

Impact of U.S. Market Access on Local Labor Markets in Vietnam

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WORLD BANK GROUP

Development Research Group
Macroeconomics and Growth Team
March 2018

Abstract

This paper examines the impact of U.S. market access on local labor markets in a developing country, Vietnam. The study finds that following the implementation of the Vietnam–United States bilateral trade agreement in December 2001, manufacturing employment increased in provinces that were more exposed to U.S. tariff cuts. In those provinces, employment also increased in many service sectors,

reflecting strong spillovers of job gains. The new job opportunities have attracted labor from agriculture, thus reducing agricultural employment. The paper examines three possible channels of job gain spillovers, namely, demand, production, and real estate. Although there is evidence for all three channels, the demand channel is the most important.

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JEL: F16

Key words: U.S.-Vietnam Bilateral Trade Agreement, employment, propagation, exports

¹We are grateful to Brian McCaig for kindly sharing tariff data. We thank Brian McCaig, Norman Loayza, Minh Nguyen, Anh Pham, Luis Serven, four referees and seminar participants at the World Bank for insightful comments and feedback. All errors are our own. Contact addresses: Trung X. Hoang (hoangxuantrung3012@gmail.com) and Ha Nguyen (hanguyen@worldbank.org). This research is funded by Vietnam National Foundation for Science and Technology Development (NAFOSTED) under grant number 502.01-2016.10.

1. Introduction

Amid the recent rise of populism and protectionism, the labor market implications of trade have increasingly moved to the center of political and economic debates. Job gains and job losses from imports and exports are the most obvious, possibly naïve but politically powerful measures of gains and losses from trade. For that reason, the local employment consequences of trade have become an important topic of research. Autor et al (2013), in an influential paper, find that U.S. regions that are more exposed to import-competing manufacturing industries witnessed larger declines in manufacturing employment and wages.

While the literature on labor market effects of globalization typically focuses on impacts due to import competition, this paper investigates local labor market consequences from the perspective of an exporting country. It examines the effects of U.S. market access on local labor markets in Vietnam, in the context of the U.S.-Vietnam bilateral trade agreement (BTA) in December 2001. As a part of the BTA, the United States granted Vietnam most-favored-nation (MFN) access to the U.S. market. Vietnamese goods immediately benefited from large, sudden and across-the-board U.S. 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 U.S. tariff cuts, more new manufacturing jobs were created between 2001 and 2003. However, we do not restrict the analysis to manufacturing jobs. It is probably not surprising that manufacturing jobs and wages would increase after access to the U.S. market. Our focus is on the general equilibrium effects of U.S. market access on employment of other sectors in the local economy, and on potential mechanisms via which the job propagation could take place. We find that new jobs are also created in many other local service sectors, reflecting strong spillover effects of new job gains in the local

economies. These new employment opportunities attract labor from agriculture, reducing agricultural employment.

The estimates capture general equilibrium effects of U.S. market access on Vietnam's local labor markets. We explore three potentially important channels: demand-led, production-led and real estate-led. There is evidence for all three channels although the demand channel is the most quantitatively important. Furthermore, we examine the impact of U.S. market access on income. Despite a decline in agricultural employment, agricultural income per capita does not fall after the implementation of the bilateral trade agreement. This suggests that the agricultural sector becomes more productive in response to labor reallocation to non-farm sectors. At the same time, non-farm income per capita significantly increases, leading to overall household income growth.

Overall, U.S. market access provides a “kick” to Vietnamese provinces exposed to U.S. tariff cuts to Vietnamese export products. Employment in manufacturing industries grows and positively propagates to employment in services, mostly via the demand channel. New job opportunities in manufacturing and services attract excess labor from agriculture. Nevertheless, agricultural income does not fall. This, combined with an increase in non-farm income, boosts households' overall income in these provinces.

To document this effect, 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 2001-2002 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. This is to increase the sample size. In addition, we would also be able to 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 labor market consequences of international trade. Much attention in the literature is paid to the U.S. labor market and its import competition. Autor et al (2013) find that U.S. regions more exposed to import-competition from China witness larger declines in manufacturing employment and wages. Pierce and Schott (2016) find that U.S. industries exposed to larger tariff cuts to Chinese goods experience larger employment declines. They discover reallocation within those industries towards less labor-intensive plants, increases in the capital intensity of the most affected plants, and negative employment effects to downstream customers. 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 (2014) estimate that globalization reduces wages between 12 and 16 percentage points in the U.S., via the reallocation of workers away from higher-wage manufacturing jobs into other sectors.

Besides the U.S., the literature on labor market consequences of trade mostly focuses on other importing countries. Using geographical variation in the exposure to imports, they usually find negative labor market effects of import competition. Topalova (2007, 2010) study the effect of opening the Indian domestic market on poverty. They find that in rural India, districts more exposed to trade liberalization- a process of opening the Indian market for 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 finds that regions where workers were concentrated in industries facing the largest tariff cuts are affected more negatively. Our

paper is different to the literature in that we examine the labor market effects from the perspective of an exporting country.

Others have studied various impacts of exports, but not so much on the labor market dynamics. Much of the literature uses the U.S. -Vietnam BTA on Vietnam as a case study. McCaig (2011), in a seminal paper, uses 2002 and 2004 VHLSSs to examine poverty implications of U.S. market access in Vietnamese provinces. McCaig and Pavcnik (2014) show that thanks to the BTA, workers reallocate from household business to formal enterprises. Fukase (2013) finds provinces more exposed to the BTA experienced a relatively larger wage growth for unskilled workers. Costa et al (2016), in the case of Brazil, find 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 et al (2012) use an Argentina manufacturing firm data set to examine the effect of export destinations on skills.

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

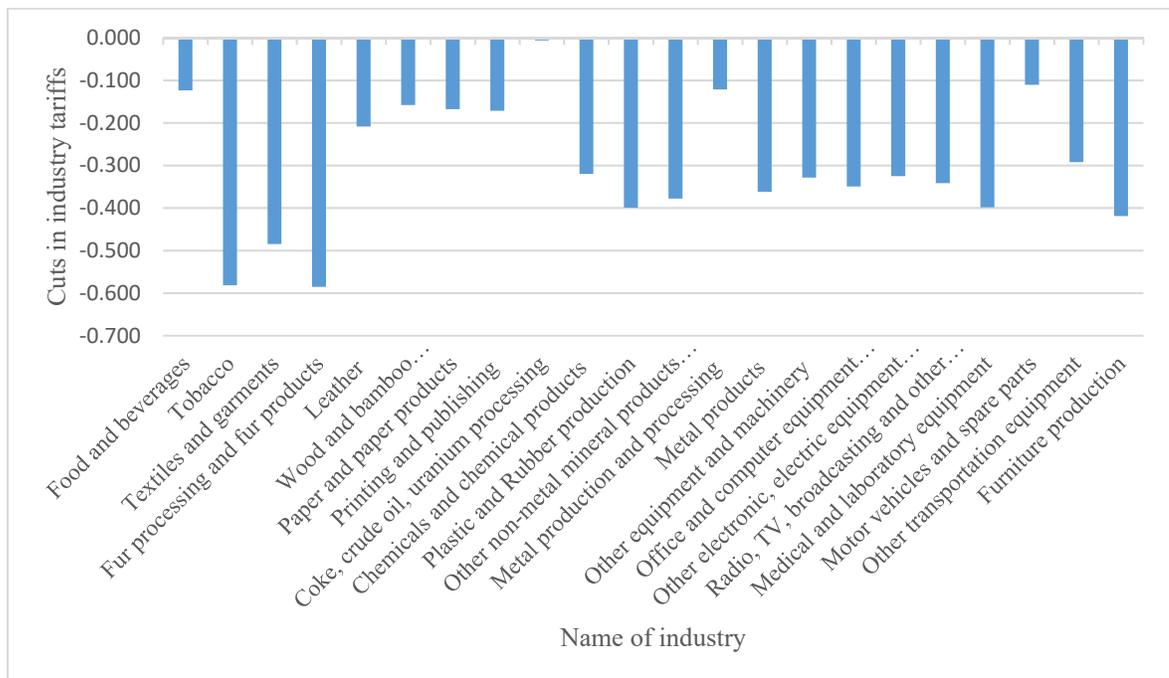
2.1 U.S.-Vietnam Bilateral Trade Agreement in 2001

The U.S.-Vietnam BTA was signed on 13 July 2000 and became effective on 10 December 2001. The United States granted Vietnam Normal Trade Relations (NTR) or Most Favored Nation (MFN) access to the U.S. market immediately upon entry into force of the BTA. What this means is that Vietnamese goods immediately benefit from large, sudden and across the board U.S. tariff

declines. Figure 2.1 shows almost complete tariff reduction for most industries. Among traded industries, the simple mean of U.S. tariffs fell from 28.9 percent to 3.7 percent (McCaig, 2011).

Figure 2.1 reports the U.S. tariff declines across industries in manufacturing sectors. Three industries – “tobacco”, “textiles and garments” and “fur processing and fur products”– have the highest tariff reductions. The industry of coke, crude oil and uranium processing has the lowest tariff decline. Clearly, there is a large variation in tariff declines across industries.

Figure 2.1: Declines in manufacturing sectors’ tariffs



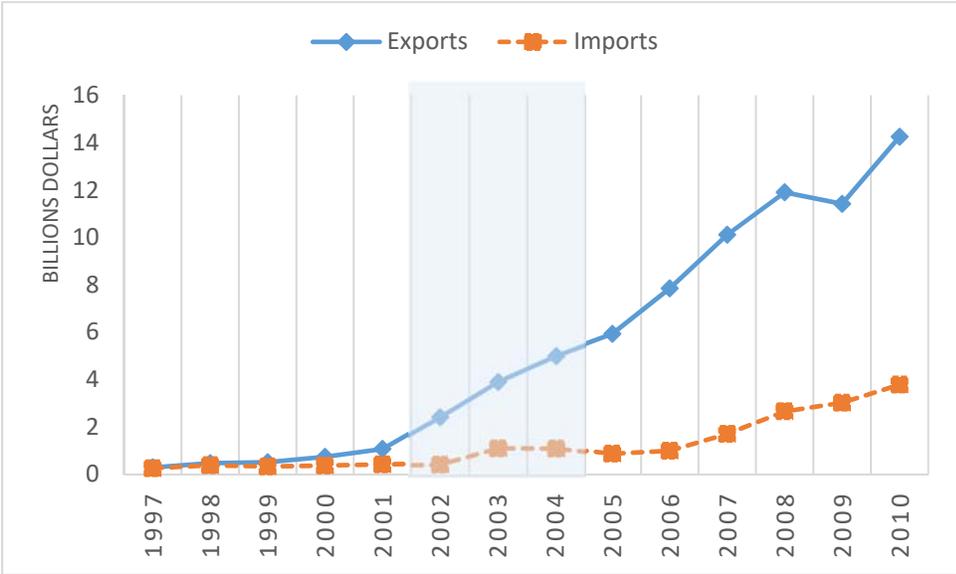
In contrast, the trade commitments for Vietnam are not immediate. Most of Vietnam’s commitments are scheduled for implementation within three to four years, but some commitments are not required until up to 10 years. Most of Vietnam’s commitments are about legal and regulatory changes as Vietnam already applied MFN tariffs to U.S. products well before the BTA. These commitments include accordance of national treatment to U.S. companies and nationals,

customs system and procedures reform, liberalizing and streamlining trading rights, liberalizing trade in services, liberalizing and safeguarding foreign investment, among others (McCaig, 2011).

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 percent and from 2002 to 2003, they grew by an additional 61 percent. Exports to the United States jumped from 5.1 percent of Vietnam’s exports in 2000 to 19 percent of Vietnam’s total exports in 2004. Figure 2.2.1 shows that export growth follows a much steeper path after 2001.

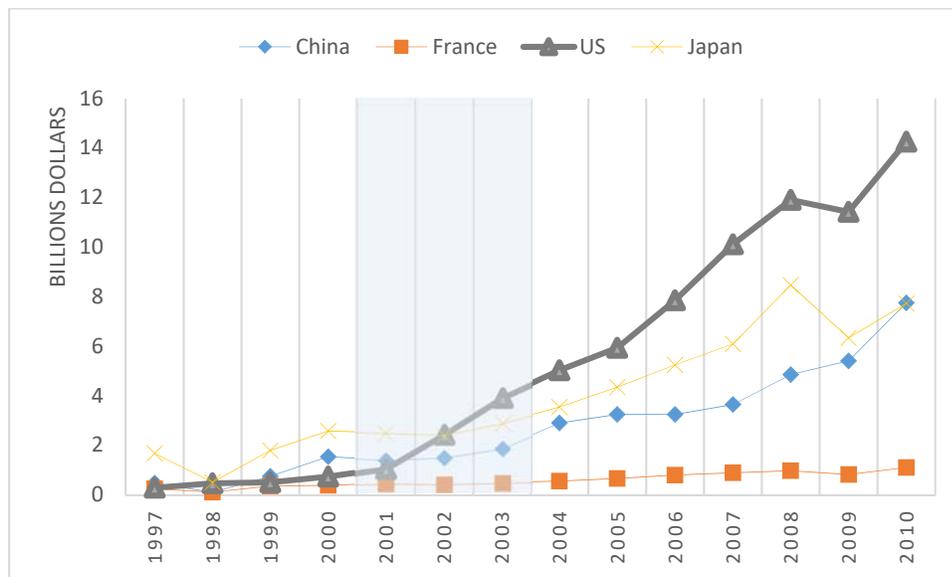
Figure 2.2.1: Exports to and Imports from the U.S.
Source: UN Comtrade



Imports from the United States also grew but not steeply. Import growth did not change in 2002 but jumped in 2003. After that, imports remained stable until 2007. In any case, the value of imports from the United States is of only a small fraction of value of Vietnamese exports to the United States. For example, in 2001, imports accounted for about 38.6 percent 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 2.2.2). 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.

Figure 2.2.2: Exports to the U.S. relative to other key trade partners
Source: UN Comtrade



3. Data

We use two waves of the Vietnam Household Living Standards Survey (VHLSS) in 2002 and 2004. VHLSS provides 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 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 a household survey as opposed to a firm survey, which only consists of formal firms. Employment data are categorized to 60 two-digit sectors (the sector list is shown in Appendix A1). The two-digit sectors are grouped in 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 the information on characteristics of households, employment and income (it is called the income module). Of 74,346 households, only 29,529 households have information on expenditure (it is called the expenditure module). This means that 29,529 households have information on both expenditure and income. Similarly, the VHLSS of 2004 contains 45,944 households with information on income and 9,189 households have information on both expenditure and income. The VHLSSs of 2002 and 2004 form a panel data set of income, covering 21,271 households appearing twice, of which 4,167 households have information on both expenditure and income. This study uses the measures of share of employed household members to total number of household members of working age, so households with no members of working age will be removed from the data set. We also control for change in share of employment at the province level between 1998 and 2002. Since VLSS 1998 covers 59 out of 61 provinces, this further reduces our observations in the data set.² Therefore, the final panel data sets include 18,957 unique households with information on income, of which 4,092 unique households have information on expenditure.

² Our results remain unchanged when we do not control for change in share of employment at province level between 1998 and 2002.

Table 3.1: 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

Table 3.1 provides descriptive statistics on the shares of employed household members across sectors between 2002 and 2004.³ Most people worked in agricultural sectors (54.5 percent on average in 2002). The share of people working in services (22.1 percent) was larger than that in the manufacturing sector (8.9 percent). While the share of workers in the agricultural sector declined between 2002 and 2004, the share of workers in manufacturing increased from about 8.9 percent in 2002 to 10.1 percent 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 labor 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

³ We also report the descriptive statistics for the whole sample of VHLSSs 2002 and 2004 in Appendix A2. The results are quantitatively similar. This suggests the panel data set is similar to the whole sample in terms of employment shares.

had 61 provinces with the total population of about 80 million in 2002. The provinces differed in their exposure to manufacturing industries that benefited from U.S. tariff cuts following the BTA implementation in 2001. Following McCaig (2011), we exploit the variation in “provincial tariff cuts”. The measure is calculated as follows:

$$\theta_p = \sum_i \frac{l_p^i}{l_p} \times \Delta\tau_i$$

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 ($\frac{l_p^i}{l_p}$)⁴ 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 θ_p reflects a larger average tariff reduction.⁵

Table 4.1: 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

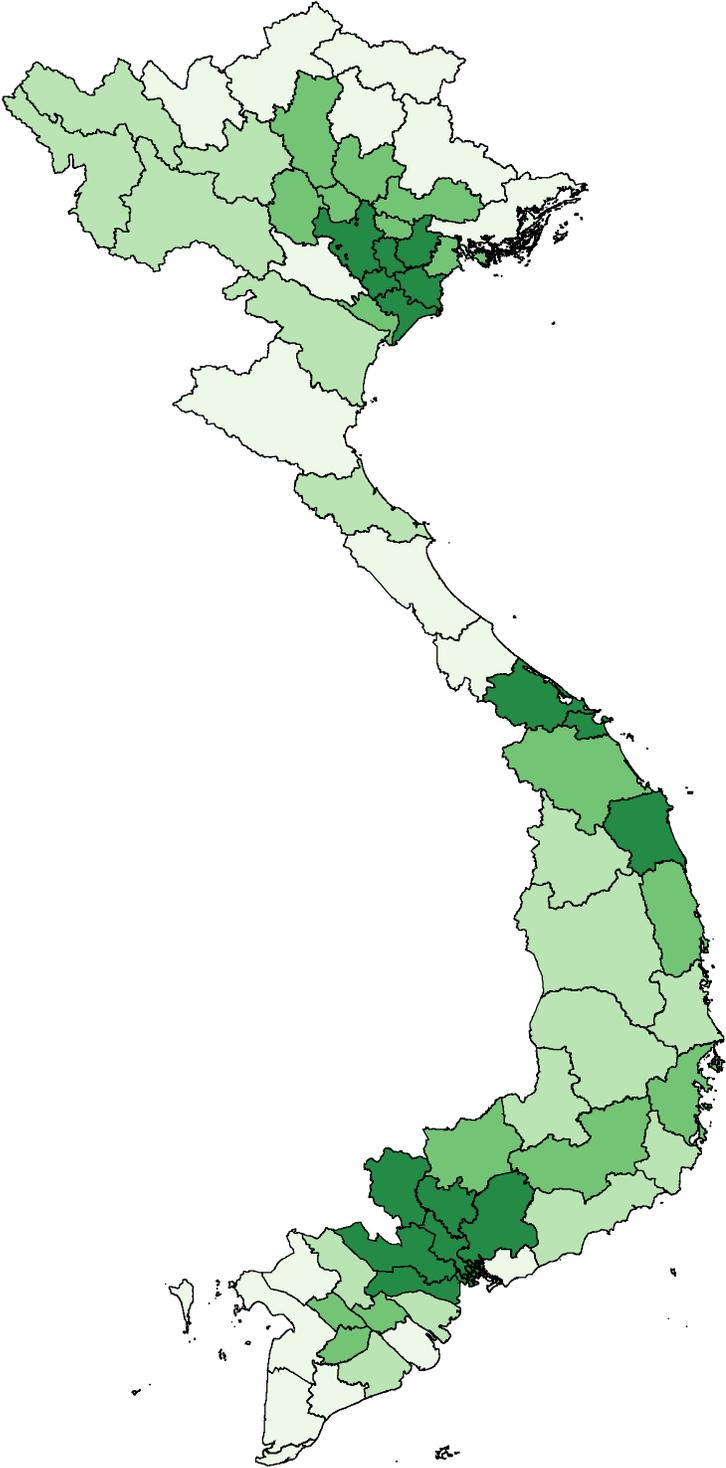
Table 4.1 provides summary statistics for change in provincial tariffs. The mean value for change in provincial tariff was -0.086, which implies that the average tariff cuts for a Vietnamese province was 8.6%. The province with the largest average tariff cuts is Ho Chi Minh City ($\theta_p = -0.151$). The province with the smallest average tariff cuts is Quang Ninh ($\theta_p = -0.066$).

Figure 4.1 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.

⁴Data for detailed employment shares are from the 1999 Population and Housing Census.

⁵ We are grateful to Brian McCaig for providing us with the data on provincial tariff declines θ_p .

Figure 4.1: Vietnamese provinces with different provincial tariff changes



Note: Darker provinces indicate larger U.S. tariff cuts. Paracel Islands and Spratly Islands are not included in the figure because they have no employment data.

4.2 Econometric specifications

The econometric specification takes the following form:

$$\Delta y_{h,p}^i = \beta_1 + \beta_2 \theta_p + \beta_3 \text{initialconditions}_{h,p,2002} + \varepsilon_p$$

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. θ_p is province p 's change in tariffs; *initialcondition* _{$h,p,2002$} 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 level⁶:

a. $y_{h,p,t}^i$ 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 of 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.

b. $y_{h,p,t}^i$ 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 equals the number of household members of working age multiplied by 40. Hence, $\Delta y_{h,p}^i$ is the change of that fraction between the two surveys.

⁶ 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 reported in the Appendix.

We also select change in log of *real* income per capita of households in the previous 12 months as the outcome variable for income. Wage is also another potentially good option⁷ 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*_{h,p,2002} 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 preexisting 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-U.S. 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 2.2.2). 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 labor in other provinces. If this was the case, tariff cuts would not influence provincial manufacturing and services employment.

⁷ 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, 2007).

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 labor 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 VHLSS 1998 and 2002.

4.3 Expected effects

Exporting to the United States would benefit labor in Vietnam due to an increase in labor-intensive products. Export firms would expand production and hire more labor. 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 works through an increase in aggregate demand. The increase in manufacturing income could result in higher demand for local services such as retails, restaurants and entertainment. This would cause higher demand for employment in those industries. New job opportunities from manufacturing and service sectors imply labor reallocation away from agricultural sectors. Hoang et al (2014) find that an increase in nonfarm participation decreases labor involvement in agricultural sectors in rural Vietnam during the period 2002-2008. We hypothesize that the BTA decreases agricultural employment, as agricultural laborers move

into manufacturing and service industries, this leads to an increase in nonfarm income of households.

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

5. Baseline results

5.1 Labor 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 5.1 presents the results. Note that in Panel A, the outcome variable is “change in the share of number of employed members to number of members in working ages”. In Panel B, the outcome variable is “change in the share of working hours to total potential working hours by members in working ages”. We pay attention to the first rows of the panels. Both panels show that a more negative θ_p (i.e. larger provincial tariff decline) causes a larger drop in the share of employment and working hours in agriculture (column [2]). At the same time, a larger provincial tariff decline causes larger gains in the share of employment and hours in manufacturing and services⁸ (columns [3] and [4]). A larger provincial tariff cut does 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.

⁸ Note that services include Commerce, Transport and Communication, and Other Services.

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

We interpret the results as follows: a *decrease* of 10% in provincial tariffs causes an average increase of 0.12 in the *share* of household members employed in manufacturing and an average increase of 0.07 in the share of household members employed in services (columns [3] and [4] of Panel A). In other words, manufacturing employment increases by 12 *percentage points* and service employment increases by 7 percentage points. At the same time, a decrease of 10% in provincial tariffs causes an average decline of 0.16 in the share of household members employed in agriculture (column [2] of Panel A). Alternatively, a decrease of 10% in provincial tariffs causes an average increase of 0.14 in the share of working hours in manufacturing and an average increase of 0.1 in the share of working hours in services (columns [3] and [4] of Panel B). Note that the share of total employment does not change but the share of total working hours increases when a province experiences tariff cuts (column [1] of Panels A and B). This suggests workers become less underemployed.

Table 5.1: Employment change across broad sectors

	All sector	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 members in working ages”						
Change in provincial tariffs	0.216 (0.221)	1.599*** (0.320)	-1.155*** (0.155)	-0.684** (0.271)	0.048 (0.040)	-0.047 (0.115)
Share of working members. ₁	-0.579*** (0.016)					
Change in share of provincial labor between 2002 and 1998	0.191** (0.073)					
Share of agricultural workers. ₁		-0.350*** (0.010)				
Change in share of provincial agricultural workers between 2002 and 1998		0.012 (0.035)				
Share of manufacturing workers. ₁			-0.417*** (0.017)			
Change in share of provincial manufacturing workers between 2002 and 1998			0.022 (0.102)			
Share of service members. ₁				-0.361*** (0.009)		
Change in share of provincial service workers between 2002 and 1998				0.007 (0.041)		
Share of mining workers. ₁					-0.475*** (0.061)	
Change in share of provincial mining workers between 2002 and 1998					0.045 (0.036)	
Share of utility and construction workers. ₁						-0.475*** (0.020)
Change in share of provincial utility and construction workers between 2002 and 1998						0.152* (0.084)
Constant	0.638*** (0.025)	0.436*** (0.029)	-0.082*** (0.014)	-0.043* (0.024)	0.014*** (0.005)	0.019* (0.010)
<i>N</i>	18957	18957	18957	18957	18957	18957
adj. <i>R</i> ²	0.253	0.178	0.189	0.177	0.231	0.206

Panel B: Changes in working hours as shares of total potential working hours by members in working ages						
Change in provincial tariffs	-1.832*** (0.566)	1.158*** (0.285)	-1.380*** (0.155)	-0.974** (0.473)	0.062 (0.047)	-0.020 (0.085)
Share of working hours. ₁	-0.607*** (0.015)					
Change in share of provincial labor between 2002 and 1998	0.140 (0.235)					
Share of agricultural-working hours. ₁		-0.505*** (0.015)				
Change in share of provincial agricultural workers between 2002 and 1998		0.025				

			(0.037)			
Share of manufacturing-working hours ₁				-0.429***		
				(0.018)		
Change in share of provincial manufacturing workers between 2002 and 1998				0.024		
			(0.084)			
Share of service-working hours ₁				-0.349***		
				(0.011)		
Change in share of provincial service workers between 2002 and 1998				0.003		
			(0.046)			
Share of mining-working hours ₁				-0.454***		
				(0.067)		
Change in share of provincial mining workers between 2002 and 1998				0.051		
			(0.043)			
Share of utility and construction working hours ₁						-0.463***
						(0.023)
Change in share of provincial utility and construction workers between 2002 and 1998						0.156**
						(0.069)
Constant	0.297***	0.390***	-0.109***	-0.075*	0.013**	0.016**
	(0.052)	(0.031)	(0.015)	(0.039)	(0.006)	(0.008)
N	18957	18957	18957	18957	18957	18957
adj. R2	0.299	0.325	0.204	0.163	0.226	0.202

Notes: - Standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

- 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 of these household characteristics are reported in 2002. Standard errors are clustered at province level.

The results suggest a reallocation of labor from agriculture to manufacturing and services in provinces more exposed to tariff declines, leaving aggregate employment unchanged. The finding that manufacturing employment goes up after the BTA is not surprising because manufacturing directly benefits from higher growth of exports to the United States. What is interesting is an increase in employment in services, the sectors that do not directly benefit from higher growth of exports. The increase is significant at the 5% level in both Panels A and B.

The finding reveals a spillover of job gains from the manufacturing sector to service sectors. 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 7, we will examine via what channels the job gain propagation could take place.

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).

5.2 Job creation in services

Table 5.2: 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 in working ages at household level				
Change in provincial tariffs	-0.491** (0.187)	-0.128* (0.069)	0.048*** (0.014)	-0.184* (0.099)
Share of commerce workers. ₁	-0.402*** (0.012)			
Change in share of provincial commerce workers between 2002 and 1998	0.037 (0.064)			
Share of transport workers. ₁		-0.482*** (0.025)		
Change in share of provincial transport workers between 2002 and 1998		0.124 (0.076)		
Share of finance workers. ₁			-0.444*** (0.073)	
Change in share of provincial finance workers between 2002 and 1998			0.065 (0.096)	
Share of other services workers. ₁				-0.384*** (0.017)
Change in share of provincial other service workers between 2002 and 1998				-0.051 (0.040)
Constant	-0.035* (0.018)	-0.009 (0.007)	0.005*** (0.002)	-0.005 (0.009)
<i>N</i>	18957	18957	18957	18957
adj. <i>R</i> ²	0.196	0.251	0.215	0.179
Panel B: Changes in working hours as shares of total potential working hours by members in working ages				
Change in provincial tariffs	-0.776** (0.328)	-0.136 (0.097)	0.038** (0.016)	-0.211 (0.130)
Share of commerce-working hours. ₁	-0.385***			

	(0.015)			
Change in share of provincial commerce workers between 2002 and 1998	0.013			
	(0.075)			
Share of transport-working hours ₁		-0.446***		
		(0.030)		
Change in share of provincial transport workers between 2002 and 1998		0.191**		
		(0.083)		
Share of finance-working hours ₁			-0.468***	
			(0.085)	
Change in share of provincial finance workers between 2002 and 1998			0.074	
			(0.106)	
Share of other-services-working hours ₁				-0.416***
				(0.021)
Change in share of provincial other service workers between 2002 and 1998				-0.048
				(0.039)
Constant	-0.062**	-0.013	0.003	-0.006
	(0.029)	(0.010)	(0.002)	(0.010)
N	18957	18957	18957	18957
adj. R2	0.178	0.221	0.229	0.193

Notes: - Standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

- 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 of these household characteristics are reported in 2002. Standard errors are clustered at province level.

This section considers the impact of export 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 to 99 in Appendix A1). The results are presented in Table 5.2. We find that in provinces with larger tariff declines, the shares of working members and working hours increase in “commerce”, and to a lesser extent, in “transport, storage and communication” and “other remaining services”. A 10% decrease in provincial tariffs causes an average increase of 0.05 in the share of employed members in commerce (column 1 of Panel A). In other words, employment in commerce increases by 5 percentage points. The same tariff cut causes an average increase of 0.08

in the share of working hours in commerce (column [1] of Panel B). Employment in finance decreases for provinces with larger U.S. tariff cuts. The results are statistically significant for both outcome variables although the magnitude is small. Since finance is considered as a *tradable* service, it is possible that higher demand for labor in financial services in provinces exposed to tariff reductions could trigger employment surge in finance in other provinces. The results remain robust if we consider changes in the number of working members (see Table A4 in the Appendix).

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 log of real income per capita of the household between the two surveys. Unfortunately, the surveys do not provide income by detailed sectors. They only provide data on farm and non-farm income of households. Nevertheless, the findings are interesting about the local income effect of U.S. market access.

Table 5.3 presents results on the income effect of BTA. Note that the dependent variable is change in log of real income per household member. Columns (1) and (2) show that in provinces with larger tariff cuts, households' real income per household member and real non-farm income per household member increase, which is expected. A decline in provincial tariffs of 10% causes real income per household member to rise by 42%, which is a very substantial increase over two years. Very interestingly, real farm income does not decline as one would expect due to labor moving out of agriculture. The finding suggests an increase in agricultural productivity thanks to job opportunities in other sectors. One reason could be that labor surplus existed in the agricultural sector. Therefore, underemployment in agriculture is reduced due to higher demand for labor from other sectors benefiting from BTA. This finding is consistent with that of Hoang et al (2014), who find that an increase in nonfarm participation leads to a reduction in labor involvement in

agricultural sectors in rural Vietnam during the period 2002-2008, however nonfarm employment did not have a significant impact on agricultural income.

Table 5.3: Income effect of the BTA

	Δ log of real income per capita	Δ log of real nonfarm income per capita	Δ log of real farm income per capita
	(1)	(2)	(3)
Change in provincial tariffs	-4.209*** (1.246)	-5.405*** (1.063)	0.276 (2.672)
Household head (HH) ethnicity ₋₁	-0.532*** (0.015)		
HH age ₋₁	0.215*** (0.029)	0.326*** (0.043)	0.030 (0.031)
HH gender ₋₁	-0.001 (0.001)	0.006*** (0.001)	0.001* (0.001)
HH vocation ₋₁	-0.011 (0.012)	-0.086*** (0.015)	0.120*** (0.022)
HH high school ₋₁	0.210*** (0.027)	0.313*** (0.033)	-0.076* (0.039)
HH middle school ₋₁	0.126*** (0.024)	0.167*** (0.036)	0.066* (0.034)
HH primary school ₋₁	0.094*** (0.020)	0.114*** (0.030)	0.091*** (0.025)
Spouse vocation ₋₁	0.072*** (0.015)	0.073*** (0.022)	0.074*** (0.019)
Spouse high school ₋₁	0.278*** (0.025)	0.333*** (0.032)	-0.111** (0.052)
Spouse middle school ₋₁	0.169*** (0.020)	0.239*** (0.029)	0.055 (0.035)
Spouse primary school ₋₁	0.097*** (0.018)	0.090*** (0.021)	0.099*** (0.026)
Household size ₋₁	0.062*** (0.013)	0.059*** (0.020)	0.025 (0.019)
No of working age members ₋₁	0.009*** (0.001)	0.008*** (0.001)	0.015*** (0.001)
Log of real income per capita ₋₁	0.109*** (0.008)	0.090*** (0.008)	0.069*** (0.013)
Log of real nonfarm income per capita ₋₁		-0.450*** (0.013)	
Log of real farm income per capita ₋₁			-0.409*** (0.014)
Constant	3.861*** (0.137)	2.689*** (0.120)	3.062*** (0.242)
<i>N</i>	19835	13801	14889
adj. <i>R</i> ²	0.476	0.395	0.353

Notes: - Standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

- 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 of these household characteristics are reported in 2002. Standard errors are clustered at province level.

Among initial household characteristics, we find that education seems to matter most to the change in real income per capita of households. This is true for both the household head's education and spouse's education. 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

Table 6.1: Changes in employment in detailed service sectors

	Δ employment in sales of vehicles and parts	Δ employment in wholesale	Δ employment in retails	Δ employment in hotels and restaurants	Δ employment in supporting industries	Δ employment in real estate	Δ employment in construction
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Panel A: Change in "ratio of number of employed members to number of members in working ages"							
Change in provincial tariffs	-0.058*** (0.019)	-0.205*** (0.063)	-0.248 (0.163)	-0.056 (0.112)	-0.119*** (0.021)	-0.087** (0.036)	-0.041 (0.123)
Share of vehicle sales jobs. ₁	-0.578*** (0.045)						
Δ share of provincial vehicle sales workers between 2002 and 1998	0.006 (0.078)						
Share of wholesales jobs. ₁		-0.725*** (0.035)					
Δ share of provincial wholesales workers between 2002 and 1998		0.190** (0.092)					
Share of retail jobs. ₁			-0.505*** (0.016)				
Δ share of provincial retail workers between 2002 and 1998			0.028 (0.057)				
Share of hotel and restaurants jobs. ₁				-0.434*** (0.024)			
Δ share of provincial hotel and restaurants workers between 2002 and 1998				0.157 (0.120)			
Share of supporting industries jobs. ₁					-0.674*** (0.105)		
Δ share of provincial supporting-industry workers between 2002 and 1998					0.052 (0.051)		
Share of real estate jobs. ₁						-1.003*** (0.002)	
Δ share of provincial real estate workers between 2002 and 1998						-0.227 (0.331)	
Share of construction jobs. ₁							-0.483***

								(0.020)
Δ share of provincial construction workers between 2002 and 1998								0.202**
Constant	-0.008***	-0.015**	-0.003	-0.005	-0.012***	-0.006**	0.019*	(0.010)
	(0.003)	(0.006)	(0.015)	(0.010)	(0.002)	(0.003)	(0.010)	
N	18957	18957	18957	18957	18957	18957	18957	18957
adj. R ²	0.233	0.352	0.266	0.167	0.312	0.352	0.211	

Panel B: Changes in working hours as shares of total potential working hours by members in working ages

Change in provincial tariffs	-0.098***	-0.349***	-0.345	-0.147	-0.129***	-0.085**	-0.018	(0.094)
	(0.026)	(0.080)	(0.223)	(0.176)	(0.023)	(0.033)		
Share of wholesales hours ₋₁		-0.790***						
		(0.044)						
Δ share of provincial wholesales workers between 2002 and 1998		0.134						
		(0.099)						
Share of vehicle sales hours ₋₁	-0.518***							
	(0.050)							
Δ share of provincial vehicle sales workers between 2002 and 1998	0.022							
	(0.101)							
Share of retails hours ₋₁			-0.475***					
			(0.021)					
Δ share of provincial retail workers between 2002 and 1998			0.020					
			(0.059)					
Share of hotel and restaurants hours ₋₁				-0.461***				
				(0.029)				
Δ share of provincial hotel and restaurants workers between 2002 and 1998				0.126				
				(0.136)				
Share of supporting industries hours ₋₁					-0.642***			
					(0.112)			
Δ share of provincial supporting-industry workers between 2002 and 1998					0.038			
					(0.058)			
Share of real estate hours ₋₁						-1.003***		
						(0.002)		
Δ share of provincial real estate workers between 2002 and 1998						-0.297		
						(0.393)		
Share of construction hours ₋₁							-0.477***	
							(0.022)	
Δ share of provincial construction workers between 2002 and 1998							0.195**	
Constant	-0.013***	-0.027***	-0.012	-0.013	-0.013***	-0.006**	0.016*	(0.008)
	(0.004)	(0.007)	(0.019)	(0.015)	(0.002)	(0.002)	(0.008)	
N	18957	18957	18957	18957	18957	18957	18957	18957
adj. R ²	0.184	0.424	0.237	0.174	0.301	0.332	0.211	

Notes: - Standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

- “**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). “**Retails**” refers to retail sales (excluding motor vehicles and parts) and repairs of family appliances; “**Supporting industries**” refers to other business activities (accounting, tax and other consulting, architecture, advertising, protection, housecleaning, photography, packaging etc). Please see Table A1 for more information. 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 of these household characteristics are reported in 2002. Standard errors are clustered at province level.

This section investigates in detail what channels job gains could propagate from manufacturing to the service sectors. 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 two-digit) and combining this with information about households' expenditures. We focus on sectors that best reflect the channels we are discussing. Specifically, we focus on (i) sales of vehicles and vehicle parts, (ii) wholesale, (iii) retail and (iv) 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 use the input-output table to examine production linkages. However, since employment data are only available at the two-digit level, we examine the 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 percent and 0.12 percent of the workforce respectively, according to the Population and Housing Census of 1999. Nevertheless, the breakdown provides useful information about which channels took place.

Table 6.1 provides the results for the three channels. Let’s first focus on the demand channel, which is reflected in columns 1, 2, 3 and 4. Both panels yield a consistent result that a larger provincial tariff reduction causes significantly higher employment in sales of vehicles and vehicle parts (column 1). A 10% tariff reduction causes employment in motor vehicle sales to rise by 0.58 percentage point. Tariff reduction is negatively and statistically significant for employment in wholesales at 1 percent level for both Panels A and B. A 10% decrease in tariff increases employment in wholesales by 2 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 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 percent 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 10% tariff reduction causes employment in supporting industries to rise by 1.2 percentage points. We also find a significant impact of tariff reductions on employment in real estate services (column 6). This suggests the real estate channel did take place during the first two years after BTA. However, we find no evidence on 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 6.2 reveal that food and daily non-food expenditure increases. This finding is consistent to a significant increase in wholesale employment and a (statistically insignificant) increase in retail employment. Underemployment in retail before BTA could be behind the insignificant result for retail employment growth. Vietnamese retail sectors in the early 2000s were characterized by mostly mom-and-pop small shops, run mostly by stay-at-home household members (Nguyen et al, 2013).

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 behavior 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 increases, which might explain the employment increase in sales of vehicles and parts (column 1 of Table 6.1).

Table 6.2: Changes in household real expenditure

	Δ Food expenditure	Δ Daily nonfood expenditure	Δ Annual nonfood expenditure	Δ Value of vehicle purchases	Δ Value of other durable good purchases	Δ Value of vehicle parts purchases
	(1)	(2)	(3)	(4)	(5)	(6)
Change in tariffs	-1.874** (0.840)	-3.730** (1.527)	-2.339 (1.499)	-15.559 (11.617)	-3.807 (6.887)	-11.322*** (3.360)
Log of real food expenditure. ₋₁	-0.403*** (0.026)					
Log of real daily nonfood expenditure. ₋₁		-0.343*** (0.025)				
Log of real annual nonfood expenditure. ₋₁			-0.484*** (0.022)			
Log (real value of vehicle +1). ₋₁				-0.943*** (0.017)		
Log (real value of nonvehicle+1). ₋₁					-0.837*** (0.016)	
Log (real value of vehicle parts +1). ₋₁						-0.509*** (0.021)
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)
N	4092	4090	4085	4092	4089	4091
adj. R2	0.178	0.160	0.205	0.443	0.442	0.212

Notes: - Standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

- “**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 tires, toys, and watches. “**Value of vehicle (cars or motorbikes) purchases**” is calculated at current price and only include 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**” calculated as similarly as value of vehicle purchases, but exclude value of vehicle purchases. “**Value of vehicle parts**” is annual expenditure on spare parts of car and motorbikes in the past 12 months. It is noteworthy that all the values are deflated at January 2002.

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 of these household characteristics are reported 2002.

7. Heterogeneity analyses

7.1 Males' versus females' employment

Table 7.1 reveals that females benefit from BTA much more than males in terms of employment, for both measures of the change in employment, particularly in manufacturing (columns 1 of Panels A and B). However, it is not clear that females benefit from BTA in services more than males do. The coefficients of the impact for female and male employment are within each other's margins of errors.

Table 7.1 Males and female's 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 members in working ages"				
Change in provincial tariffs	-0.551*** (0.081)	-0.721*** (0.109)	-0.427*** (0.144)	-0.330* (0.184)
Share of male manufacturing workers ₋₁	-0.467*** (0.016)			
Change in share of provincial male manufacturing workers between 2002 and 1998	-0.024 (0.077)			
Share of female manufacturing workers in ₋₁		-0.474*** (0.023)		
Change in share of provincial female manufacturing workers between 2002 and 1998		0.118 (0.094)		
Share of male service worker in ₋₁			-0.436*** (0.013)	
Change in share of provincial male service workers between 2002 and 1998			0.033 (0.045)	
Share of female service worker ₋₁				-0.396*** (0.009)
Change in share of provincial female service workers between 2002 and 1998				-0.016 (0.047)
Constant	-0.047*** (0.007)	-0.044*** (0.011)	-0.039*** (0.012)	-0.005 (0.017)
<i>N</i>	18957	18957	18957	18957
adj. <i>R</i> ²	0.218	0.210	0.213	0.192
Panel B: Changes in working hours as shares of total potential working hours by members in working ages				
Change in provincial tariffs	-0.660*** (0.090)	-0.833*** (0.098)	-0.540** (0.215)	-0.551* (0.320)
Share of hours of male manufacturing workers ₋₁	-0.469*** (0.021)			

Change in share of provincial male manufacturing workers between 2002 and 1998	-0.038			
	(0.066)			
Share of hours of female manufacturing workers in _{t-1}		-0.472***		
		(0.022)		
Change in share of provincial female manufacturing workers between 2002 and 1998		0.113		
		(0.086)		
Share of hours of male service worker in _{t-1}			-0.426***	
			(0.014)	
Change in share of provincial male service workers between 2002 and 1998			0.035	
			(0.049)	
Share of hours of female service worker _{t-1}				-0.389***
				(0.011)
Change in share of provincial female service workers between 2002 and 1998				-0.022
				(0.053)
Constant	-0.059***	-0.059***	-0.050***	-0.029
	(0.009)	(0.010)	(0.018)	(0.027)
<i>N</i>	18957	18957	18957	18957
adj. <i>R</i> ²	0.227	0.212	0.203	0.181

Notes: - Standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

- 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 of these household characteristics are reported in 2002. Standard errors are clustered at province level.

The result could be explained by the fact that the BTA most benefits female labor-intensive manufacturing sectors such as apparel, clothing and footwear. Female labor accounted for about 79 percent of total labor of those sectors in 2002. The finding has important welfare implications. On the one hand, females' increasing economic empowerment in households could lead to improvement in children's health and education (see Allendorf, 2007 and Menon et al, 2013 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 et al (2017) find that in exposed provinces, families are 10 percent more likely to spend on health care of children aged 0-6, but school enrollment growth in these provinces is lower than the national average.

7.2 Poor versus rich households

Table 7.2A Employment in manufacturing and services by income

	Poor		Rich	
	manufacturing (1)	services (2)	manufacturing (5)	services (6)
Panel A: Change in “ratio of number of employed members to number of members in working ages”				
Change in provincial tariffs	-1.663*** (0.302)	-1.042*** (0.328)	-0.999*** (0.119)	-0.421 (0.293)
Share of manufacturing workers. ₁	-0.464*** (0.025)		-0.398*** (0.016)	
Change in share of provincial manufacturing workers between 2002 and 1998	0.030 (0.108)		0.011 (0.110)	
Share of service workers. ₁		-0.415*** (0.016)		-0.353*** (0.009)
Change in share of provincial service workers between 2002 and 1998		0.006 (0.047)		0.011 (0.042)
Constant	-0.132*** (0.026)	-0.091*** (0.028)	-0.062*** (0.014)	-0.038 (0.029)
<i>N</i>	9187	9187	9770	9770
adj. <i>R</i> ²	0.170	0.181	0.200	0.180
Panel B: Changes in working hours as shares of total potential working hours by members in working ages				
Change in provincial tariffs	-1.880*** (0.328)	-0.985* (0.566)	-1.211*** (0.136)	-0.842* (0.443)
Share of hours of manufacturing workers. ₁	-0.476*** (0.030)		-0.416*** (0.017)	
Change in share of provincial manufacturing workers between 2002 and 1998	0.013 (0.091)		0.031 (0.091)	
Share of hours of service workers. ₁		-0.356*** (0.021)		-0.360*** (0.012)
Change in share of provincial service workers between 2002 and 1998		0.017 (0.050)		-0.008 (0.050)
Constant	-0.166*** (0.029)	-0.087* (0.046)	-0.083*** (0.016)	-0.086** (0.040)
<i>N</i>	9187	9187	9770	9770
adj. <i>R</i> ²	0.171	0.135	0.220	0.178

Notes: - Standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

- 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 of these household characteristics are reported in 2002. Standard errors are clustered at province level.

Table 7.2B Income effect of the BTA by the poor versus the rich

	Poor	Rich
	(1)	(2)
Change in provincial tariffs	-4.668** (2.258)	-3.296*** (1.010)
Log of real income per capita ₋₁	-0.561*** (0.030)	-0.494*** (0.019)
Constant	4.227*** (0.290)	3.494*** (0.139)
<i>N</i>	9731	10104
adj. <i>R</i> ²	0.308	0.355

Notes: - Standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

- 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 of these household characteristics are reported in 2002. Standard errors are clustered at province level.

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 (households that have *real* income per capita above the national median in 2002).

Table 7.2A shows the employment gains by income per capita of households in 2002. We find that poor households benefit from employment gains more than rich households do for both measures of employment. The difference between poor and rich households is clear for both manufacturing and service employment. The finding implies that the BTA is a good force towards employment equality: poor households obtain more jobs from the BTA than rich households do. The result is similar when we look at the BTA effect on income per capita, Table 7.2B reveals that growth of income per capita of poor households due to the BTA is larger than that of rich households. A 10% tariff cut boosts income per capita of poor households by 47 percent while the same tariff cut only boosts income per capita of rich households by 33 percent. In other words, the BTA seems to narrow income equality in Vietnam. This finding is consistent with that of Fukase

(2013), which shows that the BTA increases the wage of unskilled workers – who are usually poor people. This is an important result that merits a much deeper investigation.

7.3 Rural versus urban households

Table 7.3 Job creation in rural versus urban areas

	Δ share of manufacturing employment	Δ share of service employment	Δ share of manufacturing hours	Δ share of service hours
	(1)	(2)	(3)	(4)
Change in tariffs*rural ₁	-0.733** (0.316)	-0.239 (0.293)	-0.755** (0.345)	0.029 (0.361)
Change in provincial tariffs	-0.808*** (0.127)	-0.268* (0.160)	-0.988*** (0.108)	-0.624** (0.252)
Rural ₁ (1 for rural areas)	-0.071** (0.027)	-0.103*** (0.030)	-0.083*** (0.030)	-0.101*** (0.036)
Share of manufacturing employment ₁	-0.419*** (0.017)			
Share of service employment ₁	0.013 (0.104)		0.017 (0.088)	
Share of manufacturing hours ₁		-0.387*** (0.009)		
Share of service hours ₁		-0.000 (0.035)		-0.004 (0.038)
Change in share of provincial manufacturing workers between 2002 and 1998			-0.432*** (0.018)	
Change in share of provincial service workers between 2002 and 1998				-0.383*** (0.011)
Constant	-0.042*** (0.013)	0.077*** (0.020)	-0.056*** (0.012)	0.061** (0.026)
<i>N</i>	18957	18957	18957	18957
adj. <i>R</i> ²	0.190	0.190	0.205	0.179

Notes: - Standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

- 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 of these household characteristics are reported in 2002. Standard errors are clustered at province level.

Impact of the BTA on employment may be different between rural and urban areas. We pay attention to the interaction between provincial tariff declines (θ_p) and a dummy variable for rural areas. Table 7.3 shows that the interaction terms (Change in tariffs*rural₁) are negative and statistically significant at the 5 percent 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 are stronger for rural households than for urban households in manufacturing. This is probably due to a higher level of unemployment and/or underemployment in rural areas compared to urban areas and manufacturing needs more unskilled labor. In other words, the BTA is a useful mechanism to reduce inequality in employment opportunities between rural and urban areas.

8. Conclusion

This paper analyzes the effect of U.S. market access on local labor 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 U.S. tariff cuts, manufacturing employment sharply increases, attracting more labor from agriculture. More interestingly, service employment also increases 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 goes down, but this does not translate to a decline in agricultural income, reflecting a rise in agricultural productivity.

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, in which the demand channel is 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 in an exporting developing country after it gains important access to U.S. 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 has 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.

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Appendix

Table A1: Two-digit sectors

Agriculture and agricultural services		
01 Cultivation (including livestock)	35 Other transportation equipment (boats, railroad, airplane)	
02 Forestry and related services	36 Furniture production	
05 Aquaculture (includes both raising, and catching seafood)	37 Recycling, reprocessing (metal and other)	
Mining and extracting minerals		
10 Coal mining	40 Electricity production and distribution	
11 Oil and gas drilling and related services	41 Extract, clean and distribute water	
12 Uranium and Thorium mining	45 Construction	
13 Metal mining	Commerce	
14 Mining for rocks, stone, sand, salt, fertilizer...	50 Vehicle sales, maintenance and repair; retail sale of gas	
Manufacturing		
15 Food and beverages	51 Wholesale and agent sales (excluding motor vehicles)	
16 Tobacco products	52 Retail sales (excluding motor vehicles);repairs of family appliances	
17 Textiles and garments	55 Hotel and Restaurant	
18 Fur processing and fur products (excluding garments)	Transport and communication	
19 Leather tanning and leather products including wallets, seats, suitcases (excluding garments)	60 Road, railroad and pipeline transport	
20 Wood, bamboo, rattan processing and production of wood, bamboo and rattan products	61 Water transport	
21 Paper and paper products	62 Airline transport	
22 Printing and publishing (books, magazines, newspapers, and recordings)	63 Services in transport; tourist services	
23 Coke, crude oil, uranium processing	64 Post and telecommunications	
24 Chemicals and chemical products (including pesticides, paints, pharmaceuticals, beauty products and synthetic fibers)	Finance	
25 Plastic and Rubber production and products	65 Financial intermediary (excluding insurance and social welfare)	
26 Other non-metal mineral products production (glass, ceramics, cement...)	66 Insurance and pensions (excluding social insurance)	
27 Metal production and processing	67 Assistance in finance (including social insurance)	
28 Metal products (non mechanical, non-electric such as tools, boiler, ...)	Other service categories	
29 Other equipment and machinery not specified elsewhere (pump, turbine, kiln, loading equipment, cranes)	70 Science and technology activities	
30 Office and computer equipment production	71 Real Estate	
31 Other electronic, electric equipment not specified elsewhere (electric generators, wires, batteries, lamps)	72 Rental of equipment, household goods	
32 Radio, TV, broadcasting and other communication equipment	73 Computer-related activities	
33 Medical and laboratory equipment, precision instruments, and meters (clocks)	74 Other business activities (accounting, tax and other consulting, architecture, advertising, protection, housecleaning, photography, packaging, etc)	
34 Motor vehicles and spare parts	75 Government administration and national defense (includes police)	
	80 Education and training	
	85 Social relief (hospital, clinic, veterinary care, relief work)	
	90 Culture and sports (broadcasting, movies, entertainment, newspapers, library, museums, sports...)	
	91 Communist party, mass organizations, professional associations	
	92 Public sanitation, garbage collection	
	93 Other services (ironing, laundry, haircutting, funerals, other)	
	95 Personal services provided at the home of client	
	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 members across broad sectors

	All sector	Agriculture	Manufacturing	Services	Mining	Utility and construction
	(1)	(2)	(3)	(4)	(5)	(6)
Change in provincial tariffs	-0.700 (0.512)	3.889*** (0.813)	-3.747*** (0.426)	-2.242** (0.931)	0.103 (0.099)	-0.162 (0.301)
Working members. ₁	-0.650*** (0.016)					
Change in share of provincial labor between 2002 and 1998	0.776** (0.310)					
Number of agricultural workers. ₁		-0.371*** (0.011)				
Change in share of provincial agricultural workers between 2002 and 1998		0.060 (0.084)				
Number of manufacturing workers. ₁			-0.433*** (0.019)			
Change in share of provincial manufacturing workers between 2002 and 1998			-0.027 (0.274)			
Number of service members. ₁				-0.365*** (0.013)		
Change in share of provincial service workers between 2002 and 1998				0.032 (0.120)		
Number of mining workers. ₁					-0.504*** (0.060)	
Change in share of provincial mining workers between 2002 and 1998					0.096 (0.070)	
Number of utility and construction workers. ₁						-0.476*** (0.021)
Change in share of provincial utility and construction workers between 2002 and 1998						0.348 (0.214)
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>	20070	20070	20070	20070	20070	20070
adj. <i>R</i> ²	0.212	0.202	0.188	0.163	0.231	0.200

Notes: - Standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

- 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 of these household characteristics are reported 2002. Standard errors are clustered at province level.

Table A4: Changes in number of working members across service sectors

	Commerce	Transport	Finance	Other services
	(1)	(2)	(3)	(4)
Change in provincial tariffs	-1.719*** (0.563)	-0.379 (0.229)	0.118*** (0.032)	-0.342*** (0.055)
Number of commerce workers ₋₁	-0.413*** (0.014)			
Change in share of provincial commerce workers between 2002 and 1998	0.045 (0.193)			
Number of transport workers ₋₁		-0.469*** (0.023)		
Change in share of provincial transport workers between 2002 and 1998		0.318 (0.199)		
Number of finance workers ₋₁			-0.437*** (0.065)	
Change in share of provincial finance workers between 2002 and 1998			0.133 (0.228)	
Number of other services workers ₋₁				-0.980*** (0.008)
Change in share of provincial other service workers between 2002 and 1998				-0.018 (0.034)
Constant	-0.148*** (0.056)	-0.038* (0.020)	0.009** (0.005)	-0.040*** (0.006)
<i>N</i>	20070	20070	20070	20070
adj. <i>R</i> ²	0.196	0.217	0.199	0.956

Notes: - Standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

- 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 of these household characteristics are reported 2002. Standard errors are clustered at province level.