

# Impact of US market access on local labour markets in Vietnam<sup>\*</sup>

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## Abstract

This paper examines the impact of US market access on local labour markets in a developing country, Vietnam. Following the implementation of the Vietnam–United States bilateral trade agreement (BTA) in December 2001, manufacturing employment increased in provinces that were more exposed to US tariff cuts. In those provinces, employment also increased in many service sectors, reflecting strong spillovers of job gains. Among three potential channels of local job gain spillovers, namely, demand, production and real estate, the demand channel is the most important. The BTA is also found to reduce employment gaps, especially in manufacturing, between females and males, rural and urban, and poor and rich households.

## KEYWORDS

employment, exports, propagation, US–Vietnam Bilateral Trade Agreement

## JEL CLASSIFICATION

F16

## 1 | INTRODUCTION

Amid the recent rise of populism and protectionism, the labour market implications of trade have increasingly moved to the centre of political and economic debates. Job gains and job losses from

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imports and exports are the most obvious, possibly naïve but politically powerful measures of gains and losses from trade. For that reason, local employment consequences of trade have become an important topic of research. Autor, Dorn, and Hanson (2013), in an influential paper, find that US regions that are more exposed to import-competing manufacturing industries witnessed larger declines in manufacturing employment and wages.

While the literature on labour market effects of globalization typically focuses on impacts due to import competition, this paper investigates local labour market consequences from the perspective of an exporting country.<sup>1</sup> It examines the effects of US market access on local labour markets in Vietnam, in the context of the US–Vietnam bilateral trade agreement (BTA) in December 2001. As a part of the BTA, the United States granted Vietnam most-favoured-nation (MFN) access to the US market. Vietnamese goods immediately benefited from large, sudden and across-the-board US tariff cuts, whereas the commitments from Vietnam were more gradual and mostly not related to tariffs.

We find that in provinces more exposed to industries that benefit from US tariff cuts, more new manufacturing jobs were created between 2001 and 2003. New jobs were also created in many other local service sectors, reflecting strong spillover effects of new job gains in the local economies. These new employment opportunities attracted labour from agriculture, reducing agricultural employment. The estimates capture general equilibrium effects of US market access on Vietnam's local labour markets. We explore three potentially important channels of job gain spillovers: demand-led, production-led, and construction and real estate-led. While there is evidence for all three channels, the demand channel is the most quantitatively important. Our finding lends support to the notion that trade could be a “push” factor for structural transformation in developing countries, i.e. labour moves from lowly to highly productive activities, hence helping raise the countries' aggregate productivity (McMillan & Rodrik, 2014).

We examine the impact of US market access on income. Non-farm income per capita significantly increased whereas farm income declined. Overall household income grew but this is not statistically significant. In addition, while the BTA lifted employment of all groups, it did more so for females, and poor and rural households. The finding suggests that the BTA carries important distributional implications: it helped reduce employment gaps between females and males, poor and rich households, and between rural and urban households.

To document these effects, we use data from the two Vietnam Households Living Standards Surveys (VHLSS) in 2002 and 2004. Both surveys recall activities in the past 12 months. In other words, we compare employment between 2001 and 2002 and 2003–2004. VHLSSs provide information on household income, expenditures, occupation and various other household and individual characteristics. While the unit of the identification variable (i.e. province's tariff cuts) is at the province level, the unit of the outcome variables is at the household level because households are our interest. We could also control for time-invariant factors at the household level and pre-existing household characteristics such as education, demographics and household employment.

Our paper is related to a large literature on labour market consequences of international trade. Much attention in the literature is paid to the US labour market and its import competition.<sup>2</sup> Besides

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<sup>1</sup>A growing literature examines the effects of exporting, for example, see McCaig (2013) on poverty, Brambilla, Lederman, and Porto (2013) on skills, Costa, Garred, and Pessoa (2016) on wages, McCaig and Pavcnik (2010) on labour allocation of labour across the informal microenterprise and formal sectors, and Erten and Leight (2018) on structural transformation.

<sup>2</sup>Autor et al. (2013) and Pierce and Schott (2018) find that US regions and industries more exposed to import-competition from China witness larger declines in manufacturing employment and wages. Using input-output linkages, Acemoglu et al. (2016) show that the employment losses also come from sizable negative upstream effects (i.e. on suppliers) in both manufacturing and non-manufacturing sectors. Ebenstein et al. (2016) estimate that globalization reduces wages between 12 and 16 percentage points in the US, via the reallocation of workers away from higher-wage manufacturing jobs into other sectors.

the United States, the literature on labour market consequences of trade mostly focuses on other importing countries.<sup>3</sup> Using geographical variation in the exposure to imports, they usually find negative labour market effects of import competition. Our paper is different to the literature in that we examine the labour market effects from the perspective of an exporting country.

Others have studied various impacts of exports, but not so much on the labour market transformation.<sup>4</sup> Our paper is most closely related to Erten and Leight (2018). Using a panel of Chinese counties from 1996 to 2013, they find that the counties more exposed to the reduction in tariff post-WTO accession witnessed increased exports and foreign direct investment, shrinking agricultural sectors, expanding secondary sectors, and higher GDP.

Our paper is structured as follows: section 2 discusses the background of the BTA. Section 3 presents our data sources. Section 4 discusses the identification strategy, model specifications and expected outcomes. Section 5 presents our baseline empirical results. Section 6 examines the three spillover mechanisms. Section 7 analyzes heterogeneous effects of the BTA across different sub-groups. Finally, section 8 concludes.

## 2 | BACKGROUND OF VIETNAM AND THE BTA

### 2.1 | US–Vietnam bilateral trade agreement in 2001

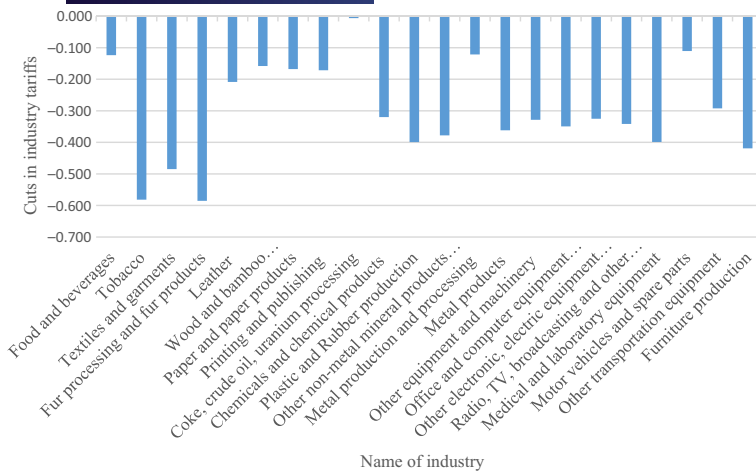
The US–Vietnam BTA was signed on 13 July 2000 and became effective on 10 December 2001. The United States granted Vietnam Most Favored Nation (MFN) access to the US market on the same basis it grants to other countries with which it has normal trade relations. Vietnamese goods immediately benefited from large, sudden and across the board US tariff declines. The MFN tariff cuts imply ‘that the tariff cuts offered by the United States are less susceptible to endogeneity concerns from political lobbying by Vietnamese and American industry groups’ (McCaig, 2013, p. 102). Figure 1 shows almost complete tariff reduction for most industries. Among traded industries, the simple mean of US tariffs fell from 28.9% to 3.7%.

Figure 1 reports the US tariff declines across industries in manufacturing sectors. Three industries – ‘tobacco’, ‘textiles and garments’ and ‘fur processing and fur products’ – had the highest tariff reductions. The coke, crude oil and uranium processing industry had the lowest tariff decline. Clearly, there is a large variation in tariff declines across industries. Pre-BTA industries tariff levels are strongly correlated to the tariff cuts (see Figure A1) because pre-BTA high tariffs had more room to decrease.

In contrast, the trade commitments for Vietnam were not immediate. Most of Vietnam's commitments were scheduled for implementation within three to four years, but some commitments were not required until up to 10 years. Most of Vietnam's commitments were about legal and regulatory changes as Vietnam already applied MFN tariffs to US products well before the BTA. ‘These commitments

<sup>3</sup>Topalova (2014, 2017) studies the effect of opening the Indian domestic market on poverty and find that districts more exposed to imports experience *slower* progress in poverty reduction. Kovak (2013) applies a specific-factors model of regional economies to Brazil's trade liberalization in the early 1990s. He also finds that regions where workers were concentrated in industries facing the largest tariff cuts were affected more negatively.

<sup>4</sup>McCaig (2013), in a seminal paper, uses 2002 and 2004 VHLSSs to examine poverty implications of US market access in Vietnamese provinces. McCaig and Pavcnik (2010) argue that thanks to the BTA, workers reallocate from household businesses to formal enterprises. Fukase (2014) finds provinces more exposed to the BTA experienced a relatively larger wage growth for unskilled workers. Costa, Garred and Pessoa (2016), in the case of Brazil, show that rising commodity demand in China is associated with wage growth in exposed Brazilian regions and an increase of workers in formal sector jobs. Brambilla, Lederman, and Porto (2013) use an Argentinian manufacturing firm dataset to examine the effect of export destinations on skills.



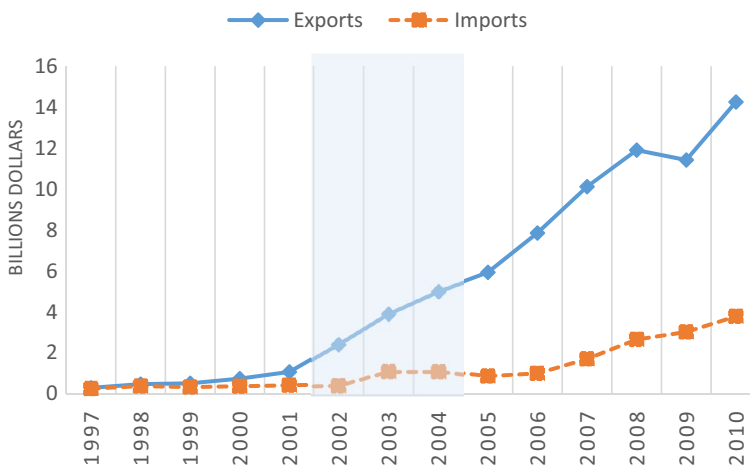
**FIGURE 1** Declines in manufacturing sectors' tariffs (in percentage points)

include accordance of national treatment to US companies and nationals, customs system and procedures reform, liberalization and streamlining of trading rights, liberalization of trade in services, and liberalization and safeguarding of foreign investment, among others' (McCaig, 2013, p. 104).

## 2.2 | Vietnam's exports and imports

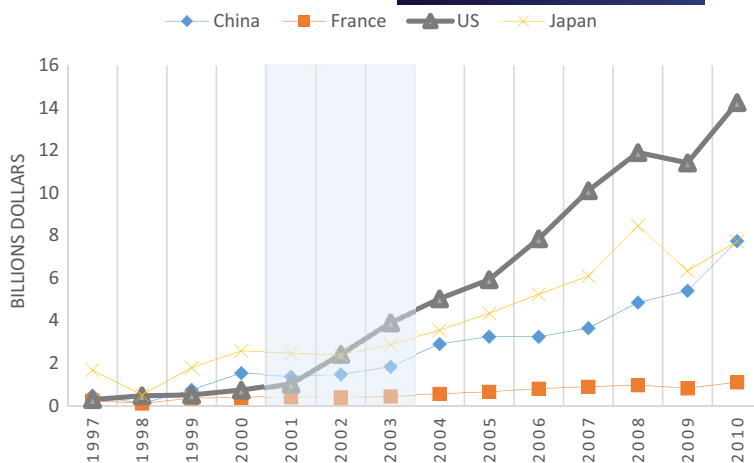
Since the BTA came into force in December 2001, Vietnamese exports to the United States have grown very rapidly. According to UN Comtrade, from 2001 to 2002, Vietnamese goods exports to the United States grew by 130% and from 2002 to 2003, they grew by an additional 61%. Exports to the United States jumped from 5.1% of Vietnam's exports in 2000 to 19% of Vietnam's total exports in 2004. Figure 2 shows that export growth follows a much steeper path after 2001.

Imports from the United States also grew but not steeply. Import growth did not change in 2002 but jumped in 2003. Thereafter, imports remained stable until 2007. In any case, the value of exports from



**FIGURE 2** Exports to and imports from the United States

Source: UN Comtrade



**FIGURE 3** Exports to the US relative to other key trade partners

Source: UN Comtrade

the United States to Vietnam is only a small fraction of the value of Vietnamese exports to the United States. For example, in 2001, imports accounted for about 38.6% of exports.

It is important to note that while the growth of Vietnamese exports to the United States jumped in 2002 and 2003 after the BTA went into effect, the growth of Vietnamese exports to other key trade partners remained stable (Figure 3). This is an important support to our argument that the estimated effects on local job markets are not driven by correlation of exports to other countries.

### 3 | DATA

We use two waves of the Vietnam Household Living Standards Survey (VHLSS) in 2002 and 2004. VHLSSs provide information on household expenditures, occupation, employment, and various other household and individual characteristics. The 2002 VHLSS was conducted between January 2002 and December 2002. The 2004 VHLSS interviewed households only from May 2004 through November 2004, with the majority of households being interviewed in June and September. For both surveys, the recall period for expenditures and employment is in the past 12 months. The two surveys are nationally representative.

Since employment information was asked at the individual and household level, both formal and informal employment are included. This is an advantage of using household surveys as opposed to firm surveys, which only consist of formal firms. Employment data are categorized to 60 two-digit sectors (the sector list is shown in Table A1). The two-digit sectors are grouped to five main broad sectors: Agriculture, Mining, Utility and Construction, Manufacturing and Services. Services consist of Commerce, Transport and Communication, Finance, and Other Services. VHLSS of 2002 includes 74,346 households covering characteristics of households, employment and income. This is called the income module. Of these 74,346 households, 29,529 households were randomly surveyed on their expenditure (the expenditure module). This means that 29,529 households have information on both expenditure and income. Note that both samples of the income module and the expenditure module are nationally representative. Similarly, the VHLSS of 2004 contains 45,944 households with information on income and 9,189 households have information on both expenditure and income. Also, both surveys are nationally representative. The VHLSSs of 2002 and 2004 form a panel dataset of income,

**TABLE 1** Descriptive statistics

Share of employed household members per household	2002				2004			
	Mean	Std	Min	Max	Mean	Std	Min	Max
All sectors	0.903	0.192	0	1	0.891	0.203	0	1
Agriculture	0.545	0.416	0	1	0.506	0.413	0	1
Manufacturing	0.089	0.220	0	1	0.101	0.230	0	1
Services	0.221	0.333	0	1	0.230	0.334	0	1
Commerce	0.116	0.251	0	1	0.121	0.253	0	1
Transport	0.027	0.116	0	1	0.027	0.113	0	1
Finance	0.003	0.040	0	1	0.003	0.041	0	1
Other	0.075	0.203	0	1	0.079	0.205	0	1
Mining	0.006	0.061	0	1	0.006	0.061	0	1
Utility and construction	0.042	0.140	0	1	0.048	0.150	0	1

covering 21,271 households appearing twice, of which 4,167 households have information on both expenditure and income.

This study uses share of employed household members to total number of household members in working age as an outcome variable, so households with no members of working age will be removed from the dataset. We also control for changes in shares of employment at the province level between 1998 and 2002. Since the VHLSS of 1998 covers 59 out of 61 provinces, this further reduces our observations in the dataset.<sup>5</sup> Therefore, the final panel datasets include 18,957 unique households with information on income, of which 4,092 unique households have information on expenditure. Using datasets at household level allows us to look at the labour allocation within a household due to the shocks of BTA.

Table 1 provides descriptive statistics on the shares of employed household members across sectors between 2002 and 2004.<sup>6</sup> Most people worked in agricultural sectors (54.5% on average in 2002). The share of people working in services (22.1%) was larger than that in manufacturing (8.9%). While the share of workers in agriculture declined between 2002 and 2004, the share of workers in manufacturing increased from about 8.9% in 2002 to 10.1% in 2004. Looking at the sub-sectors of services, the share of household members working in commerce was the largest and tended to rise during the period of 2002–2004.

## 4 | IDENTIFICATION STRATEGY AND CONCEPTUAL FRAMEWORK

### 4.1 | Provincial tariff reduction

Local labour markets are considered at the province level. Each province is treated as a sub-economy subject to differential trade shocks, per initial pattern of industry specialization. Vietnam had 61 provinces with the total population of about 80 million in 2002. The provinces differed in their exposure

<sup>5</sup>Our results remain unchanged when we do not control for change in share of employment at the province level between 1998 and 2002.

<sup>6</sup>We also report the descriptive statistics for the whole sample of VHLSSs 2002 and 2004 in Table A2 in the Appendix. The results are quantitatively similar. This suggests the panel dataset is similar to the whole sample in terms of employment shares.

**TABLE 2** Summary statistics for change in provincial tariffs

No of provinces	Mean	SD	Min	10 percentile	Median	90 percentile	Max
61	-0.086	0.013	-0.151	-0.095	-0.083	-0.076	-0.066

to manufacturing industries that benefited from US tariff cuts following the BTA implementation in 2001. Following McCaig (2013), we exploit the variation in 'provincial tariff cuts'. The measure is calculated as follows:

$$\theta_p = \sum_i \frac{l_p^i}{l_p} \times \Delta\tau_i. \quad (1)$$

It is the weighted sum of tariff cuts to all goods. For each good  $i$ , it is a product of province  $p$ 's share of workers that worked in industry  $i$  in 1999  $\left(\frac{l_p^i}{l_p}\right)^7$  and the change in the tariff of industry  $i$  thanks to the BTA ( $\Delta\tau_i = \tau_{postBTA} - \tau_{preBTA}$ ). Since a negative  $\Delta\tau_i$  implies tariff declines, a more negative  $\theta_p$  reflects a larger average tariff reduction.<sup>8</sup>

Table 2 provides summary statistics for change in provincial tariffs. The mean value for change in provincial tariff was  $-0.086$ , which implies that the average tariff cuts for a Vietnamese province was 8.6%. The province with the largest average tariff cuts is Ho Chi Minh City ( $\theta_p = -0.151$ ). The province with the smallest average tariff cuts is Quang Ninh ( $\theta_p = -0.066$ ).

Figure 4 shows the province's average tariff reductions. The darker provinces are more exposed to tariff cuts. The darker areas are concentrated around Hanoi in the North, and Ho Chi Minh City in the South.

## 4.2 | Econometric specifications

The econometric specification takes the following form:

$$\Delta y_{h,p}^i = \beta_1 + \beta_2 \theta_p + \beta_3 initialconditions_{h,p,2002} + \varepsilon_p, \quad (2)$$

where  $\Delta y_{h,p}^i$  is the change in outcome of household  $h$  in province  $p$  working in sector  $i$  between before and

after the BTA.  $\theta_p$  is province  $p$ 's change in tariffs;  $initialconditions_{h,p,2002}$  include initial household characteristics (i.e. in 2002). Note that standard errors in the paper are clustered at the province level.

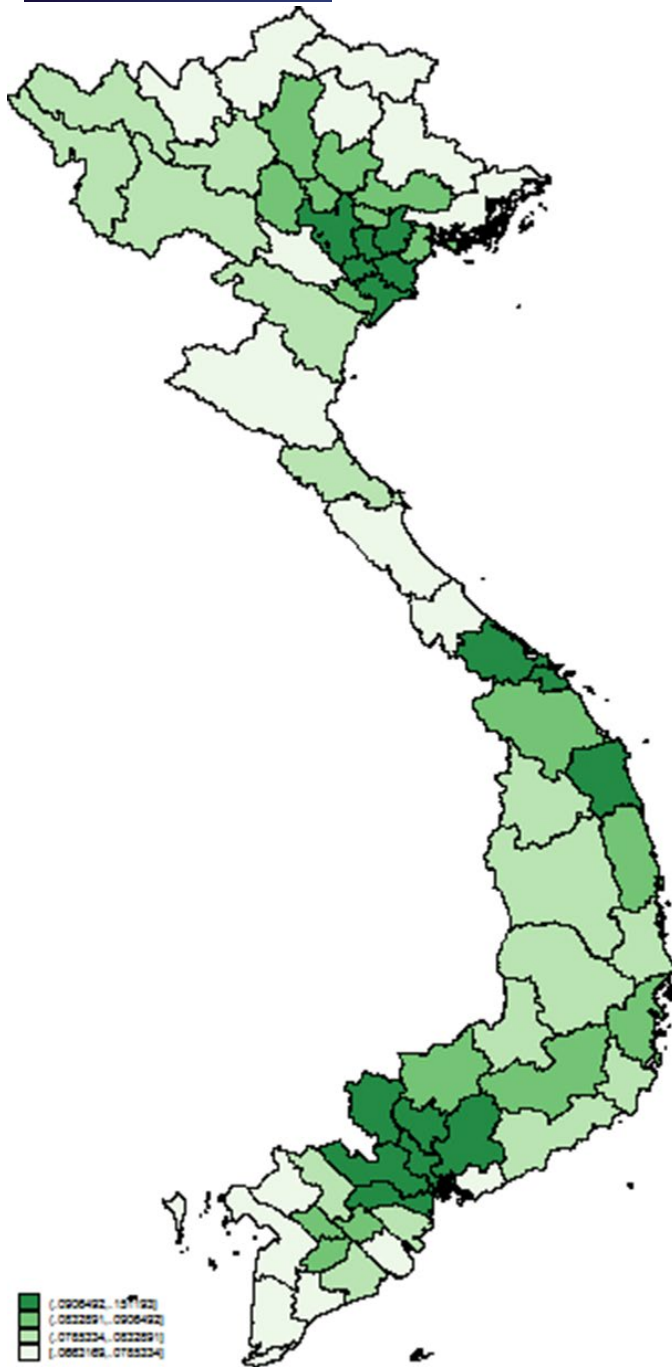
We chose two measures of employment  $y_{h,p,t}^i$  at the household level<sup>9</sup>:

<sup>7</sup>Data for detailed employment shares are from the 1999 Population and Housing Census.

<sup>8</sup>We are grateful to Brian McCaig for providing us with the data on provincial tariff declines  $\theta_p$ .

<sup>9</sup>In addition, we use the absolute measure of employment, that is the number of household members working in sector  $i$  as a robustness check and  $\Delta y_{h,p}^i$  is the change in number of household members working in sector  $i$  between the two surveys. The results are unchanged and are reported in the Appendix.





**FIGURE 4** Vietnamese provinces with different provincial tariff changes

Note: Darker provinces indicate larger US tariff cuts. Paracel Islands and Spratly Islands are not included in the figure because they have no employment data. [Colour figure can be viewed at [wileyonlinelibrary.com](http://wileyonlinelibrary.com)]

1.  $y_{h,p,t}^i$  is the number of members in household  $h$  in province  $p$  at time  $t$  that are working primarily in sector  $i$ , as a fraction of the total number of household members in working age (18–65 years old) at that time. Hence,  $\Delta y_{h,p}^i$  is the change of that fraction between the two surveys.



2.  $y_{h,p,t}^i$  is the number of working hours of household  $h$  in province  $p$  at time  $t$  primarily working in sector  $i$ , as a fraction of total potential working hours of all household members of working age. The total potential working hours equal the number of household members in working age multiplied by 40. Hence,  $\Delta y_{h,p}^i$  is the change of that fraction between the two surveys.

We also select change in *real* income per capita of households in the previous 12 months as the outcome variable for income. Wage is also another potentially good option<sup>10</sup> but we decided against using it, because in the early 2000s many Vietnamese individuals were self-employed or worked with other household members, hence their wages were not reported.

*initialconditions* <sub>$h,p,2002$</sub>  include: Household head (HH)'s ethnicity, HH age, HH gender, HH vocational education dummy, HH high school dummy, HH middle school dummy, HH primary school dummy, spouse vocational education dummy, spouse high school dummy, spouse middle school dummy, spouse primary school dummy, household size, and number of working age members. All these household characteristics are pre-existing characteristics, that is, they are reported in 2002.

There could be a few concerns regarding the specification. First, it could be the case that employment change is caused by other activities, and not by exporting to the United States. This is possible only when the exposure of provinces to these 'non-US export activities' is correlated to the province's tariff declines. This is not likely because Vietnamese exports to the other key trade partners grow at normal rates during this period of consideration (see Figure 3). This removes the concern that the local employment effects could be caused by exports to other countries.

The second issue is factor mobility. If capital was perfectly mobile across provinces, firms would move easily across provinces to take advantage of cheaper labour in other provinces. If this was the case, tariff cuts would not influence provincial manufacturing and services employment. Hence, any evidence of an increase in employment found in this paper implies that inter-provincial capital mobility is not perfect and not immediate.

There is also a concern that we might pick up a long-term trend of structural transformation in different provinces. This is the case if provincial tariff reduction is correlated with provincial trend of labour reallocation across sectors. To address the concern, we control for province-level changes in the share of sectoral employment between 1998 and 2002, using data from VHLSSs 1998 and 2002.

### 4.3 | Expected effects on local labour market dynamics

Exporting to the United States would benefit labour in Vietnam due to an increase in labour-intensive products. Exporting manufacturing firms would expand production and hire more labour. Hence, the BTA is expected to have a direct impact on employment of manufacturing industries in Vietnam. Added to this direct impact is an upstream effect on supporting industries which supply to manufacturing industries. In this paper, we focus on local service supporting industries. We expect that employment of supporting service industries such as accounting, consulting, advertising, protection and cleaning services also increases.

An important spillover mechanism of job gain spillovers works through an increase in aggregate demand. The increase in manufacturing income could result in higher demand for local services such as retail, restaurants and entertainment. This would cause higher demand for employment in those

<sup>10</sup>Export activities were found to contribute significantly to an increase in the wage of employees in export industries (Baumgarten, 2013; Bernard and Jensen, 1995; Helpman et al., 2010; Schank et al., 2011).

TABLE 3 Employment change across broad sectors

	All sectors	Agriculture	Manufacturing	Services	Mining	Utility and construction
	(1)	(2)	(3)	(4)	(5)	(6)
Panel A: Change in 'share of number of employed members to number of household members of working age'						
Change in provincial tariffs	0.197 (0.178)	1.736*** (0.237)	-1.050*** (0.151)	-0.500*** (0.161)	0.031 (0.033)	-0.019 (0.101)
Constant	0.634*** (0.026)	0.547*** (0.035)	-0.056*** (0.018)	0.120*** (0.021)	0.010* (0.005)	0.012 (0.012)
<i>N</i>	18,957	18,957	18,957	18,957	18,957	18,957
Adj. $R^2$	0.256	0.185	0.190	0.187	0.231	0.207
Pre-BTA mean of dependent variable	0.903	0.545	0.089	0.221	0.006	0.042
Panel B: Change in working hours as share of total potential working hours by household members of working age						
Change in provincial tariffs	-1.204** (0.486)	0.965*** (0.239)	-1.297*** (0.164)	-0.934** (0.389)	0.049 (0.037)	0.014 (0.078)
Constant	0.429*** (0.047)	0.456*** (0.029)	-0.068*** (0.018)	0.003 (0.032)	0.014** (0.005)	0.025*** (0.008)
<i>N</i>	18,957	18,957	18,957	18,957	18,957	18,957
Adj. $R^2$	0.326	0.339	0.206	0.173	0.227	0.203
Pre-BTA mean of dependent variable	0.731	0.386	0.084	0.219	0.006	0.036

Notes: All regressions control for household head (HH)'s ethnicity, HH age, HH gender, HH vocational education dummy, HH high school dummy, HH middle school dummy, HH primary school dummy, spouse vocational education dummy, spouse high school dummy, spouse middle school dummy, spouse primary school dummy, household size, and number of working age members. All of these household characteristics are reported in 2002.

Regressions in Panel A also control for shares of agricultural, manufacturing, service, mining, and utility and construction workers of households in 2002, changes in shares of provincial agricultural, manufacturing, service, mining and utility and construction workers between 1998 and 2002.

Regressions in Panel B also control for shares of working hours in agriculture, manufacturing, service, mining, utility and construction respectively of households in 2002, changes in shares of provincial agricultural, manufacturing, service, mining, utility and construction workers respectively between 1998 and 2002.

\* $p < 0.10$ , \*\* $p < 0.05$ , \*\*\* $p < 0.01$ . Standard errors are clustered at the province level and are shown in parentheses.

industries. This, combined with higher manufacturing employment, implies labour reallocation away from agricultural sectors. Hoang, Pham, and Ulubaşoğlu (2018) find that an increase in non-farm participation decreases labour involvement in agricultural sectors in rural Vietnam during the period 2002–2008. We hypothesize that the BTA decreases agricultural employment, as agricultural labourers move into manufacturing and service industries. This leads to an increase in non-farm income of households.

Another spillover channel is the construction and real estate-led spillover of employment. New business opportunities with the BTA could cause a local construction and real estate boom, which would create jobs for construction and other real estate businesses. This is the third channel which we consider in this paper.

## 5 | BASELINE RESULTS

### 5.1 | Labour reallocation across broad sectors

First, we examine the reallocation of employment across broad sectors after the implementation of the BTA. We do so by examining the changes in employment in agriculture, mining, manufacturing, utility and construction, and services. Table 3 presents the results. Note that in Panel A, the outcome variable is ‘change in share of employed household members to total number of household members of working age’. In Panel B, the outcome variable is ‘change in share of working hours to total potential working hours by household members of working age’. Both panels show that a more negative  $\theta_p$  (i.e. larger provincial tariff decline) caused a larger drop in the share of employment and working hours in agriculture (column (2)). At the same time, a larger provincial tariff decline caused larger gains in the share of employment and hours in manufacturing and services<sup>11</sup> (columns (3) and (4)).<sup>12</sup> A larger provincial tariff cut did not cause a significant change in household employment in mining, and utility and construction. Finally, we do not see aggregate household employment grow in provinces more exposed to tariff declines.

Note that in addition to pre-existing household characteristics, we control for two important sets of variables, which are not shown in the table. The first is household's share of employment in all sectors (Panel A) or household's share of working hours in all sectors (Panel B) in 2002. The second set of control variables is change in share of province-level sectoral employment between 1998 and 2002. This is to control for the existing trend of structural transformation of provinces before the BTA. In Panel B, since working hours in 1998 and 2002 are not surveyed consistently, we could not construct changes in the shares of province-level sectoral working hours between 1998 and 2002. We then chose to use change in share of province-level sectoral employment instead.

For households with the same initial shares of employment, a decrease of 1% in provincial tariffs caused an average increase of 1.1 percentage points in the share of household members employed in manufacturing and an average increase of 0.5 percentage points in the share of household members employed in services (columns (3) and (4) of Panel A). At the same time, a decrease of 1% in provincial tariffs caused an average decline of 1.7 percentage points in the share of household members employed in agriculture (column (2) of Panel A). Alternatively, a decrease of 1% in provincial tariffs caused an average increase of 1.3 percentage points in the share of working hours in manufacturing and an average increase of about 1 percentage points in the share of working hours in services (columns (3) and (4) of Panel B). Note that the share of total employment did not change but the share of total working hours increased when a province experienced tariff cuts (column (1) of Panels A and B).

Given that the BTA took effect in December 2002, a concern is the ‘pre-BTA’ 2002 VHLSS is collected partly after the BTA came into effect. For example, a household surveyed in December 2002 would apparently report its activities over the period December 2001–December 2002, so that household outcomes may be partly inclusive of BTA's effects (especially if the BTA had any anticipatory effects on employer behaviour). The imperfect timing of the 2002 VHLSS survey plausibly biases the estimated effects towards zero, so that the effects reported in Table 3 are probably lower bounds for the true effect. To check the robustness of the results in Table 3, we restricted the sample to households surveyed in the first half of 2002 (so that these households' ‘lookback’ periods fall within 2001). We

<sup>11</sup>Note that services include Commerce, Transport and Communication, and Other Services.

<sup>12</sup>This finding is consistent with that of Davalos et al. (forthcoming), who show that a decrease in price of chemical fertilizer due to trade liberalization reforms in the 1990s increases farm employment and reduces participation non-farm activities in Vietnam.

re-estimate the results of Table 3 with the pre-BTA sample. We find that the results are quantitatively similar (see Table A5 in the Appendix). Note that 85% of households were surveyed between January and June 2002. Therefore, we are confident about the results with the whole sample.

Since Hanoi and Ho Chi Minh City are large cities in Vietnam, another concern is that the results may be driven by these two cities. We re-run regressions of Table 3 removing the households in Hanoi and Ho Chi Minh City. The results are reported in Table A7 of the Appendix. The results are largely robust without Hanoi and Ho Chi Minh City. Tariff reductions caused an increase in employment in manufacturing and a decrease in agricultural employment. Tariff reductions also led to a rise in employment in services, however, the result is not statistically significant.

The main regression specification of Table 3 regresses changes in household employment variables on province-level tariff changes. As a result, the sample is restricted to households that appear in both the 2002 and 2004 surveys. To check the robustness of the results of Table 3 to an alternative specification that includes all households that appear in either survey round, we regress levels of household employment variables on province fixed effects, a post-BTA exposure variable  $\theta_p * 1 \{t = 2004\}$ , and interactions between initial province-level characteristics (e.g. average education levels in each province) and  $1 \{t = 2004\}$ . The results, which are reported in Table A6 of the Appendix, are similar, except for the share of total employment. Specifically, the findings also show that tariff reductions led to an increase in employment (or working hours) in manufacturing and services and a decrease in employment (or working hours) in agriculture. The result is significant and negative for the share of total working hours.

Our results are still strong and robust when we use another measure of employment at the household level. Specifically, when we replace the outcome variables with the change in number of working members, we obtain similar results (see Table A3 in the Appendix).

The results with different samples and specifications robustly suggest a reallocation of labour from agriculture to manufacturing and services in provinces more exposed to tariff declines, leaving aggregate employment unchanged. The finding that manufacturing employment went up after the BTA is not surprising because manufacturing directly benefited from higher growth of exports to the United States. What is interesting is an increase in employment in services, the sectors that did not directly benefit from higher growth of exports. The finding reveals a spillover of job gains from the manufacturing sector to the service sector. Note that the magnitude of employment increase in services is not much smaller than the employment increase in manufacturing. This suggests a sizable equilibrium effect, or the propagation effect, of job gains. In section 5.2, we will break down exactly what service sectors benefit from the BTA. In section 6, we will examine via what channels the job gain propagation could take place.

## 5.2 | Job creation in services

This section considers the impact of exports to the United States on service sub-sectors, namely, 'commerce' (which consists of sales of vehicles and vehicle parts, retails, wholesales, hotels and restaurants), 'transport, storage and communication', 'finance' and 'other remaining services' (codes 65–99 in Table A1). The results are presented in Table 4. In provinces with larger tariff declines, the shares of working members and working hours increased in 'commerce', and to a lesser extent, in 'transport, storage and communication' and 'other remaining services'. A 1% decrease in provincial tariffs caused an average increase of 0.5 percentage points in the share of employed members in commerce (column 1 of Panel A). The same tariff cut caused an average increase of 0.8 percentage points in the share of working hours in commerce (column (1) of Panel B). Employment in finance decreased for provinces with larger US tariff cuts although the magnitude is small. Note that finance is considered as a *tradable* service, the spillover effects could be in other provinces.

**TABLE 4** Employment change in services sectors

	Commerce	Transport	Finance	Other services
	(1)	(2)	(3)	(4)
Panel A: Change in share of number of employed members to number of members of working age at household level				
Change in provincial tariffs	-0.461** (0.183)	-0.104* (0.055)	0.051*** (0.013)	-0.159* (0.083)
Constant	-0.037** (0.018)	-0.008 (0.006)	0.005*** (0.002)	-0.003 (0.009)
<i>N</i>	18,957	18,957	18,957	18,957
Adj. <i>R</i> <sup>2</sup>	0.200	0.252	0.216	0.180
Panel B: Change in working hours as share of total potential working hours by household members of working age				
Change in provincial tariffs	-0.720** (0.312)	-0.096 (0.078)	0.042*** (0.015)	-0.188* (0.105)
Constant	-0.063** (0.028)	-0.011 (0.008)	0.003* (0.002)	-0.003 (0.009)
<i>N</i>	18,957	18,957	18,957	18,957
Adj. <i>R</i> <sup>2</sup>	0.183	0.223	0.229	0.194

*Notes:* All regressions control for household head (HH)'s ethnicity, HH age, HH gender, HH vocational education dummy, HH high school dummy, HH middle school dummy, HH primary school dummy, spouse vocational education dummy, spouse high school dummy, spouse middle school dummy, spouse primary school dummy, household size, and number of working age members. All of these household characteristics are reported in 2002.

Regressions in Panel A also control for shares of agricultural, manufacturing, service, mining, and utility and construction workers of households in 2002, changes in shares of provincial agricultural, manufacturing, service, mining and utility and construction workers, between 1998 and 2002.

Regressions in Panel B also control for shares of working hours in agriculture, manufacturing, service, mining, utility and construction of households in 2002, changes in shares of provincial agricultural, manufacturing, service, mining, utility and construction workers between 1998 and 2002.

\* $p < 0.10$ , \*\* $p < 0.05$ , \*\*\* $p < 0.01$ . Standard errors are clustered at the province level and are shown in parentheses.

### 5.3 | Income

We would like to examine how household income per capita changes in provinces differentially exposed to tariff reductions. The outcome variable is change in real income per capita of the household from different sources between the two surveys. We define each income measure as  $\frac{y_t^k - y_{2002}^k}{y_{2002}^k}$ , where  $y_{2002}^{total}$  is total household income in 2002,  $y_t^k$  is household income in year  $t$  in a category  $k$  (total, non-farm, farm, manufacturing and services). This will be defined for any household with positive real income in 2002 and it will capture both intensive shifts in income among households who never experience zeroes and extensive shifts between zero and non-zero income in each category. Furthermore, the regressors are kept unchanged across columns, so the coefficients for total income should be additively decomposable into income partitions (e.g. total income equals farm income plus non-farm income).

Table 5 presents results on the income effect of BTA. Note that the dependent variable is change in real income per household member. Columns (2), (4) and (5) show that in provinces with larger tariff cut, real non-farm income per household member increased, which reflects the increases in

TABLE 5 Income effect of the BTA

	$\Delta$ real income per capita	$\Delta$ real non-farm income per capita	$\Delta$ real farm income per capita	$\Delta$ real wage income per capita from manufacturing	$\Delta$ real wage income per capita from services
	(1)	(2)	(3)	(4)	(5)
Change in provincial tariffs	-6.498 (7.218)	-25.610*** (4.455)	19.203*** (6.560)	-12.106*** (1.175)	-5.343** (2.237)
Household head (HH) ethnicity <sub>2002</sub>	0.680*** (0.208)	1.367*** (0.194)	-0.696*** (0.120)	0.327*** (0.035)	-0.002 (0.060)
HH age <sub>2002</sub>	0.032*** (0.011)	0.016*** (0.004)	0.016* (0.008)	0.001* (0.001)	0.012*** (0.002)
HH gender <sub>2002</sub>	0.074 (0.132)	-0.565*** (0.110)	0.637*** (0.075)	-0.040 (0.031)	-0.372*** (0.062)
HH vocation <sub>2002</sub>	0.313 (0.450)	0.499 (0.458)	-0.206 (0.142)	-0.014 (0.045)	0.854*** (0.144)
HH high school <sub>2002</sub>	0.191 (0.443)	0.217 (0.456)	-0.024 (0.147)	-0.052 (0.049)	0.402*** (0.077)
HH middle school <sub>2002</sub>	0.541 (0.481)	0.080 (0.458)	0.448** (0.220)	-0.023 (0.037)	0.186*** (0.063)
HH primary school <sub>2002</sub>	-0.192 (0.409)	-0.264 (0.414)	0.063 (0.068)	0.023 (0.032)	0.095* (0.049)
Spouse vocation <sub>2002</sub>	1.153*** (0.421)	1.675*** (0.419)	-0.519*** (0.103)	0.010 (0.057)	1.150*** (0.137)
Spouse high school <sub>2002</sub>	0.782*** (0.288)	1.089*** (0.287)	-0.300*** (0.087)	-0.048 (0.059)	0.423*** (0.093)
Spouse middle school <sub>2002</sub>	0.519* (0.266)	0.312 (0.252)	0.213** (0.100)	-0.001 (0.053)	0.115** (0.057)
Spouse primary school <sub>2002</sub>	1.139* (0.584)	0.904* (0.525)	0.213 (0.229)	-0.021 (0.031)	0.120*** (0.039)
Household size <sub>2002</sub>	0.144*** (0.012)	0.052*** (0.011)	0.092*** (0.007)	0.007*** (0.002)	0.006*** (0.002)
No of working age members <sub>2002</sub>	-0.118 (0.125)	0.215* (0.113)	-0.333*** (0.066)	0.097*** (0.016)	0.132*** (0.028)
Constant	-0.322 (0.564)	-2.731*** (0.510)	2.423*** (0.428)	-1.318*** (0.107)	-0.848*** (0.246)
<i>N</i>	20,132	20,140	20,072	20,177	20,177
Adj. <i>R</i> <sup>2</sup>	0.035	0.015	0.058	0.046	0.058

Notes: Control variables are real wage income per capita from manufacturing, real wage income per capita from services, real income per capita, real non-farm income per capita, real farm income per capita. All these control variables are 2002 data. Standard errors are clustered at the province level and are shown in parentheses.

\* $p < 0.10$ , \*\* $p < 0.05$ , \*\*\* $p < 0.01$ .

manufacturing and services wages. Real farm income declined, as labour moved out of agriculture. Total real income per household member rose, however, the rise is not statistically significant.

Among initial household characteristics, education seems to matter most to the change in real income per capita of households. This is true for both household heads and spouses. Several education variables are highly significant compared to the reference education group (i.e. those without primary education). This reflects an important role of education on taking advantage of job opportunities.

## 6 | ON THE SPILLOVER MECHANISMS

This section investigates in detail what channels job gains could propagate from manufacturing to services. Identifying the exact mechanism would provide useful information for economists and policy makers to understand the full employment equilibrium effects of new export opportunities in developing countries.

We examine three potentially important channels. The first channel operates via demand-driven propagation. That is, newly employed manufacturing workers could increase spending on local services, such as wholesale, retail and restaurants, generating new jobs in local commerce. The second channel operates via production linkages, that is, via higher demand for inputs from manufacturing production. Expanding production activities of the manufacturing sector could require more input from local supporting service industries, such as accounting, tax and other consulting, architecture, advertising, protection, housecleaning or packaging. This would help create more jobs in the supporting service sectors. The third channel operates via increasing real estate and construction activities, benefiting from, for example, a house price appreciation.

We examine these channels by dissecting to the finest sectors possible (which is at the two-digit level) and combining this with information about households' expenditures. We focus on sectors that best reflect the channels we are discussing. Specifically, we focus on (1) sales of vehicles and vehicle parts, (2) wholesale, (3) retail, and (4) hotels and restaurants to examine the demand channel. This is because they are more likely to reflect final consumption (i.e. consumption from households). To examine the production channel, we focus on supporting industries (code 74 in Table A1 of the Appendix). Ideally, one would like to use the input-output table to examine production linkages. However, since employment data are only available at the two-digit level, a meaningful use of input-output tables is not possible. For that reason, we examine the spillover impact on the aggregate supporting industries. Finally, we focus on real estate and construction employment to examine the real estate channel.

The categorization is not perfect, but this is the best we could do given that VHLSSs do not provide a breakdown to finer sectors. For example, one could argue that 'vehicle sales' could serve manufacturing production and hence could be a part of the production channel. In addition, hotels could serve visitors outside a province and hence not reflect consumption of households residing in that province. The latter case is possible but not quantitatively important, because restaurant employment overwhelms hotel employment. Restaurant and hotel employment accounted for 1.65% and 0.12% of the workforce, respectively, according to the Population and Housing Census of 1999. Nevertheless, the breakdown provides useful information about which channels took place.

Let us first focus on the demand channel, which is reflected in columns (1), (2), (3) and (4) of Table 6. Both panels yield a consistent result that a larger provincial tariff reduction caused significantly higher employment in sales of vehicles and vehicle parts (column (1)) and wholesales (column (2)). A 1% decrease in tariff raised employment share in wholesales by 0.19 percentage points (column (2) of Panel A). Surprisingly, employment in local retail increases in both panels with large magnitude, but the coefficients are not statistically significant (column (3)), a point to which we will return to discuss



TABLE 6 Changes in employment in detailed service sectors

	$\Delta$ employment in sales of vehicles and parts	$\Delta$ employment in wholesale	$\Delta$ employment in retail	$\Delta$ employment in hotels and restaurants	$\Delta$ employment in supporting industries	$\Delta$ employment in real estate	$\Delta$ employment in construction
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(7)
Panel A: Change in 'ratio of employed members to number of household members of working age'							
Change in provincial tariffs	-0.055** (0.021)	-0.185*** (0.064)	-0.176 (0.165)	-0.026 (0.098)	-0.118*** (0.013)	-0.078*** (0.029)	-0.086 (0.102)
Constant	-0.008*** (0.003)	-0.015** (0.006)	-0.003 (0.015)	-0.005 (0.010)	-0.012*** (0.002)	-0.006** (0.003)	0.019* (0.010)
<i>N</i>	18,957	18,957	18,957	18,957	18,957	18,957	18,957
Adj. <i>R</i> <sup>2</sup>	0.233	0.352	0.266	0.167	0.312	0.352	0.211
Panel B: Change in working hours as share of total potential working hours by household members of working age							
Change in provincial tariffs	-0.091*** (0.029)	-0.272*** (0.069)	-0.109 (0.192)	-0.050 (0.148)	-0.127*** (0.014)	-0.071*** (0.026)	-0.016 (0.082)
Constant	-0.013*** (0.004)	-0.027*** (0.007)	-0.012 (0.019)	-0.013 (0.015)	-0.013*** (0.002)	-0.006** (0.002)	0.016* (0.008)
<i>N</i>	18,957	18,957	18,957	18,957	18,957	18,957	18,957
Adj. <i>R</i> <sup>2</sup>	0.184	0.424	0.237	0.174	0.301	0.332	0.211

Notes: 'Vehicle sales' refers to sales of motor vehicles and parts, maintenance and repair of cars and motorcycles; retail sale of gas; 'Wholesale' refers to wholesale and agent sales (excluding motor vehicles). 'Retail' refers to retail sales (excluding motor vehicles and parts) and repairs of domestic appliances; 'Supporting industries' refers to other business activities (accounting, tax and other consulting, architecture, advertising, protection, housecleaning, photography, packaging etc). see Table A1 for more information.

All regressions control for Household head (HH)'s ethnicity, HH age, HH gender, HH vocational education dummy, HH high school dummy, HH middle school dummy, HH primary school dummy, spouse vocational education dummy, spouse high school dummy, spouse middle school dummy, spouse primary school dummy, household size, and number of working age members. All of these household characteristics are reported in 2002.

Regressions in Panel A control for share of workers in vehicle sales, wholesales, retail, hotel and restaurants, supporting industries, real estate and construction of households in 2002, changes in shares of workers in vehicle sales, wholesales, retail, hotel and restaurants, supporting industries, real estate and construction at the province level between 1998 and 2002

Regressions in Panel B control for shares of working hours in vehicle sales, wholesales, retail, hotel and restaurants, supporting industries, real estate and construction of households in 2002, changes in share of workers in vehicle sales, wholesales, retail, hotel and restaurants, supporting industries, real estate and construction at the province level between 1998 and 2002

\* $p < 0.10$ , \*\* $p < 0.05$ , \*\*\* $p < 0.01$ . Standard errors are clustered at the province level, and are shown in parentheses.

**TABLE 7** Changes in household real expenditure

	$\Delta$ Food expenditure	$\Delta$ Daily non-food expenditure	$\Delta$ Annual non-food expenditure	$\Delta$ Value of vehicle purchases	$\Delta$ Value of other durable good purchases	$\Delta$ Value of vehicle parts purchases
	(1)	(2)	(3)	(4)	(5)	(6)
Change in tariffs	-1.547** (0.718)	-2.552 (1.538)	-0.469 (1.595)	-11.734 (12.774)	3.748 (6.869)	-9.573** (4.363)
Constant	3.253*** (0.179)	1.648*** (0.174)	2.776*** (0.176)	-0.918 (0.985)	2.785*** (0.732)	-0.414 (0.384)
<i>N</i>	4,092	4,090	4,085	4,092	4,089	4,091
Adj. $R^2$	0.178	0.160	0.205	0.443	0.442	0.212

Notes: 'Food expenditure' includes daily and holiday expense on eating, drinks and smoking. 'Daily nonfood expenditure' contains expense on stuffs serving for daily living such as: gas, coal, washing powder, shampoo, books. 'Annual nonfood expenditure' covers the irregular spending like: clothing, shoes, bicycle tyres, toys, and watches. 'Value of vehicle (cars or motorbikes) purchases' is calculated at current prices and only includes vehicles which households bought in 2001 and 2000 for VHLSS of 2002 and in 2002 and 2003 of VHLSS of 2004. 'Value of household durable good purchases' is calculated similarly as the value of vehicle purchases, but excludes value of vehicle purchases. 'Value of vehicle parts' is annual expenditure on spare parts cars and motorbikes in the past 12 months. Note that all the values are deflated as of January 2002.

All regressions control for Household head (HH)'s ethnicity, HH age, HH gender, HH vocational education dummy, HH high school dummy, HH middle school dummy, HH primary school dummy, spouse vocational education dummy, spouse high school dummy, spouse middle school dummy, spouse primary school dummy, household size, and number of working age members, log of real food expenditure, log of real daily non-food expenditure, log of real annual non-food expenditure, log (real value of vehicle + 1), log (real value of non-vehicle + 1) and log (real value of vehicle parts + 1). All these control variables are from 2002.

\* $p < 0.10$ , \*\* $p < 0.05$ , \*\*\* $p < 0.01$ . Standard errors are clustered at the province level, and are shown in parentheses.

in detail. In addition, tariff reductions do not have any impact on employment in hotels and restaurants (column (4)).

We do find strong evidence for the 'production spillover' channel. Change in household employment in supporting industries is highly statistically significant at the 1% level for both measures (column (5) of Panels A and B). Note that 'supporting industries' refers to other business activities (accounting, tax and other consulting, architecture, advertising, protection, housecleaning, photography, packaging...). A 1% tariff reduction caused employment share in supporting industries to rise by 0.12 percentage points. With a caveat that there are only a small number of real estate employees in both VHLSSs, we find a significant impact of tariff reductions on employment in real estate services (column (6)) which suggests the real estate channel did take place during the first two years after BTA. However, there is no statistically significant evidence for the impact of tariff cuts on employment in construction.

To further understand the demand channel, we examine changes in household expenditure between the two waves of VHLSSs. Columns (1) and (2) in Table 7 reveal that food expenditure increased. This finding is consistent to a significant increase in wholesale employment and a (statistically insignificant) increase in retail employment.

Annual non-food expenditure, vehicle and other household durable goods (e.g. appliances) purchases do not increase in provinces more exposed to tariff cuts. While surprising, this reveals possible thrifty spending behaviour of Vietnamese households in the early 2000s when job opportunities were still rare. Perhaps, they did not want to spend on goods that were not necessary. We also investigate a sub-category, 'purchases of vehicle spare parts'. Expenditure on this sub-category sharply

**TABLE 8** Male and female employment in manufacturing and services

	Manufacturing		Services	
	Male	Female	Male	Female
	(1)	(2)	(3)	(4)
Panel A: Change in 'ratio of number of employed members to number of household members of working age'				
Change in provincial tariffs	-0.494*** (0.070)	-0.700*** (0.125)	-0.370** (0.140)	-0.245* (0.138)
Constant	-0.047*** (0.007)	-0.044*** (0.011)	-0.039*** (0.012)	-0.005 (0.017)
<i>N</i>	18,957	18,957	18,957	18,957
Adj. <i>R</i> <sup>2</sup>	0.218	0.210	0.213	0.192
Panel B: Change in working hours as share of total potential working hours by household members of working age'				
Change in provincial tariffs	-0.486*** (0.072)	-0.590*** (0.112)	-0.281* (0.155)	-0.344 (0.214)
Constant	-0.059*** (0.009)	-0.059*** (0.010)	-0.050*** (0.018)	-0.029 (0.027)
<i>N</i>	18,957	18,957	18,957	18,957
Adj. <i>R</i> <sup>2</sup>	0.227	0.212	0.203	0.181

*Notes:* Both Panels A and B control for Household head (HH)'s ethnicity, HH age, HH gender, HH vocational education dummy, HH high school dummy, HH middle school dummy, HH primary school dummy, spouse vocational education dummy, spouse high school dummy, spouse middle school dummy, spouse primary school dummy, household size, and number of working age members. All of these household characteristics are reported in 2002.

Panels A and B also control for change in shares of provincial male manufacturing, female manufacturing, male services, female services workers. All initial household characteristics are for 2002.

\* $p < 0.10$ , \*\* $p < 0.05$ , \*\*\* $p < 0.01$ . Standard errors are clustered at the province level, and are shown in parentheses.

increases, which might explain the employment increase in sales of vehicles and parts (column (1) of Table 6).

## 7 | HETEROGENEITY ANALYSES

### 7.1 | Male versus female employment

Table 8 reveals that females benefited from BTA more than males did in terms of employment, particularly in manufacturing (columns (1) and (2) of Panels A and B). However, it is not clear that females benefited from BTA in services more than males did. The coefficients of the impact for female and male employment are within each other's margins of error.

The result could be explained by the fact that the BTA most benefits female labour-intensive manufacturing sectors such as apparel, clothing and footwear. Female labour accounted for about 79% of total labour of those sectors in 2002. The finding has important welfare implications. On the one hand, increasing economic empowerment of females in households could lead to improvement in children's health and education (see Allendorf, 2007 and Menon et al., 2013

**TABLE 9** Employment in manufacturing and services: the poor versus the rich

	(1)	(2)	(3)	(4)
	Change in share of manufacturing workers	Change in share of services workers	Change in share of manufacturing-working hours	Change in share of services-working hours
Change in provincial tariffs * poor <sub>2002</sub>	-0.589** (0.239)	-0.427 (0.281)	-5.718 (3.533)	-3.510 (4.363)
Change in provincial tariffs	-1.003*** (0.129)	-0.483* (0.282)	-14.197*** (1.817)	-5.332 (3.830)
Poor <sub>2002</sub>	-0.050** (0.021)	-0.067** (0.026)	-0.419 (0.323)	-0.443 (0.391)
Constant	-0.067*** (0.013)	-0.016 (0.026)	-0.665*** (0.186)	0.373 (0.336)
<i>N</i>	18,957	18,957	19,283	19,283
Adj. <i>R</i> <sup>2</sup>	0.189	0.180	0.126	0.094

*Notes:* Control variables are Household head (HH)'s ethnicity, HH age, HH gender, HH vocational education dummy, HH high school dummy, HH middle school dummy, HH primary school dummy, spouse vocational education dummy, spouse high school dummy, spouse middle school dummy, spouse primary school dummy, household size, and number of working age members. All household characteristics are for 2002.

Regressions in columns (1) and (2) control for shares of manufacturing and services workers of households in 2002, changes in shares of provincial manufacturing and services workers between 1998 and 2002.

Regressions in columns (3) and (4) control for shares of manufacturing and service working hours of households in 2002, changes in shares of provincial manufacturing and services workers between 1998 and 2002.

\* $p < 0.10$ , \*\* $p < 0.05$ , \*\*\* $p < 0.01$ . Standard errors are clustered at the province level and are shown in parentheses.

for example). On the other hand, female employment could take away mothers' time from their children, which could have adverse effects on the children's development. Nguyen, McCaig, and Kaestner (2011) find that in exposed provinces, families are 10% more likely to spend on health care of children aged 0–6 years, but school enrollment growth in these provinces is lower than the national average.

## 7.2 | Poor versus rich households

To consider whether the BTA has a larger impact on poor households than rich ones, we divide households into two groups: poor (i.e. households that have *real* income per capita below the national median in 2002) and rich (those that have *real* income per capita above the national median in 2002). We interact the change in provincial tariffs with the 'poor' dummy.

Table 9 reveals that poor households benefited from employment gains more than rich households did in both measures of employment. However, the difference in employment effect between poor and rich households is only significant for manufacturing. The finding implies that the BTA is a good force towards employment equality: poor households obtained more jobs from the BTA than rich households did. However, quite interestingly, the differential employment effects did not translate to differential income effects, as the interaction is not statistically significant as shown in Table 10. This suggests that the rich might have had some other non-wage income (such as from an appreciation in real estate prices) thanks to the BTA.

**TABLE 10** Income effect of the BTA: the poor versus the rich

	(1)
	Change in log of income per capita
Change in provincial tariffs * poor <sub>2002</sub>	-0.269 (1.589)
Change in provincial tariffs	-4.140*** (1.040)
Poor <sub>2002</sub>	-0.023 (0.137)
Constant	3.865*** (0.144)
<i>N</i>	19,835
Adj. <i>R</i> <sup>2</sup>	0.476

Notes: Control variables are Household head (HH)'s ethnicity, HH age, HH gender, HH vocational education dummy, HH high school dummy, HH middle school dummy, HH primary school dummy, spouse vocational education dummy, spouse high school dummy, spouse middle school dummy, spouse primary school dummy, household size, and number of working age members and log of income per capita. All household characteristics are for 2002.

\* $p < 0.10$ , \*\* $p < 0.05$ , \*\*\* $p < 0.01$ . Standard errors are clustered at the province level, and are shown in parentheses.

**TABLE 11** Job creation in rural versus urban areas

	$\Delta$ share of manufacturing employment	$\Delta$ share of service employment	$\Delta$ share of manufacturing hours	$\Delta$ share of service hours
	(1)	(2)	(3)	(4)
Change in tariffs*rural <sub>2002</sub>	-0.748** (0.306)	-0.233 (0.280)	-9.855** (4.001)	0.649 (2.552)
Change in provincial tariffs	-0.788*** (0.128)	-0.253 (0.158)	-10.417*** (1.884)	-3.582* (1.899)
Rural <sub>2002</sub> (1 for rural areas)	-0.074*** (0.026)	-0.100*** (0.029)	-1.082*** (0.362)	-0.760*** (0.265)
Constant	-0.042*** (0.013)	0.077*** (0.020)	-0.056*** (0.012)	0.061** (0.026)
<i>N</i>	18,957	18,957	18,957	18,957
Adj. <i>R</i> <sup>2</sup>	0.190	0.190	0.205	0.179

Notes: Control variables are Household head (HH)'s ethnicity, HH age, HH gender, HH vocational education dummy, HH high school dummy, HH middle school dummy, HH primary school dummy, spouse vocational education dummy, spouse high school dummy, spouse middle school dummy, spouse primary school dummy, household size, and number of working age members. All household characteristics are for 2002.

Regressions in columns (1) and (2) control for shares of manufacturing and services workers in the household in 2002, change in share of provincial manufacturing and services workers between 1998 and 2002.

Regressions in columns (3) and (4) control for shares of manufacturing and services hours of households in 2002, changes in share of provincial manufacturing and services workers between 1998 and 2002.

\* $p < 0.10$ , \*\* $p < 0.05$ , \*\*\* $p < 0.01$ . Standard errors are clustered at the province level, and are shown in parentheses.

### 7.3 | Rural versus urban households

Impact of the BTA on employment may be different between rural and urban areas. We pay attention to the interaction between provincial tariff declines ( $\theta_p$ ) and a dummy variable for rural areas. Table 11 shows that the interaction terms (Change in tariffs\*rural<sub>1</sub>) are negative and statistically significant at the 5% level for both measures of manufacturing employment (columns (1) and (3)). However, we find no evidence on the difference in service employment between rural and urban areas. The findings imply that job creation effects of the BTA were stronger for rural households than for urban households in manufacturing. This is probably due to a higher level of unemployment in rural areas compared to urban areas, and manufacturing needs more unskilled labour. In other words, the BTA is a useful mechanism to reduce inequality in employment opportunities between rural and urban areas.

## 8 | CONCLUSION

This paper analyses the effect of US market access on local labour markets in Vietnam. It pays attention to general-equilibrium effects of job gains in the local economies. We find that in provinces more exposed to US tariff cuts, manufacturing employment sharply increased, attracting more labour from agriculture. More interestingly, service employment also increased quite substantially, particularly in local commerce and supporting services. Since services are not directly tied to exports, this finding reflects important job gain spillover from manufacturing to services. Meanwhile, agricultural employment levels decreased.

We explore three potentially prominent channels of job gain spillover in provinces benefiting from the BTA. They are demand-led, production-led and real estate-led spillovers. We find evidence for all the channels, with the demand channel being the most important. We document expenditure growth in food and daily non-food items, and in vehicle parts and repairs.

The paper contributes to the understanding of employment dynamics and structural transformation in an exporting developing country after it gains access to US markets. The employment boost is substantial and not limited to manufacturing thanks to propagation channels that operate in local economies.

Finally, we find that the BTA had a more positive impact on employment of females, and poor and rural households. The findings seem to suggest that the BTA carries important distributional implications: it helps reduce income gaps between poor and rich households, and between rural and urban ones.

## REFERENCES

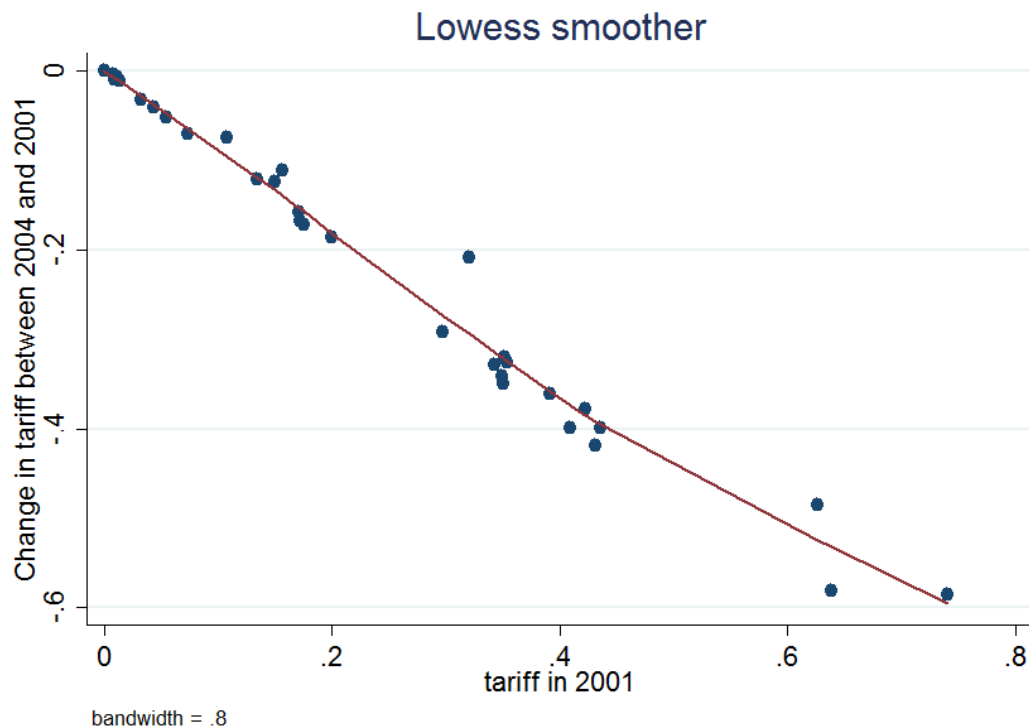
- Acemoglu, D., Autor, D., Dorn, D., Hanson, G. H., & Price, B. (2016). Import competition and the great US employment sag of the 2000s. *Journal of Labor Economics*, 34(1), S141–S198.
- Allendorf, K. (2007). Do women's land rights promote empowerment and child health in Nepal? *World Development*, 35(11), 1975–1988.
- Autor, D. H., Dorn, D., Hanson, G. H. (2013). The China syndrome: Local labor market effects of import competition in the United States. *American Economic Review*, 103(6), 2121–2168. <https://doi.org/10.1257/aer.103.6.2121>
- Baumgarten, D., (2013). Exporters and the rise in wage inequality: Evidence from German linked employer-employee data. *Journal of International Economics*, 90(1), 201–217.
- Bernard, A.B., & Jensen, J.B.,(1995). Exporters, jobs, and wages in US manufacturing: 1976-1987. *Brookings Papers on Economic Activity. Microeconomics*, 67–119.
- Brambilla, I., Lederman, D., & Porto, G. (2012). Exports, export destinations, and skills. *American Economic Review*, 102(7), 3406–3438. <https://doi.org/10.1257/aer.102.7.3406>

- Brian, K. (2013). Regional effects of trade reform: What is the correct measure of liberalization? *American Economic Review*, 103(5), 1960–1976.
- Costa, F. J. M., Garred, J., & Pessoa, J. P. (2016). Winners and losers from a commodities-for-manufactures trade boom. *Journal of International Economics*, 102, 50–69. <https://doi.org/10.1016/j.jinteco.2016.04.005>
- Dávalos, J., Hoang, T. X., & Tiberti, L. (2018). The effect of input-trade liberalization on farm and nonfarm labour in Vietnam. *European Review of Agricultural Economics*, forthcoming.
- Ebenstein, A., Harrison, A., McMillan, M., & Phillips, S. (2014). Estimating the impact of trade and offshoring on American workers using the current population surveys. *The Review of Economics and Statistics*, 96(4), 581–595.
- Erten, B., Leight, J. (2018). Exporting out of agriculture: The impact of WTO accession on structural transformation in China. *The Review of Economics and Statistics*, 1–46.
- Fukase, E. (2013). Export liberalization, job creation, and the skill premium: Evidence from the US–Vietnam bilateral trade agreement (BTA). *World Development*, 41, 317–337.
- Helpman, E., Itskhoki, O., & Redding, S. (2010). Inequality and unemployment in a global economy. *Econometrica*, 78(4), 1239–1283.
- Hoang, T. X., Pham, C. S., & Ulubaşoğlu, M. A. (2014). Non-farm activity, household expenditure, and poverty reduction in rural Vietnam: 2002–2008. *World Development*, 64(C), 554–568. <https://doi.org/10.1016/j.worlddev.2014.06.027>
- Kovak, K. B. (2013). Regional effects of trade reform: What is the correct measure of liberalization? *American Economic Review*, 103(5), 1960–1976.
- McCaig, B. (2011). Exporting out of poverty: Provincial poverty in Vietnam and US market access. *Journal of International Economics*, 85(1), 102–113. <https://doi.org/10.1016/j.jinteco.2011.05.007>
- McCaig, B., & Pavcnik, N. (2018). Export markets and labor allocation in a low-income country. *American Economic Review*, 108(7), 1899–1941. <https://doi.org/10.1257/aer.20141096>
- McMillan, M. S., & Rodrik, D. (2011). Globalization, structural change and productivity growth, NBER Working Paper No. 17413 (Cambridge, MA: NBER).
- Menon, N., van der Rodgers Meulen, Y., & Nguyen, H. (2014). Women's land rights and children's human capital in Vietnam. *World Development*, 54(C), 18–31.
- Nguyen, M., McCaig, B., & Kaestner, R. (2017). Trade liberalization and investment in children's human capital: Evidence from the US-Vietnam, Bilateral Trade Agreement, mimeo.
- Pierce, J. R., Schott, P. K. (2016). The surprisingly swift decline of US manufacturing employment. *American Economic Review*, 106(7), 1632–1662. <https://doi.org/10.1257/aer.20131578>
- Schank, T., Schnabel, C., & Wagner, J. (2007). Do exporters really pay higher wages? First evidence from German linked employer–employee data. *Journal of International Economics*, 72(1), 52–74. <https://doi.org/10.1016/j.jinteco.2006.08.004>
- Topalova, P. (2007). Trade liberalization, poverty and inequality: Evidence from Indian districts, in Harrison, A. (ed.), *Globalization and Poverty*. Chicago, IL: University of Chicago Press, 291–336.
- Topalova, P. (2010). Factor immobility and regional impacts of trade liberalization: Evidence on poverty from India. *American Economic Journal: Applied Economics*, 2, 1–41.

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## APPENDIX



**FIGURE A1** Initial tariff and tariff reduction. [Colour figure can be viewed at [wileyonlinelibrary.com](http://wileyonlinelibrary.com)]

**TABLE A1** Two-digit sectors

Agriculture and agricultural services	Electricity and water production and distribution, construction
01 Cultivation (including livestock)	40 Electricity production and distribution
02 Forestry and related services	41 Extract, clean and distribute water
05 Aquaculture (includes both raising, and catching seafood)	45 Construction
Mining and extracting minerals	Commerce
10 Coal mining	50 Vehicle sales, maintenance and repair; retail sale of gas
11 Oil and gas drilling and related services	51 Wholesale and agent sales (excluding motor vehicles)
12 Uranium and Thorium mining	52 Retail sales (excluding motor vehicles); repairs of family appliances
13 Metal mining	55 Hotel and restaurant
14 Mining for rocks, stone, sand, salt, fertilizer...	Transport and communication
Industry	60 Road, railroad and pipeline transport
15 Food and beverages	61 Water transport
16 Tobacco products	62 Airline transport

(Continues)

TABLE A1 (Continued)

17	Textiles and garments	63	Services in transport; tourist services
18	Fur processing and fur products (excluding garments)	64	Post and telecommunications
19	Leather tanning and leather products including wallets, seats, suitcases (excluding garments)	Finance	
20	Wood, bamboo, rattan processing and production of wood, bamboo and rattan products	65	Financial intermediary (excluding insurance and social welfare)
21	Paper and paper products	66	Insurance and pensions (excluding social insurance)
22	Printing and publishing (books, magazines, newspapers, and recordings)	67	Assistance in finance (including social insurance)
23	Coke, crude oil, uranium processing	Other service categories	
24	Chemicals and chemical products (including pesticides, paints, pharmaceuticals, beauty products and synthetic fibers)	70	Science and technology activities
25	Plastic and rubber production and products	71	Real estate
26	Other non-metal mineral products production (glass, ceramics, cement...)	72	Rental of equipment, household goods
27	Metal production and processing	73	Computer-related activities
28	Metal products (non-mechanical, non-electric such as tools, boiler,...)	74	Other business activities (accounting, tax and other consulting, architecture, advertising, protection, housecleaning, photography, packaging, etc)
29	Other equipment and machinery not specified elsewhere (pump, turbine, kiln, loading equipment, cranes)	75	Government administration and national defence (includes police)
30	Office and computer equipment production	80	Education and training
31	Other electronic, electric equipment not specified elsewhere (electric generators, wires, batteries, lamps)	85	Social relief (hospital, clinic, veterinary care, relief work)
32	Radio, TV, broadcasting and other communication equipment	90	Culture and sports (broadcasting, movies, entertainment, newspapers, library, museums, sports...)
33	Medical and laboratory equipment, precision instruments, and meters (clocks)	91	Communist party, mass organizations, professional associations
34	Motor vehicles and spare parts	92	Public sanitation, garbage collection
35	Other transportation equipment (boats, railroad, airplane)	93	Other services (ironing, laundry, haircutting, funerals, other)
36	Furniture production	95	Personal services provided at the home of client
37	Recycling, reprocessing (metal and other)	99	Activities of foreign organizations

**TABLE A2** Employment shares for the whole samples of 2002 and 2004

Share of employed household members per household	2002				2004			
	Mean	Std	Min	Max	Mean	Std	Min	Max
All sectors	0.902	0.194	0	1	0.890	0.205	0	1
Agriculture	0.528	0.418	0	1	0.500	0.415	0	1
Manufacturing	0.095	0.229	0	1	0.100	0.229	0	1
Services	0.228	0.336	0	1	0.234	0.336	0	1
Commerce	0.120	0.256	0	1	0.121	0.254	0	1
Transport	0.028	0.116	0	1	0.028	0.115	0	1
Finance	0.003	0.042	0	1	0.003	0.040	0	1
Other	0.077	0.206	0	1	0.083	0.210	0	1
Mining	0.009	0.075	0	1	0.007	0.066	0	1
Utility and construction	0.042	0.142	0	1	0.048	0.152	0	1

**TABLE A3** Changes in number of working household members across broad sectors

	All sectors	Agriculture	Manufacturing	Services	Mining	Utility and construction
	(1)	(2)	(3)	(4)	(5)	(6)
Change in provincial tariffs	-1.015* (0.533)	4.138*** (0.675)	-3.401*** (0.408)	-1.748*** (0.524)	0.038 (0.080)	-0.042 (0.264)
Constant	1.242*** (0.058)	1.354*** (0.083)	-0.310*** (0.038)	-0.194** (0.079)	0.029** (0.013)	0.023 (0.027)
<i>N</i>	20,070	20,070	20,070	20,070	20,070	20,070
Adj. $R^2$	0.212	0.202	0.188	0.163	0.231	0.200

*Notes:* All these regressions control for Household head (HH)'s ethnicity, HH age, HH gender, HH vocational education dummy, HH high school dummy, HH middle school dummy, HH primary school dummy, spouse vocational education dummy, spouse high school dummy, spouse middle school dummy, spouse primary school dummy, household size, and number of working age members. All household characteristics are for 2002. The regressions also control for the numbers of workers in agriculture, manufacturing, services, mining, utility and construction of households in 2002, change in share of workers in agriculture, manufacturing, services, mining, utility and construction at the province level between 1998 and 2002.

\* $p < 0.10$ , \*\* $p < 0.05$ , \*\*\* $p < 0.01$ . Standard errors are clustered at the province level, and are shown in parentheses.

**TABLE A4** Changes in number of working members across service sectors

	<b>Commerce</b>	<b>Transport</b>	<b>Finance</b>	<b>Other services</b>
	<b>(1)</b>	<b>(2)</b>	<b>(3)</b>	<b>(4)</b>
Change in provincial tariffs	-1.603*** (0.567)	-0.318 (0.192)	0.123*** (0.030)	-0.304*** (0.042)
Constant	-0.148*** (0.056)	-0.038* (0.020)	0.009** (0.005)	-0.040*** (0.006)
<i>N</i>	20,070	20,070	20,070	20,070
Adj. $R^2$	0.196	0.217	0.199	0.956

*Notes:* All these regressions control for Household head (HH)'s ethnicity, HH age, HH gender, HH vocational education dummy, HH high school dummy, HH middle school dummy, HH primary school dummy, spouse vocational education dummy, spouse high school dummy, spouse middle school dummy, spouse primary school dummy, household size, and number of working age members. All household characteristics are for 2002. The regressions also control for numbers of commerce, transport, finance and other services workers of households in 2002, changes in shares of workers in commerce, transport, finance and other services at the province level between 1998 and 2002.

\* $p < 0.10$ , \*\* $p < 0.05$ , \*\*\* $p < 0.01$ . Standard errors are clustered at the province level, and are shown in parentheses.

**TABLE A5** Employment change across broad sectors (Sample restricted to households surveyed in the first half of 2002)

	All sectors	Agriculture	Manufacturing	Services	Mining	Utility and construction
	(1)	(2)	(3)	(4)	(5)	(6)
Panel A: Change in 'share of number of employed members to number of household members of working age'						
Change in provincial tariffs	0.172 (0.190)	1.763*** (0.256)	-1.058*** (0.147)	-0.461*** (0.158)	0.029 (0.035)	-0.101 (0.103)
Constant	0.644*** (0.026)	0.562*** (0.037)	-0.056*** (0.019)	0.124*** (0.023)	0.010* (0.005)	0.004 (0.012)
<i>N</i>	16,045	16,045	16,045	16,045	16,045	16,045
Adj. <i>R</i> <sup>2</sup>	0.259	0.188	0.188	0.189	0.239	0.203
Panel B: Change in working hours as share of total potential working hours by household members of working age						
Change in provincial tariffs	-1.354*** (0.479)	0.934*** (0.235)	-1.295*** (0.179)	-0.969** (0.414)	0.049 (0.038)	-0.071 (0.080)
Constant	0.419*** (0.048)	0.458*** (0.029)	-0.070*** (0.020)	0.002 (0.034)	0.014*** (0.005)	0.015* (0.008)
<i>N</i>	16,045	16,045	16,045	16,045	16,045	16,045
Adj. <i>R</i> <sup>2</sup>	0.333	0.344	0.207	0.177	0.233	0.192

Notes: Both Panels A and B control for household head (HH)'s ethnicity, HH age, HH gender, HH vocational education dummy, HH high school dummy, HH middle school dummy, HH primary school dummy, spouse vocational education dummy, spouse high school dummy, spouse middle school dummy, spouse primary school dummy, household size, and number of working age members. All household characteristics are for 2002.

Regressions in Panel A control for shares of workers in agriculture, manufacturing, services, mining, utility and construction of households in 2002, change in shares of workers in agriculture, manufacturing, services, mining, utility and construction at the province level between 1998 and 2002.

Regressions in Panel B control for shares of working hours in agriculture, manufacturing, services, mining, utility and construction of households in 2002, changes in shares of workers in agriculture, manufacturing, services, mining, utility and construction at the province level between 1998 and 2002.

\* $p < 0.10$ , \*\* $p < 0.05$ , \*\*\* $p < 0.01$ . Standard errors are clustered at the province level, and are shown in parentheses.

TABLE A6 Pooled sample

	All sectors	Agriculture	Manufacturing	Services	Mining	Utility and construction
	(1)	(2)	(3)	(4)	(5)	(6)
Panel A: Change in 'share of number of employed members to number of household members of working age'						
Change in provincial tariffs	0.244*** (0.065)	0.773*** (0.155)	-0.272** (0.112)	-0.266*** (0.093)	-0.015 (0.016)	0.024 (0.058)
Share of population with over 10 years of general education in 2002 * t	0.008 (0.025)	0.036 (0.052)	-0.050 (0.052)	-0.032 (0.035)	0.006 (0.008)	0.047** (0.022)
Share of population that is an ethnic minority in 2002 * t	0.013** (0.006)	0.034* (0.020)	-0.019** (0.009)	-0.002 (0.013)	0.000 (0.002)	-0.000 (0.005)
Share of workers in manufacturing in 2002 * t	0.072* (0.038)	0.156 (0.100)	-0.034 (0.054)	-0.043 (0.033)	-0.015 (0.011)	0.010 (0.045)
Share of workers in mining in 2002 * t	-0.145*** (0.048)	-0.202 (0.122)	0.063 (0.075)	0.146*** (0.030)	-0.136*** (0.008)	-0.016 (0.032)
Constant	0.820*** (0.001)	0.549*** (0.002)	0.049*** (0.001)	0.202*** (0.001)	0.001*** (0.000)	0.018*** (0.001)
<i>N</i>	115,010	115,010	115,010	115,010	115,010	115,010
Adj. <i>R</i> <sup>2</sup>	0.044	0.165	0.060	0.056	0.062	0.022
Panel B: Change in working hours as shares of total potential working hours by household members of working age						
Change in provincial tariffs	0.663** (0.289)	1.189*** (0.292)	-0.239** (0.108)	-0.311** (0.123)	-0.012 (0.014)	0.035 (0.060)
Share of population with over 10 years of general education in 2002 * t	-0.172 (0.104)	-0.117 (0.115)	-0.057 (0.052)	-0.045 (0.042)	-0.000 (0.007)	0.047* (0.026)
Share of population that is an ethnic minority in 2002 * t	0.004 (0.034)	0.024 (0.033)	-0.016* (0.008)	-0.003 (0.014)	-0.000 (0.002)	-0.000 (0.005)
Share of workers in manufacturing in 2002 * t	0.433*** (0.160)	0.465** (0.177)	-0.004 (0.046)	-0.028 (0.049)	-0.007 (0.009)	0.008 (0.037)
Share of workers in mining in 2002 * t	0.131 (0.174)	-0.025 (0.213)	0.058 (0.062)	0.202*** (0.043)	-0.069*** (0.007)	-0.035 (0.031)
Constant	0.540*** (0.003)	0.276*** (0.003)	0.043*** (0.001)	0.206*** (0.001)	0.001*** (0.000)	0.014*** (0.001)
<i>N</i>	115,010	115,010	115,010	115,010	115,010	115,010
adj. <i>R</i> <sup>2</sup>	0.071	0.180	0.066	0.068	0.072	0.022

Notes: Standard errors in parentheses.

\**p* < 0.10, \*\**p* < 0.05, \*\*\**p* < 0.01. The regressions control for province fixed-effects. Standard errors are clustered at the province level.

**TABLE A7** Removing Hanoi and Ho Chi Minh City

	All sectors	Agriculture	Manufacturing	Services	Mining	Utility and construction
	(1)	(2)	(3)	(4)	(5)	(6)
Panel A: Change in 'share of number of employed members to number of household members of working age'						
Change in provincial tariffs	-0.188 (0.348)	1.241*** (0.421)	-1.169*** (0.323)	-0.183 (0.258)	0.059 (0.070)	-0.137 (0.224)
Constant	0.616*** (0.035)	0.523*** (0.047)	-0.061** (0.030)	0.136*** (0.030)	0.013* (0.008)	0.005 (0.019)
<i>N</i>	16,045	16,045	16,045	16,045	16,045	16,045
Adj. <i>R</i> <sup>2</sup>	0.259	0.188	0.188	0.189	0.239	0.203
Panel B: Changes in working hours as shares of total potential working hours by household members of working age						
Change in provincial tariffs	-0.422 (0.902)	0.816 (0.524)	-1.242*** (0.350)	-0.027 (0.430)	0.090 (0.074)	-0.059 (0.168)
Constant	0.494*** (0.080)	0.449*** (0.050)	-0.063* (0.032)	0.074* (0.039)	0.017** (0.008)	0.017 (0.014)
<i>N</i>	16,045	16,045	16,045	16,045	16,045	16,045
Adj. <i>R</i> <sup>2</sup>	0.333	0.344	0.207	0.177	0.233	0.192

Notes: Both Panels A and B control for household head (HH)'s ethnicity, HH age, HH gender, HH vocational education dummy, HH high school dummy, HH middle school dummy, HH primary school dummy, spouse vocational education dummy, spouse high school dummy, spouse middle school dummy, spouse primary school dummy, household size, and number of working age members. All household characteristics are for 2002.

Regressions in Panel A control for shares of workers in agriculture, manufacturing, services, mining, utility and construction of households in 2002, changes in shares of workers in agriculture, manufacturing, services, mining, utility and construction at the province level between 1998 and 2002.

Regressions in Panel B control for shares of working hours in agriculture, manufacturing, services, mining, utility and construction of households in 2002, changes in shares of workers in agriculture, manufacturing, services, mining, utility and construction at the province level between 1998 and 2002.

\* $p < 0.10$ , \*\* $p < 0.05$ , \*\*\* $p < 0.01$ . Standard errors are clustered at the province level, and are shown in parentheses.