.53	4.60	3.30
	(1.06)	(0.95)	(1.78)
Observations	591,063	470,623	120,440
Panel B: Household level variables			
Sample	Full sample	HH head age < 50	HH head age $\geqq$ 50
Household size	2.95	3.03	2.84
	(0.83)	(0.63)	(1.01)
Parental co-residence	0.31	0.17	0.49
(Yes = 1)	(0.46)	(0.37)	(0.50)
Household head living with adult	0.26	0.09	0.48
children (Yes = 1)	(0.44)	(0.28)	(0.50)
Household head living with	0.05	0.08	0.02
parent(s) (Yes = 1)	(0.22)	(0.27)	(0.13)
Household yearly income per capita	11.2	10.6	12.0
(1,000 yuan)	(8.6)	(8.5)	(8.7)
Consumption yearly per capita	7.4	7.1	7.7
(1,000 yuan)	(5.5)	(5.4)	(5.7)
Saving rate	0.28	0.27	0.30
	(0.25)	(0.25)	(0.26)
Observations	251,506	142,278	109,228

Note: Standard deviations in parentheses.

Table 2: Lowered Wage and Increased Labor Supply

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Dep. Var:	Log (Wage)			Working (Yes = 1)	Tradable sector (Yes = 1)	Non-tradable sector (Yes = 1)	Log(Working hours)
Sample	Full sample	Tradable	Non-tradable	Full sample			Working people
Panel A: OLS							
Tariff	1.76***	2.22***	1.45***	-0.42***	0.43**	-0.85***	-1.42**
	(0.47)	(0.77)	(0.42)	(0.14)	(0.18)	(0.21)	(0.67)
Observations	379,389	95,205	282,225	591,063	591,063	591,063	229,160
R^2	0.35	0.36	0.36	0.53	0.12	0.28	0.15
Panel B: 2SLS							
Tariff	2.67***	3.05***	2.47***	-0.59***	0.29	-0.88***	-1.05
	(0.74)	(0.90)	(0.72)	(0.18)	(0.21)	(0.24)	(0.72)
Observations	379,389	95,205	282,225	591,063	591,063	591,063	229,160
R^2	0.35	0.36	0.36	0.53	0.12	0.28	0.15
Controls in both panels							
Basic controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Clusters	179	179	179	179	179	179	166

Note: Dependent variable is log yearly wage at individual level. Panel b uses regional WTO accession tariff as instrument for regional tariff. Column (2) only includes workers in the tradable sector (manufacturing and mining). column (3) only include workers in the non-tradable sector. Column (7) include only working people. All regressions include dummies of city, survey year, gender (male/female), education (junior high or below, senior high, and college or above), and interactions between city and gender, interactions between gender, year, and age, and interactions between gender and education.
Standard errors in parentheses are clustered at the city level.
*** p<0.01, ** p<0.05, * p<0.1

Table 3: Labor supply adjustment: Heterogeneity

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Dep. Var.:	Working or not		Working at tradable sector		Working at non-tradable sector		Log wage	
Sample	Male	Female	Male	Female	Male	Female	Male	Female
Panel A: OLS								
20-29	-0.42	-1.23***	0.15	-0.13	-0.57	-1.10**	1.2	0.5
30-39	-0.10	-0.59**	0.30	0.11	-0.40	-0.69	1.7***	0.8
40-49	-0.13	-0.76**	0.60	0.64	-0.73**	-1.40***	1.9***	1.7***
50-59	-0.03	-0.45	0.48	-0.02	-0.51	-0.43	2.6***	2.7*
60+	-2.39***	-1.08***	-0.06	0.02	-2.33***	-1.10***	-	-
Panel B: 2SLS								
20-29	-0.31	-0.98***	0.19	-0.03	-0.50	-0.95***	2.4**	1.5
30-39	-0.11	-0.49***	0.57*	0.32	-0.68**	-0.81*	2.4***	1.7*
40-49	-0.03	-0.55**	0.89***	0.67	-0.92***	-1.22***	1.9**	2.0**
50-59	-0.21	-0.26	0.76**	0.05	-0.97***	-0.30	4.3***	5.7***
60+	-1.48***	-0.61**	-0.07	0.04	-1.41***	-0.65**	-	-

Note: This table reports estimation of equation 2 by gender and age group. Dependent variables are all at individual level. Column (1) - (2): working or not (yes=1); Column (3) - (4): working for tradable sector (yes=1); Column (5) - (6): working for non-tradable sector (yes=1). Column (7) - (8): log monthly wage. Panel B use regional WTO accession tariff as instrument for regional tariff. All regressions include dummies of city, survey year, gender (male/female), education (junior high or below, senior high, and college or above), and interactions between city and gender, interactions between gender, year, and age, and interactions between gender and education.
Standard errors in parentheses are clustered at the city level.
*** p<0.01, ** p<0.05, * p<0.1

Table 4: Effects of regional tariff on Household Size and Parental Co-residence

Dep. Var.	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Log (Household size)			Parental co-residence (Yes = 1)			Head with children	Head with parents
Sample	Full sample	HH head age < 50	HH head age $\geqq$ 50	Full sample	HH head age < 50	HH head age $\geqq$ 50	HH head age $\geqq$ 50	
Panel A: OLS								
Tariff	-0.27**	-0.12	-0.54**	-0.50**	-0.19	-1.09**	-1.13**	0.03
	(0.13)	(0.11)	(0.25)	(0.24)	(0.18)	(0.50)	(0.50)	(0.05)
Observations	251,492	142,264	109,228	251,492	142,264	109,228	109,228	109,228
R-squared	0.11	0.10	0.08	0.21	0.14	0.09	0.09	0.03
Panel B: 2SLS								
Tariff	-0.35**	-0.24*	-0.50*	-0.35	-0.16	-0.79*	-0.86*	0.08
	(0.15)	(0.13)	(0.29)	(0.26)	(0.20)	(0.48)	(0.48)	(0.08)
Observations	251,492	142,264	109,228	251,492	142,264	109,228	109,228	109,228
R-squared	0.11	0.10	0.08	0.21	0.14	0.09	0.09	0.03
Controls in both panels								
Basic controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Clusters	179	179	179	179	179	179	179	179

Note: Dependent variables are at household level. Columns (1) - (3): log household size; Columns (4) - (6): dummy of co-residence between two adult generations (yes=1); Columns (2) and (5) include households whose household head are aged below 50, Columns (3) and (6) include households whose household head are aged 50 or above. Panel B use regional WTO accession tariff as instrument for regional tariff. All regressions include dummies of city, survey year, household head characteristics including gender (male/female), education (junior high or below, senior high, and college or above), and interactions between city and gender, interactions between gender, year, and age, as well as interactions between gender and education. Standard errors in parentheses are clustered at the city level.

*** p<0.01, ** p<0.05, * p<0.1

Table 5: Effects on household income, consumption, and saving

	(1)	(2)	(3)	(4)	(5)	(6)
Dep. Var.	Log (Household income /capita)		Log (Household consumption /capita)		Saving rate	
Panel A: OLS						
Tariff	1.17***	1.05***	1.03***	0.90***	0.07	0.08
	(0.36)	(0.36)	(0.33)	(0.32)	(0.12)	(0.12)
Observations	251,492	251,492	251,492	251,492	251,492	251,492
R-squared	0.42	0.47	0.36	0.42	0.07	0.07
Panel B: 2SLS						
Tariff	1.58***	1.42***	1.08**	0.91*	0.31**	0.32**
	(0.55)	(0.54)	(0.51)	(0.50)	(0.15)	(0.15)
Observations	251,492	251,492	251,492	251,492	251,492	251,492
R-squared	0.42	0.47	0.36	0.42	0.07	0.07
Controls in both panels						
Basic controls	Yes	Yes	Yes	Yes	Yes	Yes
Household structure	No	Yes	No	Yes	No	Yes
Clusters	179	179	179	179	179	179

Note: Dependent variables: Column (1) log household income per capita; Column (2): log household real consumption per capita; Column (3) household saving rate. Panel B use regional WTO accession tariff as instrument for regional tariff. All regressions include dummies of city, survey year, household head characteristics including gender (male/female), education (junior high or below, senior high, and college or above), and interactions between city and gender, interactions between gender, year, and age, as well as interactions between gender and education.
*** p<0.01, ** p<0.05, * p<0.1

Table 6: Robustness Checks

Dep. var.	(1) Log wage	(2) Working	(3) log HH size	(4) Parental co-residence	(5) log(HH inc. /capita)	(6) log(HH consump /capita)
Panel A: Control for confounding factors						
Import license	1.26**	-0.38***	-0.51*	-1.22*	0.92**	0.74**
FDI restrictions	1.77***	-0.42***	-0.53**	-1.06**	1.18***	1.04***
Exports	2.00***	-0.42***	-0.45*	-0.81**	1.27***	1.05***
Housing price	1.74***	-0.43***	-0.54**	-1.04**	1.19***	0.99***
Minimum wage	1.78***	-0.43***	-0.48**	-0.92**	1.21***	1.02***
Province*Post WTO	1.63***	-0.48***	-0.43*	-0.66**	0.91***	0.57*
Panel B: Alternative regional tariff measures						
Effective rate of protection	0.46***	-0.11***	-0.13*	-0.27*	0.30***	0.28***
Labor-share adj.	1.38***	-0.32***	-0.40*	-0.41*	0.95***	0.82***
2001 weights	1.68***	-0.43***	-0.55**	-0.85*	1.05***	0.92***
Using 1999-2001 actual tariff	1.57***	-0.39***	-0.48**	-0.99*	1.00***	0.79**
Panel C: Results in alternative samples						
Consistent cities (1999-2008)	2.94***	-0.66***	-0.60*	-1.38**	1.25**	1.24**
Living here since 2001	1.77***	-0.42***	-0.53**	-1.09**	1.19***	1.04***

Note: This table reports the OLS coefficients of regional tariff measures under specific setting. Panel A: "Import license" controls for regional measure of import license restrictions. "FDI" controls for regional measure of FDI restrictions. "exports" controls for the interaction between the post-WTO dummy and the regional tariff gap measure. "Minimum wage" controls for prefecture minimum wage standards, housing price index, and dummies for province interacting with post-WTO. Panel B: "effective rate of protection" uses regional effective rate of protection. "2001 weight" uses employment weight in 2001 to construct regional tariff measure. "1998-2001 actual tariff" allows tariff to vary between 1998-2001. Panel C: "Consistent cities" uses 96 cities that exist every year during 1998-2008.

*** p<0.01, ** p<0.05, * p<0.1

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Online Appendix

A1 The impact of tariff reduction on firm-level outcomes

In this appendix section we investigate how tariff reduction affect firm performance, using Chinese firm-level data. The purpose of doing this is two folded. First, we can check whether the wage effects we found using household data are also present in the firm-level data. If so, they provide cross-validation for the wage results presented in the main text. Second, we can explore how other firm performance, such as investment, sales, and profit, are affected by tariff change, and whether such changes are consistent with the wage effects. In other words, examining the response of these firm performance variables are useful in revealing the mechanism underlying the impact of tariff on wages.

The main data set we use are the Annual Survey of Industrial Firms for 1998-2007. We estimate the following equation.

$$Y_{fct} = \alpha + \beta Tariff_{c,t-1} + v_f + \lambda_t + \varepsilon_{ft}$$

Where f, c, t refers to firm, city, and year, respectively. is the outcome variable. Y_{fct} is the constructed regional tariff in the main text. We include firm fixed effects (v_f) to capture the effect of time-invariant firm heterogeneity, and year fixed effects (λ_t) to capture the effect of economy-wide shocks. We estimate the equation by OLS and cluster the standard error at city-year level.

Equation (A1) exploits the variation of tariff changes across cities. We also estimate another equation, exploiting the variation of tariff changes across industries, as follows:

$$Y_{fjt} = \alpha + \beta Tariff_{j,t-1} + v_f + \lambda_t + \varepsilon_{ft}$$

The only difference between Equation (A2) with (A1) is that here the independent variable is the 4-digit CIC industry-level tariff ($Tariff_{j,t-1}$) instead of the regional tariff. We can estimate this equation because the ASIF data reports firm's detailed industry affiliation. We estimate the equation by OLS and cluster the standard error at industry-year level.

For each of these two specifications, we report the results for four outcome variables: log

wage, log investment, log domestic sales, and log profit. The first variable directly checks the wage effects of trade liberalization, while the other three variables help revealing the mechanism of the wage effects. That is, whether firms lower their wages because tariff reduction reduced investment, profit, sales, etc.

The results are reported in Table A4. In Column (1), tariff reduction is associated with lower wages. This holds regardless of whether the tariff measure is at the regional or industry level. The results corroborates our findings using household data that regional tariff reduction reduced local wages. In Columns (2) - (4), tariff reduction is associated with lower investment, lower domestic sales, and lower profit. This suggests that the reason why firms lower wages is that the import competition resulting from tariff reduction reduced firms' profitability in the short-run and firms transmit such shocks to workers through lowering wages.

A2 Construction of measures in the robustness section

Import License Control. We assembled information on the licensing of imports at HS 8-digit level, drawing on annual circulars of the Ministry of Foreign Trade and Economic Cooperation and the Ministry of Commerce. We construct city-level import license measure as follows. First, we measure the extent of import license control for each 4-digit CIC industry as the share of HS8 products under import license control within this industry. Second, we construct city level import license measure as employment weighted average of the share across all industries.

FDI restrictions. Our data on FDI restrictions is from the Catalogue for the Guidance of Foreign Investment Industries issued by the Ministry of Commerce of China. Based on the industry descriptions listed in the Catalogue, we first map city-level FDI restriction measures to CIC 4-digit, and categorize a CIC industry as subject to an FDI restrictions if it is either restricted or prohibited. We then further map 4-digit CIC to the 1-digit industry classification in the UHS data and calculate the share of 4-digit CIC industries that are restricted within each 1-digit industry. Finally, we construct city-level FDI restriction as the employment weighted average of the share across all 1-digit industries, where the 1-digit employment data is obtained from the UHS.

Export Shocks. To control for export shocks, one strategy is to include the region's export value in the regression. However, this strategy suffers from obvious endogeneity problem. For example, export boom may increase wages, but rising wages may also reduce exports. Therefore, we need more exogenous variations that affect exports but not directly affect local labor market outcomes. The recent literature finds that tariff uncertainty reduction resulting from the US granting permanent normal trade relations (PNTR) to China after China's WTO entry has substantially increased Chinese exports (Handely and Limao, 2017; Pierce and Schott, 2016). Therefore, we construct regional level tariff uncertainty measures to capture the export effects.

We construct regional tariff uncertainty measures as follows. First, following Handely and Limao (2017) and Pierce and Schott (2016), we define tariff uncertainty for each HS 8-digit product as the difference between the MFN tariff and the US "Column 2" tariff in year 2000. We call this tariff uncertainty measure "GAP":

$$GAP_g = Tariff_{column2,g} - Tariff_{MFN,g}$$

Second, we map HS 8-digit goods to 4-digit CIC industry, and calculate the CIC industry level GAP as the simple average of the GAP for all HS products within this industry. Third, we calculate the GAP for each city as the weighted average of GAP across all industries in the city, where we use the share of an industry's export value in the city's total export value in 2000 as weights.[14]

$$GAP_c = \sum_g s_{cg,2000} GAP_g$$

This regional GAP variable captures the degree of tariff uncertainty of each city in the Pre-WTO year. We interact this variable with a post-WTO dummy ($Post - WTO$) which equals 1 for years later than (including) 2002. Theoretically, cities facing larger tariff uncertainty pre-WTO will experience larger reductions in tariff uncertainty after China's WTO entry. Therefore, we expect exports to growth faster in these regions in the Post-WTO years.

[14]This strategy has been used in Facchini et al. (2017). Alternatively, Erten and Leight (2017) used regional employment weights instead of export weights. We experiment with both and find similar results.

Appendix Table A1: Tariff and changes in different industries

(1) CIC code	(2) Industry name	(3) Tariff 1998	(4) Tariff 2007	(5) Change
15	Manufacture of Beverages	0.465	0.231	-0.235
16	Manufacture of Tobacco	0.537	0.315	-0.221
21	Manufacture of Furniture	0.220	0.019	-0.201
17	Manufacture of Textile	0.261	0.112	-0.149
28	Manufacture of Chemical Fibers	0.164	0.043	-0.121
13	Processing of Food from Agricultural Products	0.263	0.150	-0.113
14	Manufacture of Foods	0.276	0.166	-0.111
18	Manufacture of Textile Wearing Apparel, Footwear and Caps	0.279	0.173	-0.106
37	Manufacture of Transport Equipment	0.211	0.108	-0.103
11	Support Activities for Mining	0.233	0.133	-0.100
40	Manufacture of Communication Equipment, Computers and Other Electronic Equipment	0.156	0.060	-0.096
42	Manufacture of Artwork and Other Manufacturing	0.231	0.135	-0.096
19	Manufacture of Leather, Fur, Feather and Related Products	0.232	0.148	-0.084
30	Manufacture of Plastics	0.186	0.102	-0.084
36	Manufacture of Special Purpose Machinery	0.137	0.053	-0.083
20	Processing of Timber, Manufacture of Wood, Bamboo, Rattan, Palm and Straw Products	0.120	0.042	-0.078
22	Manufacture of Paper and Paper Products	0.132	0.057	-0.076
24	Manufacture of Articles For Culture, Education and Sport Activities	0.205	0.130	-0.075
23	Printing, Reproduction of Recording Media	0.116	0.044	-0.072
41	Manufacture of Measuring Instruments and Machinery for Cultural Activity and Office Work	0.138	0.070	-0.069
39	Manufacture of Electrical Machinery and Equipment	0.179	0.117	-0.062
35	Manufacture of General Purpose Machinery	0.141	0.085	-0.056
27	Manufacture of Medicines	0.104	0.052	-0.052
26	Manufacture of Raw Chemical Materials and Chemical Products	0.127	0.080	-0.047
29	Manufacture of Rubber	0.182	0.137	-0.045
31	Manufacture of Non-metallic Mineral Products	0.157	0.116	-0.041
34	Manufacture of Metal Products	0.146	0.108	-0.038
7	Extraction of Petroleum and Natural Gas	0.050	0.020	-0.030
32	Smelting and Pressing of Ferrous Metals	0.056	0.035	-0.021
33	Smelting and Pressing of Non-ferrous Metals	0.052	0.032	-0.020
25	Processing of Petroleum, Coking, and Processing of Nuclear Fuel	0.056	0.043	-0.013
10	Mining and Processing of Non-metal Ores	0.045	0.036	-0.009
9	Mining and Processing of Non-Ferrous Metal Ores	0.012	0.004	-0.007
6	Mining and Washing of Coal	0.046	0.044	-0.002
8	Mining and Processing of Ferrous Metal Ores	0.000	0.000	0.000

Appendix Table A2: Regional tariff change in different cities

(1) City name	(2) Tariff 1998	(3) Tariff 2007	(4) Tariff change	(5) Major industry in 1998-2001
Panel a: Five cities with largest cut				
Shi yan	0.379	0.143	-0.236	Manufacture of Transport Equipment
Hao zhou	0.240	0.098	-0.142	Manufacture of Beverages
Zhou kou	0.244	0.116	-0.128	Manufacture of Textile
Fu yang	0.223	0.102	-0.122	Manufacture of Beverages
Pu ning	0.255	0.134	-0.121	Manufacture of Textile
Panel b: Five cities with smallest cut				
Chang zhi	0.072	0.056	-0.016	Mining and Washing of Coal
He gang	0.067	0.052	-0.015	Mining and Washing of Coal
Pan zhi hua	0.050	0.037	-0.013	Smelting and Pressing of Ferrous Metals
Qi tai he	0.060	0.048	-0.012	Mining and Washing of Coal

Appendix Table A3: Tariff and Firm-level Outcomes

	(1)	(2)	(3)	(4)
Dep. Var.	log wage	log investment	log dom. sales	log profit
Period	98-07	98-07	98-07	98-07
Panel A: Regional tariff				
Regional tariff	1.08***	1.08*	0.52	4.11***
	(0.25)	(0.59)	(0.35)	(0.83)
Observations	1,434,873	964,156	1,318,575	1,132,034
R-squared	0.724	0.666	0.868	0.811
Panel B: Industry tariff				
Industry tariff	0.14***	0.46***	0.16*	0.63***
	(0.05)	(0.17)	(0.10)	(0.15)
Observations	1,436,855	686,396	1,310,617	1,105,894
R-squared	0.688	0.684	0.840	0.793
Controls in both panels				
Firm FE	Yes	Yes	Yes	Yes
Year FE	No	Yes	No	Yes

Note: Dependent variable in each column: column (1): log wage; Column (2) log investment; Column (3) log domestic sales; Column (4) log profit. Panel A uses regional tariff, Panel B uses 4-digit industry tariff. All regressions include firm fixed effects and year fixed effects. Standard errors are clustered at city-year level in Panel A, and industry-year level in Panel B.
*** p<0.01, ** p<0.05, * p<0.1

Appendix Table A4: How tariff affects labor supply arrangement within couples

	(1)	(2)	(3)	(4)
Dep. Var.	Both working	Only husband working	Only wife working	Neither working
Sample	Households with head's age < 60			
Mean of dep. var.	0.748	0.182	0.027	0.043
Panel A: OLS				
Tariff	-0.55***	0.45***	0.03	0.06
	(0.20)	(0.16)	(0.06)	(0.06)
Observations	192,247	192,247	192,247	192,247
R-squared	0.29	0.14	0.04	0.21
Panel B: 2SLS				
Tariff	-0.72***	0.71***	-0.05	0.06
	(0.26)	(0.22)	(0.06)	(0.09)
Observations	192,247	192,247	192,247	192,247
R-squared	0.29	0.14	0.04	0.21
Controls in both panels				
Basic controls	Yes	Yes	Yes	Yes
Clusters	179	179	179	179

Note: Dependent variables are at household level. All regressions include dummies of city, survey year, household head characteristics including gender (male/female), education (junior high or below, senior high, and college or above), and interactions between city and gender, interactions between gender, year, and age, as well as interactions between gender and education.
Standard errors in parentheses are clustered at the prefecture level.
*** p<0.01, ** p<0.05, * p<0.1

Appendix Table A5: How tariff affects household age structure

	(1)	(2)	(3)	(4)	(5)	(6)
Dep. Var.	Prop. of people aged below 16 in the HH			Prop. of people aged over 60 in the HH		
Sample	Full sample	HH head age < 50	HH head age $\geqq$ 50	Full sample	HH head age < 50	HH head age $\geqq$ 50
Panel A: OLS						
Tariff	0.01	0.03	0.01	0.13**	0.00	0.33***
	(0.04)	(0.06)	(0.06)	(0.05)	(0.04)	(0.11)
Observations	251,492	142,264	109,228	251,492	142,264	109,228
R-squared	0.49	0.45	0.07	0.76	0.03	0.75
Panel B: 2SLS						
Tariff	0.02	0.04	0.03	0.18**	0.02	0.37**
	(0.05)	(0.08)	(0.08)	(0.07)	(0.05)	(0.15)
Observations	251,492	142,264	109,228	251,492	142,264	109,228
R-squared	0.49	0.45	0.07	0.76	0.03	0.75
Controls in both panels						
Basic controls	Yes	Yes	Yes	Yes	Yes	Yes
Clusters	179	179	179	179	179	179

Note: Dependent variables are at household level. All regressions include dummies of city, survey year, household head characteristics including gender (male/female), education (junior high or below, senior high, and college or above), and interactions between city and gender, interactions between gender, year, and age, as well as interactions between gender and education.
Standard errors in parentheses are clustered at the prefecture level.
*** p<0.01, ** p<0.05, * p<0.1

Appendix Table A6: Household Transfers

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Dep. Var.	Recieved public transfer (Yes = 1)		Log(Public transfer income)		Received private transfer (Yes = 1)		Log(Private transfer income)		Have any out-transfer (Yes = 1)		Log(transfer out)	
Mean	0.445		3.561		0.359		1.328		0.934		1.769	
Tariff	0.42**	0.39**	1.57**	1.22*	0.28	0.25	1.24	1.13	-0.03	-0.03	1.09	0.97
	(0.17)	(0.16)	(0.67)	(0.64)	(0.31)	(0.30)	(0.84)	(0.85)	(0.11)	(0.10)	(0.92)	(0.90)
Observations	218,819	218,819	97,367	97,367	218,819	218,819	78,493	78,493	251,492	251,492	234,773	234,773
R-squared	0.50	0.89	0.44	0.99	0.08	0.72	0.12	0.82	0.05	0.98	0.13	0.88
Controls in both panels												
Basic controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
HH structure	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
Clusters	166	166	166	166	166	166	166	166	179	179	179	179

Note: Dependent variable in each column: columns 1-2 received public transfer; columns 3-4 log (public transfer income); columns 5-6 received private transfer; columns 7-8 log (private transfer income); columns 9-10 conduct any out-transfer; columns 11-12 log (out-transfer). All the covarietes are the same as those in Table 5. Standard errors in parentheses are clustered at the prefecture level. The number of clusters in columns 1-8 is smaller because only the information is available in 2002-2008 UHS data.

*** p<0.01, ** p<0.05, * p<0.1

Appendix Table A7: Household Borrowing and Lending

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Dep. Var.	Borrow (Yes = 1)		Log(Money borrowed from others)		Lend (Yes = 1)		Log (Money lent to others)	
Tariff	0.35	0.36	0.01	-0.15	0.13	0.15	1.17	1.08
	(0.41)	(0.41)	(1.40)	(1.40)	(0.35)	(0.35)	(1.18)	(1.17)
Observations	251,492	251,492	155,130	155,130	251,492	251,492	189,648	189,648
R-squared	0.10	0.88	0.25	0.93	0.11	0.93	0.35	0.95
Controls in both panels								
Basic controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
HH structure	No	Yes	No	Yes	No	Yes	No	Yes
Clusters	179	179	179	179	179	179	179	179

Note: Dependent variable in each column: columns 1-2 borrowed any money; columns 3-4 log (money borrowed from others); columns 5-6 lent any money to others; columns 7-8 log (money lent to others); All the covariants are the same as those in Table 5. Standard errors in parentheses are clustered at the prefecture level.

*** p<0.01, ** p<0.05, * p<0.1

Appendix Table A8: Migration

Dep. Var.	(1) Moving here in 2002 or afterwards (Yes = 1)	(2) Change in log (working age population, 2000-2005)
Mean of dep. var.	0.018	
Panel A: OLS		
Tariff	0.07	0.422
	(0.05)	(0.424)
Observations	591,063	176
R-squared	0.05	0.328
Panel B: 2SLS		
Tariff	0.16	0.645
	(0.10)	(0.482)
Observations	591,063	176
R-squared	0.05	0.327
Controls in both panels		
Basic controls	Yes	Yes
Clusters	179	18

Note: Columns 1 includes basic controls the same as those in Table 2. Standard errors in parentheses are clustered at the city level. In column 2, dependent variable is the log change of city's working age population between 2000 and 2005, constructed using 2005 China Population Census. RTC is calculated as the regional output tariff change between 1999 and 2004. The instrument in panel b is regional tariff level in initial year (1998). Basic controls include province fixed effects. Standard errors (in brackets) are clustered at province level.
*** p<0.01, ** p<0.05, * p<0.1