

## **Export markets and labor allocation in a poor country<sup>1</sup>**

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### **Abstract**

Labor allocation plays a key role in how international trade affects worker earnings and for understanding the distributional impacts of international trade. We study labor allocation in response to new export opportunities in a setting where a majority of workers work in small, often household-owned businesses. We examine the effects of the 2001 U.S.-Vietnam Bilateral Trade Agreement (BTA) on the allocation of employment across industries and employers in Vietnam. The aggregate share of employment in household businesses declines, as workers reallocate away from household businesses toward larger employers in the enterprise sector. We find that the incidence of employment in household businesses declines more in industries that face larger U.S. tariff cuts. These effects are stronger for younger cohorts and in more internationally integrated provinces. Among non-household business employers, we observe expansion of employment in industries facing new export opportunities.

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## 1. Introduction

Labor allocation plays a key role in how international trade affects worker earnings and for understanding the distributional impacts of international trade. Labor allocation across heterogeneous employers might also have important implications for aggregate output and productivity (see for example, Hsieh and Klenow (2009, 2011)).

In this paper, we examine how new export opportunities affect the allocation of labor across employers and industries in a poor country. We examine this issue for Vietnam and the new export market opportunities induced by the U.S.-Vietnam Bilateral Trade Agreement (henceforth, BTA) implemented in December 2001. Our project makes two main contributions to the existing literature on trade and labor allocation in developing countries.<sup>2</sup>

While low-income countries such as Vietnam have drastically increased their engagement in international trade in the past decade (Hanson (2012)), studying labor reallocation in response to trade in these countries is particularly challenging. Much of the existing evidence on labor reallocation is based on firm-level data that usually cover firms with 10 or more employees or administrative employee-employer data of registered firms.<sup>3</sup> These datasets provide an excellent source of information for the formal manufacturing sector. However, in Vietnam in 2001, 85 percent of all workers and 66 percent of workers in manufacturing were either self-employed or worked for an unregistered household business and would not be captured in the abovementioned surveys. Vietnam is not unique in the importance of household businesses for employment. Such informal businesses account for 80 percent of manufacturing employment in India (see Nataraj (2011), Hsieh and Klenow (2009, 2011)) and the majority of individuals in poor countries rely on employment in small, often household-run businesses as the main source of income (Banerjee and Duflo (2007)). A study of labor reallocation with conventional firm-level datasets would thus miss 66 to 80 percent of employment in manufacturing in countries such as Vietnam and India.

An important contribution of our work is that we use comprehensive, nationally representative data on workers from Vietnam that covers economy-wide employment in all types of employers, including household businesses. As explained in detail in Section 4, this enables us to examine adjustment to export market opportunities along a margin that is usually not observed in conventional firm-level data, namely allocation of labor between household businesses and other

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<sup>2</sup> See surveys by Goldberg and Pavcnik (2007) and Harrison, McLaren, and McMillan (2011).

<sup>3</sup> See, for example, Menezes-Filho and Muendler (2011).

employers.<sup>4</sup> This margin of adjustment has potentially important implications for worker earnings. Workers in household businesses earn 7 to 14 percent less than observationally equivalent workers in the same industry, province, and occupation.

Our second contribution is that we examine labor allocation in response to increased export market opportunities, which has so far received substantially less attention in the labor allocation literature than adjustments in response to unilateral trade reforms.<sup>5</sup> Labor market reallocation in response to export market opportunities in our setting are of particular interest given recent policy attempts to further liberalize market access for developing countries through the Doha WTO negotiation round and bilateral and regional free trade agreements. The BTA reduced tariffs on Vietnamese exports to the U.S. on average by 23.4 percentage points and thus improved export opportunities to the U.S. for Vietnamese firms. The growth in exports to the U.S. subsequent to the BTA represented a substantial shock to Vietnam's economy (see Figure 1). Vietnamese exports to the U.S. grew from 5.1 to 20.2 percent of Vietnam's total exports (Figure 2) and grew from 2.8 to 13 percent of Vietnam's GDP between 2001 and 2004. The BTA-induced declines in US tariffs lead to declines in poverty and increases in wages (especially for less educated workers) in Vietnamese geographic areas that were more exposed to the new exporting opportunities (McCaig (2011)). As we discuss in detail in Section 3, the nature of the BTA makes the industry-specific tariff changes plausibly unrelated to industry-specific economic conditions in Vietnam during the early 2000s (McCaig (2011)).

To examine the effect of new export opportunities on the allocation of labor across different types of employers within industries and across industries, we link the BTA-induced tariff cuts on Vietnamese exports to information on worker employment and employer using the 2002 and 2004 Vietnam Household Living Standards Surveys (VHLSS). The two VHLSSs are repeated cross sections, but they also contain a smaller individual panel component. We can thus track individuals over time as they move between different types of employers and across industries. This enables us

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<sup>4</sup> The existing literature on trade and informality focuses on a different aspect of informality, namely compliance with payroll taxes and other labor market regulation among the formal firms in middle-income countries in Latin America (see, for example, Menezes-Filho and Muendler (2011), Goldberg and Pavcnik (2003), Cosar, Gunar and Tybout (2011)). In contrast, we are focusing on whether the business is formal, not the worker. Section 4 provides further details on the distinction between a household business and a registered enterprise.

<sup>5</sup> Our study thus complements a large literature on trade and labor reallocation in response to unilateral import tariff liberalizations. See Menezes-Filho and Muendler (2011), Kovak (2011), Topalova (2010) and studies surveyed in Goldberg and Pavcnik (2007), among others.

to examine transitions across employers within and across industries. It also enables us to control for time-invariant unobserved heterogeneity across workers.

We find that reallocation of labor from household businesses to other more formal, productive employers provides an important margin of adjustment to new exporting opportunities. The aggregate share of workers in household businesses declined in Vietnam during the early 2000s. Approximately half of this decline in employment in household businesses is driven by the relative contraction of industries that tend to organize production in small household businesses, namely agriculture and aquaculture. The remaining half can be attributed to the reallocation of labor from household businesses to larger, more formal employers within industries. The importance of this within-industry component is particularly pronounced in manufacturing. We find that industries that face better export opportunities (as measured by larger declines in tariffs on Vietnamese exports to the U.S.) observe a greater decline in the incidence of household business employment. Our estimates suggest that in manufacturing, expanded export opportunities could account for 40 percent of the increase in formal employment during this period. Additionally, we find heterogeneity in worker responses to new exporting opportunities. Younger cohorts and individuals living in more internationally integrated provinces are more likely to reallocate from household businesses toward more formal employers in response to new export opportunities.

While changes in the economy-wide structure of employment across industries appear uncorrelated with tariff changes, new export opportunities have shifted the structure of employment across industries among the registered, enterprise employers, which are most directly impacted by new export opportunities. We find that the new export opportunities lead to a more pronounced expansion of industry employment in the enterprise sector, and this expansion is more pronounced in industries with a revealed comparative advantage.

Our results relate to the recent literature on firm heterogeneity and aggregate output differences in developing countries. Several recent studies (see for example, Hsieh and Klenow (2009, 2011)) emphasize the prevalence of small, unproductive firms in poor economies and the implications of misallocation of resources across heterogeneous firms for aggregate output and productivity. Our study shows that the elimination of a product market distortion, such as export market liberalization, induces a movement of labor away from household businesses, which tend to be less productive and pay lower wages for observationally equivalent workers, to larger, more formal firms. As we show in Section 4, there are important differences between household

businesses and other employers in Vietnam. Household businesses have on average substantially lower labor productivity than more formal firms. Workers in household businesses earn 7 to 14 percent less than observationally equivalent workers in the same industry, province, and occupation. Thus, the reallocation of labor from household business to other employers might lead to aggregate productivity gains through reallocation of labor toward more productive uses.

The rest of the paper is organized as follows. Section 2 summarizes a conceptual framework to examine how changes in export market opportunities affect the allocation of labor across industries and employers. In Section 3, we provide a detailed description of the BTA and in Section 4 we describe the individual level data. Section 5 examines the effects of the BTA on reallocation of employment across employer types within industries in a regression framework. Section 6 examines the effects of the BTA on reallocation of employment between industries. Section 7 concludes.

## **2. A conceptual framework**

We examine the allocation of labor across employers and industries in response to increased export market access. In this section we highlight two channels through which a reduction in industry tariffs on Vietnamese exports induced by the BTA could influence the composition of employment between smaller, less formal employers (such as household businesses) and larger, more formal employers.

First, the BTA differentially increased export market access across several industries. Models of trade based on comparative advantage suggest that export market opportunities will induce workers to move into industries that experienced greater increases in foreign market access (i.e., large foreign tariff cuts) and away from industries that are less affected by cuts in foreign tariffs. In this setting trade policy could affect the incidence of aggregate employment in smaller, less formal firms (such as household businesses) by changing the composition of industries that differ in their reliance on household business production. If the expanding industries are industries that rely more heavily on household business production, then it is possible that trade liberalization would lead to an increase of employment in non-household businesses in the aggregate. For example, suppose that production in agriculture is more prone to be organized around household businesses than in apparel. If export market opening increases the relative demand for apparel, the expansion of the apparel sector will decrease the aggregate share of jobs in household businesses in the economy. However, if trade liberalization increases the relative demand for agriculture, the aggregate share of household business employment could increase. This example illustrates that, more generally,

the total effect of trade on the composition of employment across employers through the between industry channel depends on the nature of the trade liberalization in question and the relative informality of the industries subject to the biggest reductions in foreign tariffs.

Second, a reduction in an industry tariff on Vietnamese exports to the United States will increase demand for Vietnamese products and induce an increase in labor demand in that industry. The increase in the industry product and labor demand will likely not be equally distributed across firms/employers if new exporting opportunities have a differential effect on the profitability of employers. There are likely many dimensions of heterogeneity between household businesses and more formal firms, including differences in productivity. One possible explanation for these heterogeneous effects is given in Melitz (2003), where firms differ in underlying productivity and face a fixed cost of accessing export markets. Because trade increases the relative profitability of exporting for larger firms (but not smaller firms), the new export opportunities are expected to lead to the reallocation of labor from smaller to larger firms within industries as workers lose jobs in smaller firms, and are rehired by larger, more successful firms. Only initially more productive firms benefit from this expansion because they are the ones profitable enough to cover the fixed cost of exporting. This leads to increased output and employment in existing exporters and entry of some firms into the export market (i.e., new exporters). Less efficient firms that only serve the domestic market and now also face higher labor costs observe a contraction in output and employment and potentially exit. Expanded export opportunities thus shift the industry composition of employment away from smaller, less productive employers, such as household businesses, toward more productive employers.<sup>6</sup>

The above example assumes that household businesses compete with more productive firms on the product market, which is potentially a strong assumption. More generally, lack of product market competition between household businesses and exporting firms does not imply that household businesses would be unaffected by export market opportunities through the general equilibrium labor market channel. For example, new export opportunities could affect employment in household businesses through the general equilibrium wage effects of trade. Exporting opportunities increase the labor demand among exporters and raise wages (see McCaig (2011)). If household businesses compete for labor with larger, more formal forms, the increased

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<sup>6</sup> See also extensions where initially better performing firms tend to pay higher wages, for example, due to efficiency wage or profit-sharing (Verhoogen (2008), Davis and Harrigan (2007), Amiti and Davis (forthcoming)).

employment opportunities in the export sector will increase the opportunity cost of working for household businesses and lead to the relative contraction of household business employment.

The above discussion provides guidance for our empirical analysis in Sections 5 and 6. In Section 5 we examine changes in the allocation of labor across employers and examine how BTA-induced tariff cuts affected the allocation of jobs between household businesses and other, more formal employers within Vietnamese industries. In Section 6 we examine how BTA-induced tariff cuts affected net reallocation of jobs across industries, as emphasized in neoclassical trade models.

### **3. The U.S.-Vietnam Bilateral Trade Agreement and Trade Data**

We combine detailed information on changes in trade policy with micro-level data that span the period of trade reform. In this section we describe the U.S.-Vietnam Bilateral Trade Agreement and discuss the trade data.<sup>7</sup>

The BTA was implemented on December 10, 2001. Vietnam already applied MFN tariffs on U.S. imports, so the agreement did not significantly affect the structure of Vietnam's trade policy.<sup>8</sup> The main trade policy change in the agreement was for the U.S., which was to immediately provide Vietnam with Normal Trade Relations (NTR) or Most Favored Nation (MFN) access to the U.S. market.

Prior to the BTA Vietnam was subject to tariffs according to Column 2 of the U.S. tariff schedule. With the BTA, Vietnam became subject to MFN tariff rates immediately upon the date of implementation. McCaig (2011) uses detailed information on U.S. tariffs for both of these tariff schedules from the U.S. International Trade Commission's online Tariff Information Center and computes the ad valorem equivalent of any specific tariffs. He then matches the tariff lines to industries by the concordance provided by the World Bank via the World Integrated Trade Solution database to construct industry-level tariffs according to ISIC nomenclature.

The BTA has had a significant impact on the volume and structure of Vietnamese exports. During this period, Vietnam's aggregate exports were expanding worldwide, but the share of exports to the U.S. grew even more. From 2001 to 2002, Vietnamese exports to the U.S. grew by

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<sup>7</sup> This section draws heavily on McCaig (2011), which in turn relies heavily on the STAR-Vietnam report "An Assessment of the Economic Impact of the United States – Vietnam Bilateral Trade Agreement".

<sup>8</sup> The BTA required Vietnam to mainly implement various regulatory and legal changes and had approximately 10 years after the implementation of the BTA to make these changes. However, the BTA did require Vietnam to reduce tariffs on approximately 250 6-digit HS agricultural and manufactured food products. As these tariff cuts were small in comparison to the U.S. tariff cuts and only affected a relatively small number of products we do not discuss these tariff cuts in detail, but our results presented below are robust to controlling for these tariff cuts.

128 percent followed by an additional 90 percent from 2002 to 2003. Figures 1 and 2, reproduced from Fukase (2012), show the value and the share of Vietnamese exports to the U.S. from 1997 through 2006. The implementation of the BTA led to a significant surge in exports, which is clearly evident from the break in trend in 2001. This is especially true for manufactured exports which, as discussed below, were subject to much larger tariff cuts than primary exports. As Figure 2 shows, the share of Vietnamese exports going to the U.S. grew rapidly from 5.1 percent in 2000 to 20.2 percent in 2004 and this increase was particularly pronounced in manufacturing, where U.S. exports accounted for 25 percent of Vietnamese exports by 2004.<sup>9</sup>

The magnitude of the tariff cuts across industries is summarized in Table 1. The table provides information on aggregate tariffs and industry-specific tariff declines. First, the BTA on average reduced tariffs by 21.1 percentage points. These are substantially bigger tariff cuts than those that have been the focus in previous work on the consequences of increased market access such as Bustos (2011) and Iacovone and Javorcik (2008). This improves our ability to separate the changes in tariffs from other confounding changes in the Vietnamese economy. A second useful feature of the BTA is that the tariff cuts were not uniform across sectors. The BTA reduced tariffs on Vietnamese goods in agriculture, fishing, mining, and manufacturing. Manufacturing experienced the largest tariff cuts, with the average ad valorem equivalent tariff dropping from 33.8 to 3.4 percent. The average ad valorem tariff dropped from 9.1 to 1.7 percent in agriculture, hunting, and forestry. The tariff cuts in fishing and mining industries were much smaller, 1.2 and 2.0 percentage points respectively. This enables us to exploit differential changes in tariff rates across sectors to identify the effects of increased market access on outcomes of interest.

Figure 3 shows the relationship between growth in exports to the US between 2001 and 2004 and tariff cuts by 2-digit ISIC industry. There is a strong negative relationship: industries that received greater tariff cuts experienced faster export growth. The magnitude of the relationship is large. An industry-level regression of the change in log exports to the U.S. between 2001 and 2004 on the change in U.S. tariffs leads to a statistically significant estimate of -6.995 on the change in US

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<sup>9</sup>As a non-member of GATT and the WTO, Vietnam was not subject to the Multi-Fibre Agreement and thus did not initially face any export quotas for textile and apparel products destined for the U.S. In July 2003 a bilateral textile agreement came into force which imposed quotas on Vietnamese textile and apparel exports to the U.S. This agreement is likely responsible for the reduction in the rate of growth of the share of Vietnamese manufacturing exports going to the U.S. following 2003. In the analysis below, this is one of the reasons why we restrict our period to the two years immediately following the implementation of the BTA.



tariffs. This suggests that an industry that received the average tariff cut, 21.1 percentage points, experienced export growth of 338 percent over three years.<sup>10</sup> A similar regression using exports to all countries yields an estimate of the coefficient on the change in U.S. tariffs of -0.908. Using this estimate suggests growth in worldwide exports of 21 percent for an industry receiving the average U.S. tariff cut.<sup>11</sup> This suggests that the U.S. tariff cuts led to an expansion of overall exports. Table 2 presents information on the value, growth, and share of exports for Vietnam's top eight exports to the U.S. according to 2004 value by industry. With the exception of refined petroleum products, Vietnam's top exporting industries to the U.S. are all industries that intensively use less-educated labor. This suggests a potential for the increase in exports to influence the prevalence of employment in household businesses or self-employment, as less-educated workers are more likely to work in household businesses than more educated workers.

A third advantage of the BTA is that the concern about the political economy of protection and the endogeneity of tariff changes are less severe. Industry-specific tariff cuts occurred by the U.S. granting Vietnam the status of Normal Trade Relations (i.e., Most Favored Nation status). The U.S. tariff cuts were presented as an all-or-nothing package whereby exports from Vietnam into the U.S. would immediately be covered by MFN tariff rates instead of Column 2 tariff rates. The movement from one pre-existing tariff schedule to a second pre-existing tariff schedule implies that neither U.S. nor Vietnamese industries had an opportunity to influence the tariff cuts faced by their industry. McCaig (2011) further shows that the Column 2 and MFN tariff schedules can be plausibly considered as not influenced by industry-specific economic conditions in Vietnam. As a check of the exogeneity of US tariff cuts to Vietnamese industries, we regressed the change in U.S. tariffs on a measure of the unskilled labor intensity of an industry (the share of workers with less than 10 years of formal education), and the share of workers within the industry working in household businesses. The respective partial correlations, all statistically insignificant, are 0.090, and 0.073. Thus, the tariff cuts were, on average, not significantly related to underlying industry characteristics.

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<sup>10</sup> A falsification check of growth of exports to the US between 1997 and 2000, where the pre-BTA tariffs are matched with exports in 1997 and the post-BTA tariffs are matched with exports in 2000, leads to an insignificant coefficient on the change in tariffs of -0.865. Thus, the export growth to the US following the BTA is not simply the continuation of pre-existing trends.

<sup>11</sup> This regression excludes the industry "Other business services" which is an extreme outlier in the regression. Starting from a very small base in 2001, the change in ln exports in this industry is about 7, while for all other industries the change in ln exports is less than 2.

#### **4. Description of individual-level data and overview of working in a household business**

In this section we introduce the individual level data from the 2002 and 2004 Vietnam Household Living Standard Surveys and provide an overview of the differences in employment in a household business versus officially registered enterprises. We show that household businesses are substantially smaller and have lower labor productivity than registered firms and workers in these businesses report lower earnings and are less likely to report receiving non-wage benefits. We begin by clearly describing the legal distinction between a household business and a registered private enterprise in Vietnam during this period.

##### **4.1 Definition of a household business**

One of the focuses of our paper is the reallocation of workers between the household business sector and the enterprise sector in response to the BTA, a margin of adjustment not observed in the usual datasets. As such, it is necessary to precisely define the household business sector relative to the enterprise sector. The enterprise sector consists of four different types of ownership categories: state, collective, foreign, and private. While the distinction between a household business and either a state, collective, or foreign enterprise is straightforward, a household business and a private enterprise are both private entities and thus require further distinction. We use the term household business to refer to a private business that has not registered under Vietnam's 2000 Enterprise Law and in contrast use the term private enterprise to refer to a private business that has registered. Thus, a household business does not necessarily refer to a business that the government does not know about as many of these businesses still have a business license from local authorities (McCaig and Pavcnik, 2011). Furthermore, some types of household businesses, such as within agriculture, street vendors and service providers with low incomes were not legally required to register for a business license.<sup>12</sup> Furthermore, a household business does not necessarily refer to a business conducted in the physical premise of the household as these businesses may also be conducted in market stalls, industrial zones, trade centers, or in unfixed locations (e.g., street vendors). Thus, the household business sector includes businesses that have and have not registered as a household business, but excludes any private businesses registered as an enterprise.

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<sup>12</sup> See Decree No. 02/2000/ND-CP of February 3, 2000 on Business Registration.

The key distinction then between the household business sector and the enterprise sector is registration under the Enterprise Law. Registration as an enterprise has important legal implications for the businesses and their workers. For example, a registered enterprise must keep a formal set of accounts and report fully and accurately information related to the financial position of the enterprise. This includes providing information on its workforce. Thus, in Vietnam, workers in the enterprise sector would be observed in the usual firm-based datasets based on the formal sector whereas workers in the household business sector would not. Our household survey data covers workers in both sectors and thus allows us to track workers as they move between these sectors. As we explain in the subsequent subsections, there are observable differences in wages and benefits for workers across these sectors.

## **4.2 Data Description**

We use two waves of the Vietnam Household Living Standards Surveys (VHLSS) that were conducted by the General Statistics Office (GSO) of Vietnam in 2002 and 2004 as our primary data source.<sup>13</sup> The VHLSSs included over 74,000 households in 2002 and over 45,000 households in 2004. Each survey contained modules related to household demographics, education, health, employment, income generating activities, and expenditures and was designed to be nationally representative, as well as representative within rural and urban areas. We can thus examine labor reallocation nationwide, as opposed to urban areas only, as is common in the existing literature on countries such as Brazil and Colombia. About 20,000 households from 2002 were also resurveyed in 2004. This smaller panel component allows us to study transitions into and out of different types of employment and to control for unobserved heterogeneity related to selection into these businesses and job types.<sup>14</sup>

For each individual in the household the survey collects information on whether the individual is employed, unable to find work or out of the labor force. We focus on employed

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<sup>13</sup> The BTA was implemented on 10 December 2001. The first wave of household survey data is from 2002. This survey had a recall period of 12 months and interviewed households throughout the year. As such, individuals that were interviewed at the start of 2002 have a recall period that almost entirely precedes the BTA while individuals interviewed at the end of 2002 have a recall period almost exclusively after the implementation of the BTA. Thus, the 2002 VHLSS does not provide a perfect “before” dataset. As such, our results potentially underestimate the full impact that the BTA has had on labor reallocation.

<sup>14</sup> The household panel is based on random selection of enumeration areas from the 2002 VHLSS to be resurveyed as part of the 2004 VHLSS. In order to be part of the household panel, the household, or at least some of its members, must be in the same location as in 2002. Thus, if entire households have moved or individual members have moved, they are not part of the panel.

individuals since unemployment is very infrequent in our data. For example, among individuals age 20 to 64 in the 2004 VHLSS, 89.3 percent report working during the past 12 months while only 6.2 percent of those not working (or 0.7 percent of the age group) report being unable to find a job. For employed individuals the employment modules collect information on the industry of employment, the occupation of the individual, the type of employer the individual works for, the amount of time spent working in that job over the past 12 months, the value of wage or salary payments, and the value of non-wage/salary payments. We restrict the analysis to the main job (i.e., the most time consuming) of individuals aged 20 to 64 inclusive.<sup>15</sup>

While our data does not include detailed firm level characteristics, it enables us to identify broad types of firms/employers that a worker works for. In particular, we rely on the question that asks about the type of employer they work for. This question distinguished between self-employment (we can separate working on a household farm from a household business), working for another household's business, the state sector, the collective sector, the private sector, and the foreign sector. We use this information to construct our key dependent variable for whether an individual works for a household business. This variable takes the value one if an individual works in his/her own household businesses or in another household's business and zero otherwise.<sup>16</sup> Thus, our key variable is consistent with the distinction between household businesses and registered enterprises as per Vietnam's Enterprise Law where the state, collective, private, and foreign sectors jointly constitute the enterprise sector.<sup>17</sup> Appendix Table A.1 provides descriptive statistics for the key variables in the analysis.

Before we move on to the analysis we need to discuss two caveats related to the indicator for working within a household business. One potential problem with the construction of a

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<sup>15</sup> Among workers age 20 to 64 in the 2004 VHLSS, 43 percent reported working more than one job during the past 12 months. Among these individuals the average annual hours worked was 1355 and 511 in their primary and secondary jobs respectively as compared to 1907 hours for workers that reported working only one job.

<sup>16</sup> In a subset of our analysis we also rely on an indicator for whether an individual is self-employed. This variable enables us to distinguish whether movements out of working for household businesses is due to movements from self-employment to working for larger employers or from working for someone else's household business to working for larger employers.

<sup>17</sup> The 2004 VHLSS makes a distinction between self-employment in a household business versus self-employment in an officially registered enterprise operating in the private sector. Unfortunately the 2002 VHLSS did not separate these two categories of self-employment. As such, to be consistent across surveys we classify all self-employed individuals as working for a household business. This is not a very egregious grouping since self-employment in the private sector is only 0.7 percent of self-employment across all industries and 1.6 percent of self-employment in manufacturing in the 2004 VHLSS.

household business indicator is that it is possible that the individual might not know whether they work for a household business or a private enterprise. While this is a concern, the survey provides detailed instructions to the enumerators about how to record the answers to questions. Moreover, if workers could not distinguish between working for a household business or a private enterprise, one would not expect to observe differences in worker outcomes such as earnings and benefits for workers that work in household businesses and other establishments. However, the discussion in Section 4.3 of observable differences across household businesses and other establishments shows that there are notable observed differences in wages and benefits received between workers that report working in the household business sector and the enterprise sector.<sup>18</sup> Those results are consistent with workers that work for household businesses receiving lower earnings and benefits, which is in line with results of existing work on other forms of informality (see for example Marcouiller, Ruiz de Castilla, and Woodruff (1997) and Goldberg and Pavcnik (2003)). Finally, to the extent that there is some measurement error in our dependent variable, it would reduce the precision of our estimates and bias us toward finding no significant impact.

Second, we use an indicator for whether a worker works for a household business to examine the reallocation of labor from household businesses toward larger, more formal firms. This measure only captures movements across employers from household businesses to other larger employers. The data does not enable us to detect any potential reallocation of workers within employer groups. Given that our data enables us to capture reallocations between household businesses and larger firms, which are usually not observed, we view our work as complementary to the existing studies that focus on reallocation of labor across larger, formal employers (see Levinsohn (1999) for Chile, and Menezes-Filho and Muendler (2011) and Krishna, Poole, and Senses (2012) for Brazil).

#### **4.3 Heterogeneity across employers: household businesses vs. enterprises**

A natural question arises about how employers that are household businesses differ from employers that are in the enterprise sector. By definition, household businesses are not registered as an enterprise according to the Enterprise Law. In contrast, businesses in the enterprise sector are officially registered under the Enterprise Law. The difference in registration status is predictive of important differences in firm characteristics. For example, household businesses are substantially

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<sup>18</sup> In unreported tabulations, we have also redone the analysis in Table 4 for private businesses alone and continue to find large differences.

smaller and have lower labor productivity than firms that operate in the enterprise sector. The average household business in Vietnam had only two workers in 2002 (McCaig and Pavcnik (2011)). The average employment size for employers in the enterprise sector is 63.8.<sup>19</sup> The labor productivity (measured by log revenue per worker) of an average household business is 7.8 (st. dev. 1.2) compared to 12.1 (st. dev. 1.6) for non-household businesses.

There are important predictive differences in earnings and non-wage compensation across household businesses and other employers, as noted in Tables 3 and 4. In Table 3 we report regressions of log hourly compensation on an indicator for whether a worker works for a household business and various combinations of control variables that capture differences across workers in demographic characteristics (age, gender, and whether an individual belongs to an ethnic minority group), education (we include indicators for whether an individual has some primary, lower secondary, or upper secondary education with no formal education as the excluded category), an urban indicator, year indicator, and industry and province fixed effects.<sup>20</sup> The coefficient on the household business indicator is -.50 in a specification that does not include any additional controls, suggesting substantially lower hourly earnings in household businesses. Part of the earning differential is due to differences in observable worker characteristics, as the coefficient drops to -.39 when we control for a year indicator and an urban indicator in column 2 and to -.28 when we additionally control for worker characteristics in column 3. In column 6, we also include industry and province fixed effects, in addition to the worker characteristics. The magnitude of the coefficient more than halves relative to the coefficient in column 1, suggesting that it is important to control for all these factors that independently affect earnings as well as selection into household business employment. Inclusion of occupation indicators in column 7 further reduces the coefficient on household business indicator.<sup>21</sup> Nonetheless, this specification suggests that workers working for a household business earn about 14 percent less than observationally equivalent workers working in the same industry, province, and occupation.

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<sup>19</sup> The above information is based on the authors' calculations from the household business module of the 2002 VHLSS and the 2001 Enterprise Survey which covered all officially registered enterprises in Vietnam.

<sup>20</sup> The sample includes individuals employed by a household business, but does not include the operators of the household business for whom net profits would also reflect returns to physical capital.

<sup>21</sup> In an unreported regression, controlling for industry-occupation effects does not appreciably alter the estimated coefficient on the household business indicator.

While the above specifications control for observable worker characteristics, unobservable characteristics might also simultaneously affect worker earnings and the choice to work for a household business. To explore this, we limit our sample to individuals in the panel.<sup>22</sup> Column 8 explicitly controls for unobserved time-invariant worker heterogeneity with individual fixed effects. The coefficient on the household business indicator, which is identified by the individuals that moved between the household business and enterprise sectors, drops from -.14 in column 7 to -.07. This suggests that, controlling for unobserved worker characteristics, workers that switch to work for a formal enterprise tend to earn 7 percent more than when they work for a household business.

The above analysis shows the importance of employer heterogeneity along the household business margin for earnings differentials. Further analysis suggests, that in a cross-section, employer heterogeneity (i.e., working for household business versus enterprises) alone accounts for 3 percent of the explained variation in log wages across workers.<sup>23</sup> This is a non-negligible contribution. For comparison, all included worker characteristics can jointly account for 11 percent of the explained variation in log wages. Industry affiliation accounts for 15 percent, while geographic location accounts for 21 percent of the variation.

The analysis in Table 3 clearly shows the differences in earnings for individuals working in household businesses. Individuals working for household businesses are also substantially less likely to receive benefits from their employer, as shown in Table 4. The table shows the share of individuals that reported receiving a positive payment for holidays, social allowance, business trips, other forms of non-wage/salary payments, and any non-wage/salary payment in 2002 and 2004 for all workers working for household businesses (top panel) and workers working for enterprises (bottom panel). Individuals that work for household businesses are less likely to obtain non-wage benefits than individuals that work for other employers.

Overall, the above evidence suggests that the allocation of workers between household businesses and non-household businesses has important implications for worker earnings and productivity, justifying the focus on this margin of adjustment in the subsequent section.

## **5. BTA and labor reallocation across employers**

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<sup>22</sup> In an unreported regression we estimate the specification in column 7 on this panel sample and this yields a nearly identical coefficient on the household business indicator as in column 7.

<sup>23</sup> We obtain this number by comparing the adjusted  $R^2$  from the regression that regresses log wages on household business indicator, worker characteristics, urban indicator, year indicator, industry and province fixed effects to the  $R^2$  from the same regression that excludes the household business indicator.

In this section we analyze labor reallocation in response to the BTA across the household business and enterprise sectors. We begin by documenting the fall in the share of workers working for household businesses between 2002 and 2004, which was particularly rapid in manufacturing. We show that this decrease was due both to workers moving to industries that feature a lower share of workers working in household businesses and to a decrease in the share of household businesses workers within industries. The latter channel is exclusively responsible for the fall in household business workers within manufacturing. We next estimate the effect of the BTA on the probability of working for a household business within an industry and find that the probability fell more in industries experiencing larger U.S. tariff cuts. Additionally, we show that the results are not due to underlying trends and that there is significant heterogeneity in the impact of the BTA based on the age and location of workers. We conclude by examining the sensitivity of the results to unobserved individual heterogeneity and discussing whether the reductions are due to individuals changing jobs or household businesses transitioning to private enterprises.

### **5.1 Decomposition of the aggregate change in household business employment**

The conceptual framework in Section 2 emphasizes that trade can influence the composition of employment through the reallocation of employment across employers within an industry. As discussed earlier, our data is well suited to examining the reallocation of labor along a margin not observed in conventional data sources used in the trade literature: household businesses and other employers. Panel A in Table 5 presents estimates of the share of individuals that work in household businesses in Vietnam in 2002 and 2004 and motivates the importance of this employment margin. We present results for workers in all industries, in all industries except agriculture and fisheries, and in manufacturing.<sup>24</sup>

The major fact to emerge is that employment in household businesses is very high in Vietnam. Across all industries, 85 percent of workers are employed in household businesses in 2002. This prevalence of employment in household businesses is not merely driven by agriculture, as the share continues to be high, at 67 percent, in 2002 when we exclude agriculture and aquaculture. We observe similarly high levels of working for household businesses, 66 percent, within manufacturing. Thus, it is clear that even in manufacturing, where most of the existing work

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<sup>24</sup> The middle panel also excludes forestry, but this is a very small sector and hence, for brevity, we refer to agriculture and aquaculture only.



on labor reallocation with firm-level data is done, the usual focus on employment in larger, more formal firms only captures a small share of employment.

The second key fact to emerge from Table 5 is that the prevalence of working in household businesses fell between 2002 and 2004. Overall, the share of workers in household businesses fell by 3.3 percentage points (or 4 percent) nationally. The drop was particularly pronounced in manufacturing, where the share of workers employed in household businesses fell by 5.6 percentage points (or 9 percent). These descriptive statistics suggest that the reallocations to and from household businesses might play an important role in the labor market adjustment to export market opening.

The conceptual framework in Section 2 emphasizes that trade can influence the composition of employment through the reallocation of employment across employers within industries and between industries that differ in their level of reliance on household businesses. We examine whether the observed aggregate changes in the incidence of employment in household businesses stem from changes in the structure of employment across industries (e.g., new export market opportunities may have expanded employment in industries that employ a proportionally larger share of workers in household businesses) or from within-industry reallocation of workers across employers. We decompose the change in the share of workers in household businesses in total employment between 2002 and 2004, denoted by  $\Delta H$ , into within and between industry shifts, respectively:

$$\Delta H_t = H_t - H_{t-1} = \sum_j \Delta h_{jt} E_{j.} + \sum_j \Delta E_{jt} h_{j.}, \quad (1)$$

where  $E_{jt}$  is the share of industry  $j$ 's employment in total employment at time  $t$ ,  $h_{jt}$  is the share of workers in household businesses in total employment in industry  $j$ ,  $E_{j.} = .5(E_{jt} + E_{jt-1})$ , and  $h_{j.} = .5(h_{jt} + h_{jt-1})$ . This decomposition provides evidence on the relative importance of mobility of workers across employers *within* an industry (the first summation term) and mobility of workers *across* industries (the second summation term) as sources of changes in employment in household businesses.<sup>25</sup>

Panel B of Table 5 presents the results of the decomposition between 2002 and 2004 for all industries, for all industries other than agriculture and aquaculture, and for manufacturing. Economy-

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<sup>25</sup> A similar decomposition is often used in the literature on skill-upgrading to decompose the change in the share of skilled workers between and within industries.

wide, the between and within industry channel contribute equally toward the decline in the aggregate share of employment in household businesses. The between-industry changes account for 48 percent of the aggregate decrease in employment in household businesses. The between component is predominately driven by the relative contraction of employment in agriculture, where almost all workers work in household farms. The BTA contributed toward this reallocation of relative employment away from agriculture. Results from Section 6 show the relative expansion of employment in industries with U.S. tariff induced export opportunities (such as manufacturing, where tariffs declined on average by 30 percentage points) relative to industries with smaller tariff cuts, such as agriculture (where tariffs declined by 7 percentage points).

Excluding agriculture and aquaculture the within-industry channel accounts for 87 percent of the decline in employment in household businesses. The within-industry channel plays an even larger role in manufacturing, where it accounts for over 100 percent of the decline in the share of household business employment.

Overall, the decomposition suggests that the declines in the aggregate share of employment in household businesses are driven by both the reallocation of workers toward industries with a lower prevalence of household businesses and by the reallocation of workers across employers from household businesses toward larger, more formal employers within an industry.

## 5.2 The BTA and labor allocation across employers

The decomposition of the aggregate share of employment in household businesses points to an important role for the relative decline in household business employment within industries in explaining the aggregate decline in employment in household businesses. In this section, we investigate whether the observed shift of employment away from household businesses within industries is related to the BTA-induced tariff cuts. We examine the extent to which export opportunities affect the incidence of household business employment within an industry by estimating the following linear probability model:

$$H_{ijt} = X_{ijt} \beta_D + \text{tariff}_{jt} * \beta + p_p + \lambda_j + t_t + \varepsilon_{ijt} \quad (2)$$

$H_{ijt}$  is an indicator for whether a worker  $i$  employed in industry  $j$  at time  $t$  works for a household business,  $X_{ijt}$  is a vector of worker characteristics (this vector includes age, age squared, and indicators for education (primary, lower secondary, upper secondary, with no formal education as the excluded category), gender, ethnic minority status, an indicator for whether a person lives in a

rural area),  $tariff_{jt}$  is the industry tariff in industry  $j$  at time  $t$ , and province, industry, and year fixed effects. We account for general forms of heteroskedasticity and serial correlation in the error term by computing robust (Huber-White) standard errors clustered by industry. The main parameter of interest is the coefficient on tariffs. A positive coefficient implies that a decline in tariffs is associated with a decline in the probability of working in a household business, and thus the reallocation of labor away from household businesses.

Inclusion of individual worker demographic characteristics in equation 2 controls for differences in worker composition across industries and employers that could independently affect the allocation of labor across industries and employers and also influence tariffs. Our key identification variation in tariffs is based on differential changes in industry tariffs facing Vietnamese exports in the U.S. As discussed in detail in Section 3, the advantage of tariff variation across industries used in our analysis is that they can be plausibly considered exogenous to other industry-specific developments in Vietnam at the time. Thus, our estimates of the key coefficient on tariffs are less prone to the usual concerns about the endogeneity of industry-specific tariff changes.

Before presenting the regression results, we first present scatterplots of the change in the share of household business workers within an industry and the BTA-induced change in U.S. tariffs in Figures 4 and 5, for all traded industries and for manufacturing respectively.<sup>26</sup> The observations are weighted, as represented by the size of the circles, by  $n_j^{2002} n_j^{2004} / (n_j^{2002} + n_j^{2004})$  where  $n_j$  is the number of workers in industry  $j$  in the indicated year. As such, the regression lines reported are equivalent to what would be estimated by equation 2 without controlling for worker characteristics and province fixed effects. The figures for both traded industries and for just manufacturing show a clear positive relationship: industries with larger tariff cuts experienced larger reductions in the share of workers working in household businesses.

The relationships shown in the scatterplots are robust to controlling for individual characteristics and province fixed effects as presented in Table 6. Column 1 estimates equation 2 for traded industries. We find that the industries that faced the largest reductions in U.S. tariffs experienced the largest decreases in the probability of employment in household businesses. The

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<sup>26</sup> Note that both figures exclude industry 12 (mining of uranium and thorium ores) from the display, but not from the regression line, as it is an extreme outlier and a very small industry in terms of employment and removing it from the figure makes it easier to see the variation in the data for the remaining industries.

magnitude of the coefficient (.21) suggests that an industry that experienced the average reduction in tariffs, 21.1 percentage points, saw the probability of working in a household business fall by 4.4 percentage points relative to an industry facing no reduction in tariffs. In column 2 we estimate equation 2 for workers in all industries, including non-traded industries, to which we assign a tariff of 0 in both years.<sup>27</sup> The inclusion of non-traded sectors dampens the magnitude of the effect we found when we focused on the traded sector alone, although the coefficient continues to be positive and statistically significant. Lastly, in column 3 we estimate equation 2 for the manufacturing sector, a sample that is more comparable to the samples used in the majority of studies of labor reallocation in response to trade reform. The estimated coefficient suggests that the average reduction in manufacturing tariff of 30.3 percentage points in an industry is associated with a 5.0 percentage point reduction in the probability of employment in a household business in that industry.<sup>28</sup>

The above results are not driven by differential employment trends across industries that differ in their propensity to organize production in household businesses nor do they simply capture pre-existing trends. As we previously showed in Section 3, the industry changes in U.S. tariffs are not related to initial industry conditions, such as the share of household business workers within an industry, nor pre-BTA growth in exports to the U.S. In addition, a falsification test using data that covers a pre-reform period from the 1993 and 1998 Vietnam Living Standards Surveys (VLSSs) finds no evidence that changes in tariffs are correlated with pre-existing trends in household business employment across industries.<sup>29</sup> The employment module for the 1993 VLSS does not separately identify employment in a household business from employment in a private sector business.<sup>30</sup> Consequently, we use an indicator for being self-employed as our dependent variable, which is highly correlated with an indicator for working in a household business in the 2002 and 2004 surveys that contain the needed data to construct both indicators. We first estimate equation 2 using an indicator for self-employment as the dependent variable using data from 2002 and 2004

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<sup>27</sup> Equation 2 includes industry fixed effects, which implies that non-traded industries observe no change in tariffs.

<sup>28</sup> These results are robust to controlling for Vietnam's BTA tariff reduction commitments, which are concentrated in agriculture and the processing of food and beverages. The estimated coefficient on U.S. tariffs is 0.171, 0.130, and 0.188 on traded, all, and manufacturing industries respectively, all of which remain statistically significant at the 1 percent level.

<sup>29</sup> The 1993 and 1998 VLSSs are based on the same sampling framework, which differs from the sampling framework used on the 2002 and 2004 VHLSSs.

<sup>30</sup> Vietnam did not make a legal distinction between household businesses and private enterprises at this time.

VHLSSs to examine the effect of tariffs on self-employment during the period of BTA's actual implementation. The results are presented in columns 1-3 of Table 7. The coefficients on tariffs are positive and statistically significant in all columns and of similar magnitudes as the coefficients on tariffs from the similar regressions for household business employment reported in Table 6.

In the falsification test, we use two-rounds of pre-reform data (1993 and 1998) and assign the pre-BTA tariffs (Column 2 tariffs in 2001) to the 1993 data and the post-BTA tariffs (MFN tariffs in 2004) to the 1998 data. If pre-existing trends in household business employment were correlated with industry-specific U.S. tariff cuts, this specification should yield estimates of tariff coefficients of the same sign and similar magnitude to the coefficients obtained in columns 1-3 using data before and after the BTA. The results are presented in columns 4-6 of Table 7.<sup>31</sup> The coefficients on tariffs are very close to zero in magnitude, always statistically insignificant, and very different from the coefficients that we obtain in the respective columns during the period when BTA was implemented. Thus, underlying trends do not explain the strong relationship between the U.S. tariff reductions and the decrease in the probability of working for a household business that we find in Table 6 and in the left panel of Table 7.<sup>32</sup>

We next disaggregate our results and estimate equation 2 by age groups, gender, education, and location. There is significant heterogeneity by age cohorts and by location. These results, along with those by gender and education are reported in Table 8. In general, the probability of working in a household business is falling more for young workers in response to the US tariff cuts. By comparison the effects are less differentiated by gender and education. Men and women were similarly affected by new export opportunities, while workers with a medium level of

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<sup>31</sup> The industry codes between the 1993 and 1998 VLSSs do not perfectly match. In particular, 2-digit ISIC revision 3 industries 31 and 32, 34 and 35, and 30 and 33 were merged together since the 1993 VLSS used a more aggregate industry definition in these instances. Additionally, industries 17 and 18 and 20 and 36 have also been merged since the 1998 VLSS appears to have switched assignment of some workers in some of these industries. The low point estimate of the tariff coefficient and the lack of statistical relationship in the pre-period do not simply reflect higher level of aggregation. When we estimate the effects of the actual tariffs cuts during the period of export reform with industries and industry tariffs defined at the same level of aggregation as in columns 4-6, we continue to obtain positive and statistically significant coefficients on tariffs (.198 (.014) for traded in column 1, .11 (.038) for all in column 2, and .12 (.016) for manufacturing in column 3).

<sup>32</sup> In the 1998 VLSS, where we do have sufficient information to disentangle working for a household business and working for a private sector business, among workers age 20 to 64, 83.0 percent of workers work for a household business either as the owner or as an employee. Only an additional 2.4 percent of workers work for a private sector business. When we repeat the analysis in Table 7 using this indicator as a dependent variable, we also find no evidence that variation in industry tariffs induced by BTA is related to pre-existing trends in industry-level household business employment

education (6 to 9 years of formal education, which accounts for 45 percent of the total sample) were less impacted than workers with low (0 to 5 years of formal education, 40 percent of the total sample) or high levels of education (10 or more years of formal education, 15 percent of the sample).

Vietnamese provinces differ in how integrated they are with international markets in part related to proximity to a major seaport. Provinces closer to major seaports are more exposed to export opportunities and more internationally integrated. For example, the information on value of manufacturing exports from the 2000 Enterprise Survey suggests that 5 provinces near to or with major seaports (Ho Chi Minh City, Dong Nai, Hanoi, Binh Duong, and Hai Phong) account for over three quarters of reported manufacturing exports. To explore the possible heterogeneity by location we split Vietnam's provinces into two groups based on the median distance from one of Vietnam's three major seaports in Hai Phong, Da Nang, and Ho Chi Minh City. The bottom rows of Table 8 show that declines in household business employment within industries in response to tariff cuts are more pronounced in proximate provinces. New export opportunities are associated with larger relative declines in household business employment in industries that experience larger tariff cuts in provinces close to major seaports. These results of larger effects in internationally more integrated provinces are consistent with evidence in McCaig (2011), who finds that poverty declined and average provincial wages increased relatively more in provinces that were more exposed to new export opportunities. These effects were particularly pronounced for average provincial wages of less educated workers.

Overall, the above evidence suggests that industries more exposed to BTA-induced expanded export opportunities observed a shift in employment of labor away from household businesses to larger, more formal and productive employers and this reallocation is more pronounced among younger cohorts and in provinces closer to major seaports.

### 5.3 Panel-level analysis

The analysis so far relied on repeated cross-sections of the VHLSSs. The surveys also contain a smaller panel of households and individuals, which enables us to track individuals over time. We use this smaller panel of individuals to further examine reallocation of workers between household businesses and other employers. We do so by estimating the following equation:

$$H_{ijt} = \text{tariff}_{jt} * \beta + p_p + J_j + t_t + \alpha_i + \varepsilon_{ijt} \quad (3)$$

where the vector of individual characteristics has been replaced by an individual fixed effect  $\alpha_i$ .

We restrict the analysis to individuals that worked in both years and were ages 20-64 in 2002.<sup>33</sup> For each industry grouping we first estimate equation 2 using tariffs based on the worker's contemporary industry and then based on the workers' initial industry. We then include worker fixed effects as in equation 3. The results are reported in Table 9. The estimates of equation 2 reported in columns 1, 4, and 7 confirm our findings from Table 6 that a greater decline in an industry tariff is associated with a decreased probability of working for a household business in an industry.<sup>34</sup> These estimates use a tariff in a worker's contemporaneous industry at time  $t$ . Estimates reported in columns 2, 5, and 8 are based on the tariffs associated with the worker's initial industry of employment. The magnitudes of the coefficient are quite similar to those using the contemporary industry tariff. Regression results that control for individual fixed effects are reported in columns 3, 6, and 9. Inclusion of individual fixed effects somewhat reduces the estimate of the coefficient on tariffs relative to the respective cross-sectional regressions. For example, the magnitude of the coefficient on tariffs for traded sectors falls from .14 in column 2 to .11 in column 3, and it suggests that a 21.1 percentage point decline in tariffs was associated with 2.3 percentage point decline in the probability that a worker works for a household business. The inclusion of individual fixed effects leads to the largest reduction in the magnitude of the coefficient for workers initially employed in the manufacturing sector: the coefficient on tariffs drops from .18 (column 8) to .09 (column 9). This implies that a 30.3 percentage point decline in tariff is associated with a 2.6 percentage point decline in the probability of working for a household business. Overall, our results that control for unobserved time-invariant individual heterogeneity continue to suggest that export

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<sup>33</sup> 9.6 percent of panel individuals ages 20-64 that report working in 2002 are not observed in the sample by 2004. The individuals that leave the sample are more likely to be young, better educated, to have worked in the enterprise sector, to have worked in industries that received larger tariff cuts, and more likely to be employed by an enterprise in industries that received larger tariff cuts. This attrition might thus bias the coefficient on tariff in the panel estimation downward toward zero and make it more likely we find no relationship between the incidence of household business employment and tariffs.

<sup>34</sup> The magnitudes of the coefficients are somewhat lower for cross-sectional estimates based on panel individuals than full repeated cross-sections. This could occur for the following reasons. First, as suggested in the previous footnote attrition could play some role and potentially bias our estimates downward. Second, to track the same individuals over time, we must choose our sample based on initial age, not contemporary age. We therefore focus on individuals ages 20-64 in 2002. Third, individuals that enter or exit the workforce will not be part of the panel since we only have one observation for their work status. In unreported regressions we show that the exclusion of individuals that were 18-20 in 2002 contributes the most toward the decline in the magnitude of the coefficient on tariffs in equation 2 in a panel sample relative to the coefficients in Table 6 based on the full sample.

opportunities lead to the reallocation of labor from household businesses to larger employers, although the effects are smaller in magnitude.<sup>35</sup>

Recall from Section 5.1 that the economy-wide share of employment in household businesses is declining because workers are moving across industries toward less household business intensive industries (mainly away from agriculture and aquaculture) and within industries from household businesses toward more formal employers. Workers could switch to a formal employer not just by moving within an industry but by switching industry and employer at the same time.

To examine this possibility, we begin with workers initially employed in manufacturing, where almost half of workers in the panel switched industry. Table 10 presents the results. Columns 1 and 2 replicate the analysis from Table 9 (columns 8 and 9), which conditioned on contemporaneous industry fixed effects and individual fixed effects. Column 3 estimates equation 3 by conditioning just on individual fixed effects. This regression yields a coefficient on tariff of virtually the same magnitude as in column 2 (although more noisily estimated): workers initially employed in an industry that experienced a greater tariff cut were more likely to switch toward working in a non-household business. Analysis in subsequent columns separates workers that stay in the same industry (columns 4 and 5) and workers that switch industry (columns 6-8). This analysis shows that declines in household business employment in response to tariff cuts are driven in part by reallocation of workers from household business toward other employers within the same industry (columns 4 and 5) and through simultaneous switching of employer and industry (columns 6-8).

Table 11 repeats this analysis for the panel sample of individuals that initially worked in traded industries (Panel A) and for the entire panel sample (Panel B). In Panel A columns 1 and 2 replicate the analysis from Table 9 (columns 2 and 3), which conditioned on contemporaneous industry fixed effects and individual fixed effects. Column 3 estimates equation 3 by conditioning on individual fixed effects. Given the importance of switches out of agriculture noted in Section 5.1, we allow for a differential time trend in household business employment for workers that are initially employed in agriculture in column 3. We find that workers initially employed in industries with

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<sup>35</sup> In unreported regressions we explored whether the initial performance of a household business influenced the probability of a self-employed individual in 2002 working in the enterprise sector in 2004. We find that the operators of higher revenue businesses are less likely to be working in the enterprise sector in 2004 and that this effect does not interact significantly with the change in U.S. tariffs.



bigger tariff declines were more likely to reallocate away from a household business. We further find that workers responded to lower tariffs by switching away from household businesses toward other employers within the same industry (columns 4 and 5) and by simultaneously switching an industry (22 percent of the sample switches industry) and employer (columns 6-9). We confirm similar patterns in the bottom panel of the table (Panel B), which focuses on panel individuals in traded and nontraded industries.

In summary, this section shows that industries that face better export opportunities (as measured by larger tariff cuts on Vietnamese exports to the U.S.) observe a greater decline in the incidence of household business employment. The analysis illustrates that an important component of adjustment to new export opportunities is the changing composition of employment away from household businesses toward more formal employers within industries. The changes in within-industry informality could be driven by two channels: workers are leaving jobs at household businesses and finding employment with different businesses in the enterprise sector or household businesses could be registering as private enterprises. Detailed analysis of this issue is beyond the scope of this paper, but some additional evidence suggests that the majority of workers moving from the household business sector to the enterprise sector appear to be doing so by finding a new job.<sup>36</sup>

## **6. The BTA and labor allocation across industries**

As discussed in the previous section, there has been significant movement of workers across industries as about 26 percent of workers in the individual panel changed industries between 2002 and 2004. Neoclassical trade theory predicts that, all else equal, industries that observed greater

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<sup>36</sup>First, summary statistics suggests one observes little mobility of household businesses to the enterprise sector. During this period, the number of registered private enterprises increased significantly, from about 35,000 in 2000 to about 84,000 in 2004 (Malesky and Taussig, 2009). Although this is an impressive growth in the number of private enterprises, it is only a small fraction of the estimated 6 to 7 million operating household businesses during this period (McCaig and Pavcnik, 2011). Second, in our panel dataset of 39,940 individuals working in both periods, 1,467 individuals (1.8 percent) moved from the household business sector to the enterprise sector. Of these, less than half (45.8 percent) were working in a private enterprise in 2004, while 39.0 percent were working for a state enterprise, 7.9 percent were working for a collective enterprise, and 7.3 percent were working for a foreign invested enterprise. Of the workers who moved from the household business sector to a private enterprise only 30 percent were also working in the same industry. Thus, out of the 1,467 workers that moved to the enterprise sector, only 14% report working in a private enterprise in the same industry as their previous job in a household business, which is consistent with a household business becoming a registered private enterprise

increases in export market access (i.e., bigger reductions in U.S. tariffs) should observe an increase in employment relative to industries with smaller or no tariff changes. We examine the relationship between market access and industry employment using the following framework:

$$s_{jt} = \alpha + \beta \text{tariff}_{jt} + \lambda_j + \gamma_t + \varepsilon_{jt} \quad (4)$$

where  $s_{jt}$  is the share of total employment in industry  $j$  at time  $t$  and  $\text{tariff}_{jt}$  is the U.S. tariff faced by industry  $j$  at time  $t$ . The main coefficient of interest is the coefficient on the U.S. tariffs.

The results are presented in Table 12a. Columns 1 through 3 focus on traded industries, all industries, and manufacturing industries, respectively.<sup>37</sup> Neoclassical trade theory predicts that net employment should expand in industries receiving the largest tariff cuts on exports, implying that the coefficient on tariffs should be negative. Focusing first on traded industries in column 1, there is a negative relationship between the change in industry tariff and the share of employment within traded industries, as predicted by theory. However, the relationship is not statistically significant. The inclusion of non-traded industries in specifications reported in column 2 or focusing on manufacturing in column 3 also yields insignificant coefficient on tariffs.

The lack of relationship between export expansion and industry employment might in part be driven by responses in employment to tariff cuts through reallocation of labor from household businesses to the enterprise sector discussed in section 5. This is consistent with the conceptual framework in Section 2 which points to the importance of heterogeneity of employers and products within an industry. In particular, products produced by firms in household businesses might not be well substitutable for the products produced by the firms in non-household businesses that are more likely to be exported. Or household businesses might be less productive than other employers, whose profitability might increase in response to new export opportunities. One might then expect expansion of net industry employment to be more responsive to tariff cuts among the employers in the enterprise sector (see also Bernard, Redding, and Schott (2007)). As a result, we compute an industry's employment share in total employment,  $s_{jt}$ , focusing on the enterprise sector alone, and repeat the above analysis. The results are reported in the top panel of Table 12b. Relative to the industry-wide results in Table 12a, these results suggest more pronounced expansion in the net industry employment in industries that experienced larger tariff cuts.

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<sup>37</sup> In specifications that include all industries, non-traded industries are assigned a tariff of 0 in both periods. Because the empirical specification always includes industry fixed effects, this treatment implies that non-traded industries face a zero change in tariffs.

Vietnam might not have a comparative advantage in some of the industries subject to tariff cuts, so one might expect a stronger net employment expansion in industries where Vietnam has comparative advantage. We thus also augment the specification in equation 4 by including an interaction of the industry tariff with the industry's revealed comparative advantage prior to the BTA. We calculate each industry's revealed comparative advantage as the ratio of industry  $j$ 's proportion of Vietnamese exports to industry  $j$ 's proportion of world exports. In these specifications, we also include an interaction of an industry's revealed comparative advantage with a 2004 dummy to allow for differential unobserved demand or supply shocks that might vary with the industry's revealed comparative advantage.

The reallocation of employment across industries in response to tariff cuts is especially pronounced among industries with a revealed comparative advantage. In the enterprise sector, for a traded industry at the mean of comparative advantage distribution, the average industry tariff cut would lead to a 0.26 percentage point increase in the industry employment share, an 8.9 percent increase relative to the mean industry employment share.

These results are further reinforced when we estimate equation 4 with industry employment shares obtained from the Enterprise Survey, which only includes formal firms (i.e., non-household businesses).<sup>38</sup> These results are presented in Panel B of Table 12b. Consider first the coefficient on tariffs reported in traded sectors in column 1. The coefficient estimate in column 1 suggests that an industry that experienced the 21.1 percentage point decline in U.S. tariffs, observed a 0.54 percentage point increase in industry share of employment, which represents an 18.2 percent increase from the mean industry employment share over a period of 3 years. These effects are more pronounced in industries with a revealed comparative advantage (see columns 4-6).

In summary, the new export opportunities lead to a more pronounced expansion of relative industry employment in the enterprise sector, which is more directly affected by exporting and this expansion is greater in industries with a revealed comparative advantage.

## 7. Conclusion

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<sup>38</sup> To match the timeframe of this data closely to VHLSS, we rely on the information about the end of year employment in 2000 and 2003. We obtain this information for all firms and aggregate it up to compute employment shares at the industry level. Summary statistics for the Enterprise Survey data are presented in Appendix Table A.2.

This paper examines how expanded export opportunities affect the reallocation of employment across employers in a poor country, where a majority of workers are employed in household businesses. Employment in household businesses is often not captured in conventional firm-level or matched employee-employer data sets. The lack of data on household business employment would, for example, miss 66 to 80 percent of employment in manufacturing in countries such as Vietnam and India. We use a comprehensive data set from Vietnam and document a decline in employment in household businesses in Vietnam during the period that follows the U.S.-Vietnam Bilateral Trade Agreement, an agreement that primarily reduced U.S. tariffs on Vietnamese exports. Our results thus complement the existing literature on labor reallocations between larger firms in response to trade.

Most importantly, we find that reallocation of labor from household businesses to other more formal, productive employers provides an important margin of adjustment to new exporting opportunities. Industries that face better export opportunities (as measured by larger declines in tariffs on Vietnamese exports to the U.S.) observe a greater decline in the incidence of household business employment. Our estimates suggest that in manufacturing expanded export opportunities could account for 40 percent of the increase in formal employment during this period. Additionally, there is heterogeneity in worker responses to new exporting opportunities. Younger cohorts and individuals living in more internationally integrated provinces are more likely to reallocate from household businesses toward more formal employers in response to new export opportunities.

We find that relative industry employment increased in the enterprise sector in industries that benefited more from expanded export opportunities (as measured by declines in tariffs on Vietnamese exports to the U.S.). This relative employment expansion in response to tariff cuts was more pronounced in industries with a revealed comparative advantage.

Our results also relate to the recent literature on firm heterogeneity and aggregate output differences in developing countries. Several recent studies (see, for example, Hsieh and Klenow (2009, 2011)) emphasize the prevalence of small, unproductive firms in poor economies and the implications of misallocation of resources across heterogeneous firms for aggregate output and productivity. Our study shows that the elimination of a product market distortion, such as export market liberalization, induces a movement of labor away from household businesses, which tend to be less productive and pay lower wages for observationally equivalent workers, to larger, more formal firms. As we show in Section 4, there is large heterogeneity between household businesses

and other employers in Vietnam. Household businesses have, on average, substantially lower labor productivity than more formal firms. Workers in household businesses earn 7 to 14 percent less than observationally equivalent workers in the same industry, province, and occupation. The reallocation of labor from household businesses to other employers might thus lead to aggregate productivity gains through the reallocation of labor toward more productive uses.

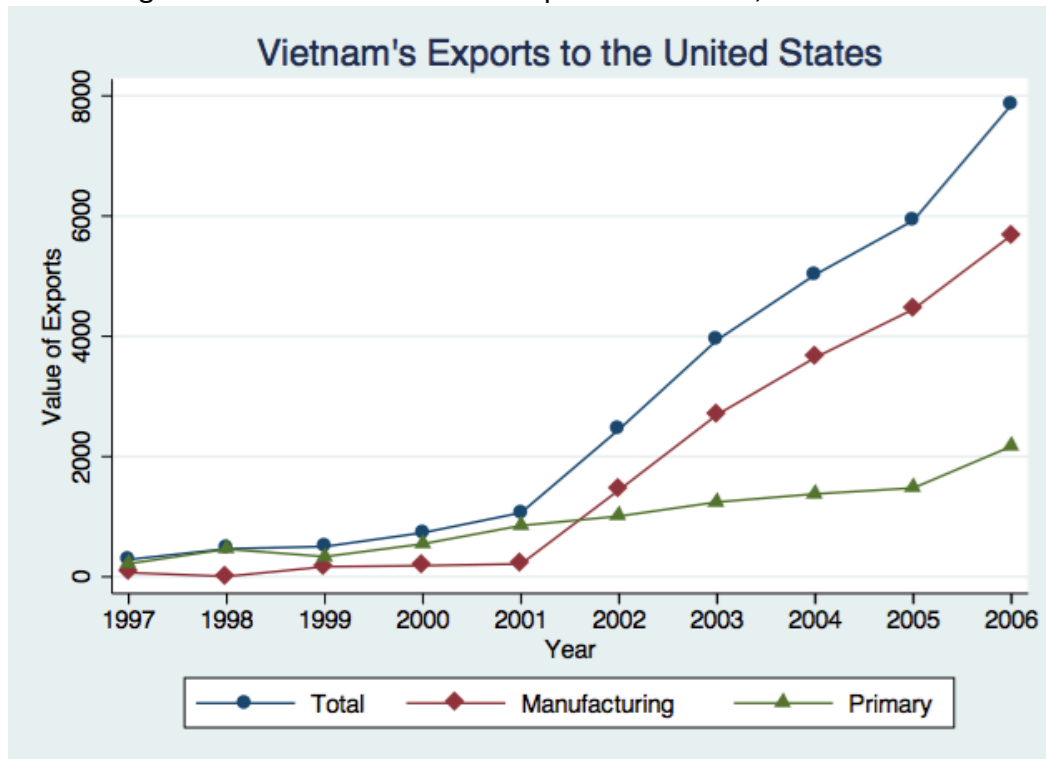
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Figure 1: Value of Vietnamese exports to the U.S., 1997 to 2006



Notes: Authors' calculations from COMTRADE. The value of exports is reported in million USD.



Figure 2: Share of the United States in Vietnam's Exports

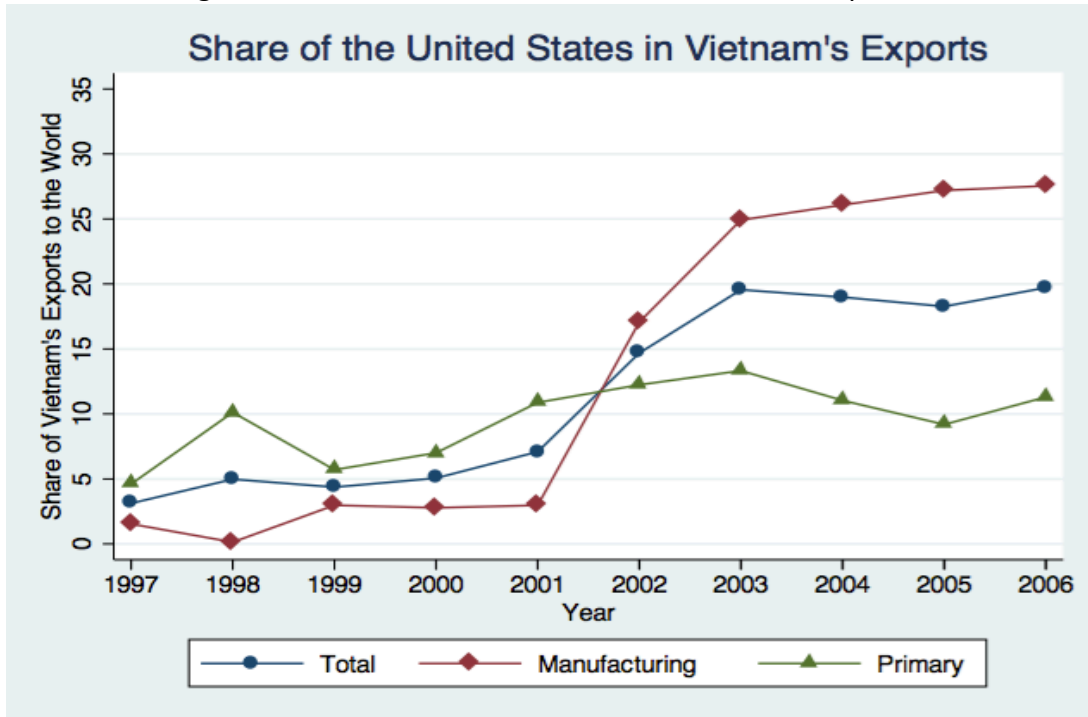
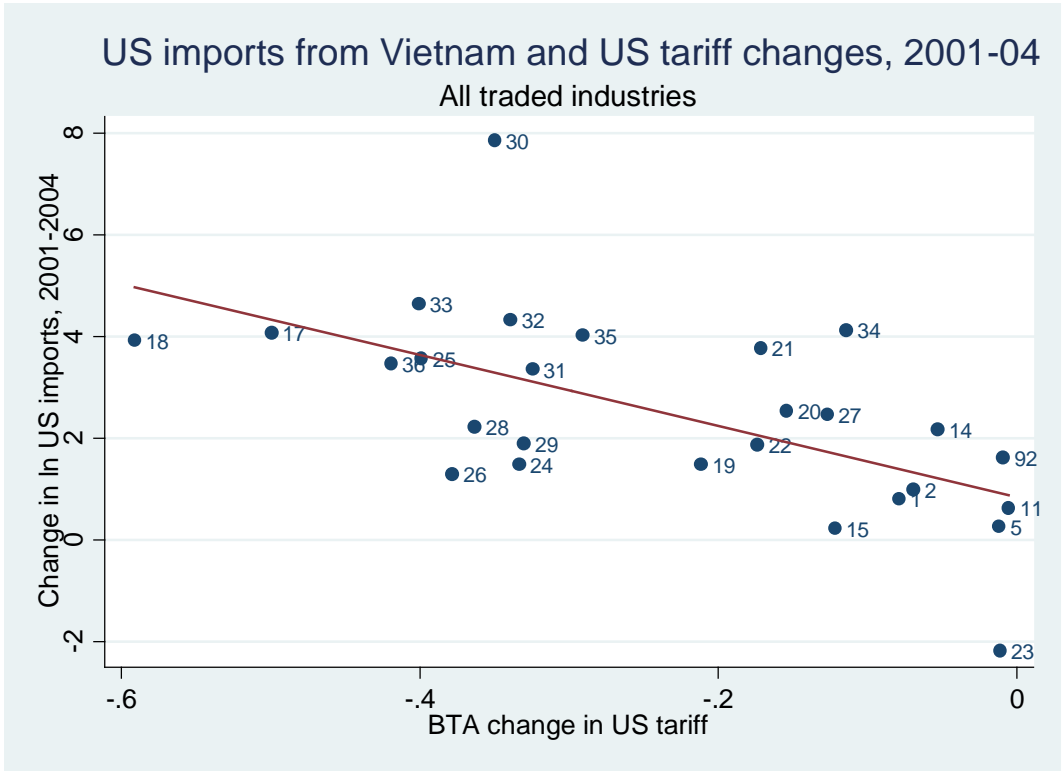
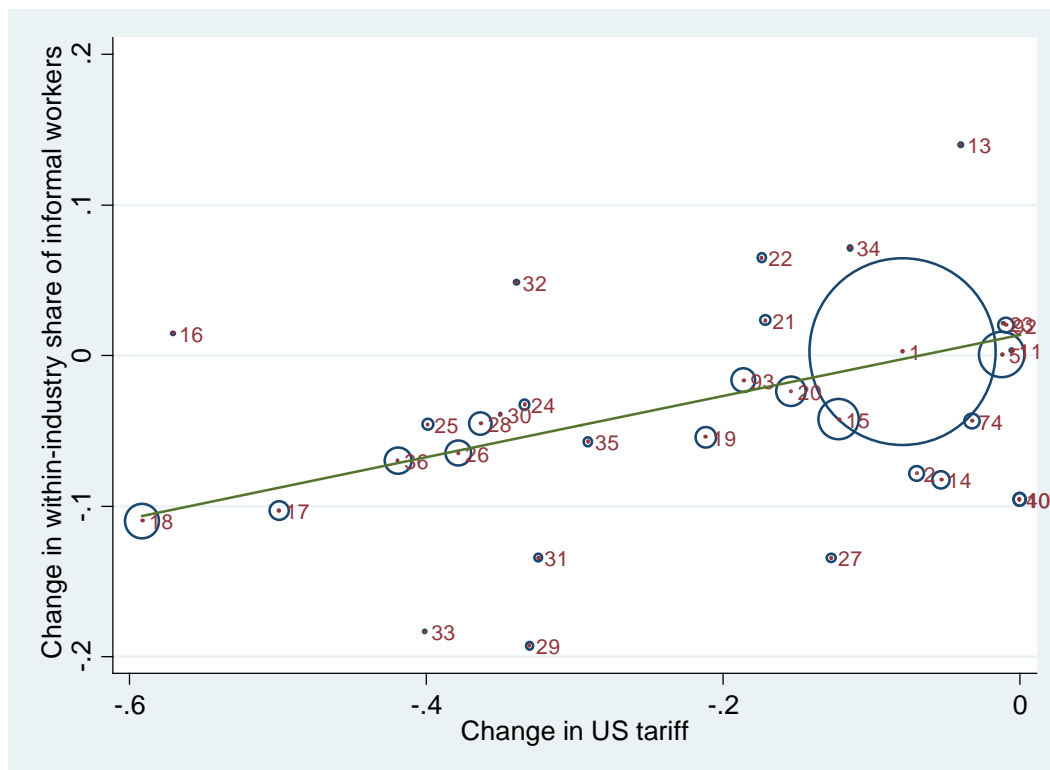


Figure 3: Growth of Vietnamese exports to the US versus US tariff cuts by industry



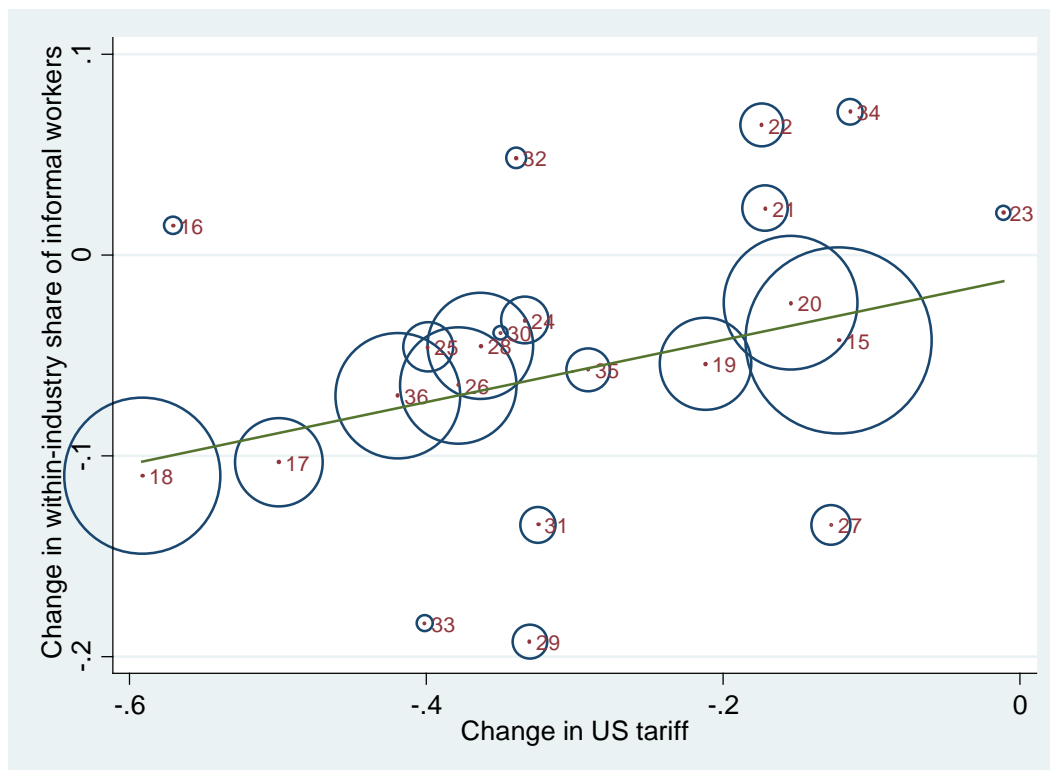
Notes: The industry codes correspond to ISIC revision 3.

Figure 4: Change in share of household business workers in an industry and U.S. tariff reductions



Notes: The bubble sizes represent the weight given to the industry in the plotted regression line. See text for explanation. The industry codes correspond to all traded industries in ISIC revision 3.

Figure 5: Change in share of household business workers in an industry and U.S. tariff reductions, manufacturing industries



Notes: The bubble sizes represent the weight given to the industry in the plotted regression line. See text for explanation. The industry codes correspond to ISIC revision 3.

Table 1: Summary of U.S. tariffs applied to imports from Vietnam

<b>Industry</b>	<b>Number of industries</b>	<b>Mean pre-BTA tariff (Column 2)</b>	<b>Mean post-BTA tariff (MFN)</b>	<b>Mean tariff cut</b>	<b>Standard deviation of tariff cut</b>
Agriculture, hunting & forestry	2	0.091	0.017	0.074	0.007
Fishing	1	0.013	0.002	0.012	
Mining	5	0.021	0.001	0.020	0.025
Manufacturing	22	0.338	0.034	0.303	0.153
Other	4	0.060	0.004	0.057	0.087
Total	34	0.234	0.024	0.211	0.179

*Source* : McCaig (2011). The tariffs reported are weighted average tariffs. For each commodity-line tariff, its weight is the share of imports within the sector based on 2001 U.S. imports.

Table 2: Vietnam's main exports to the US in 2004 by industry

		2004 value (million USD)	Annual Growth 2001 to 2004 (%)	Share of exports in 2004	Cumulative share
<b>2-digit ISIC revision 3 industry</b>					
18	Manufacture of wearing apparel; dressing and dyeing of fur	2056	273	0.401	0.401
19	Tanning and dressing of leather; manufacture of luggage, handbags, saddlery, harness and footwear	588	63	0.115	0.515
17	Manufacture of textiles	577	293	0.112	0.627
15	Manufacture of food products and beverages	570	7	0.111	0.738
36	Manufacture of furniture; manufacturing n.e.c.	433	213	0.084	0.823
1	Agriculture, hunting and related service activities	349	33	0.068	0.891
23	Manufacture of coke, refined petroleum products and nuclear fuel	213	11	0.041	0.932
30	Manufacture of office, accounting and computing machinery	49	1290	0.010	0.942
Total		5134	72	1.000	1.000

Table 3: Earnings Differentials in Household Businesses

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
HH business Indicator	-0.501*** 0.00494	-0.391*** (0.00504)	-0.283*** (0.00571)	-0.240*** (0.00655)	-0.250*** (0.00555)	-0.211*** (0.00630)	-0.143*** (0.00647)	-0.0513** (0.0208)
Urban		0.339*** (0.00516)	0.268*** (0.00513)	0.233*** (0.00520)	0.166*** (0.00532)	0.138*** (0.00529)	0.116*** (0.00519)	
Age			0.0382*** (0.00158)	0.0388*** (0.00155)	0.0389*** (0.00151)	0.0366*** (0.00147)	0.0342*** (0.00144)	
Age squared			-0.000455*** (2.11e-05)	-0.000451*** (2.06e-05)	-0.000447*** (2.02e-05)	-0.000407*** (1.96e-05)	-0.000377*** (1.92e-05)	
Primary education			0.0466*** (0.0122)	0.00858 (0.0119)	0.0466*** (0.0118)	0.0154 (0.0113)	0.0165 (0.0111)	
Lower secondary education			0.0473*** (0.0120)	-0.0496*** (0.0120)	0.134*** (0.0120)	0.0607*** (0.0117)	0.0538*** (0.0114)	
Upper secondary education			0.292*** (0.0127)	0.152*** (0.0128)	0.388*** (0.0126)	0.270*** (0.0125)	0.181*** (0.0123)	
Female indicator			-0.200*** (0.00482)	-0.180*** (0.00519)	-0.208*** (0.00462)	-0.174*** (0.00493)	-0.162*** (0.00489)	
Ethnic minority indicator			-0.286*** (0.00874)	-0.229*** (0.00862)	-0.181*** (0.00989)	-0.127*** (0.00957)	-0.127*** (0.00935)	
Industry fixed effects?	No	No	No	Yes	No	Yes	Yes	Yes
Province fixed effects?	No	No	No	No	Yes	Yes	Yes	No
Occupation fixed effects?	No	No	No	No	No	No	Yes	No
Year fixed effects?	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Individual fixed effects?	No	No	No	No	No	No	No	Yes
Observations	76,066	76,066	76,066	76,066	76,066	76,066	76,066	22,769
R-squared	0.119	0.172	0.234	0.284	0.302	0.357	0.387	0.880

Notes: Standard errors are clustered at industry level; \*\*\*, \*\*, and \* denotes significance at 1, 5, and 10 percent level, respectively. Dependent variable is In real hourly compensation, where compensation is defined as (wages or salary + additional payments). The real wage is calculated by deflating the nominal wage to January prices of the contemporary survey using the monthly cpi deflators included in the household surveys and these values are then converted to January 2006 prices. The sample in columns (1) through (6) is all wages earners between 20 and 64 years old inclusive. The sample in column (8) is restricted to individuals that worked in 2002 and 2004.

Table 4: Share of employees reporting non-wage/salary payments

<b>Payment Type</b>	<b>Repeated Cross Sections</b>	
	<b>2002</b>	<b>2004</b>
<b>All individuals that report working in the household business sector</b>		
Holidays	0.185	0.193
Social subsidy (including maternity benefits)	0.002	0.002
Business trips	0.003	0.002
Other	0.154	0.198
Any benefit	0.269	0.309
<b>All individuals that report working for other employers</b>		
Holidays	0.849	0.821
Social subsidy (including maternity benefits)	0.036	0.038
Business trips	0.147	0.136
Other	0.597	0.589
Any benefit	0.901	0.870

Notes: The shares are estimated using survey sample weights. Based on individuals between the ages of 20 and 64 inclusive.



Table 5: Share of employment in household businesses

	All	Excluding agriculture and fisheries	Manufacturing
<b>Panel A: Share of employment in household businesses</b>			
2002	0.847	0.672	0.657
2004	0.814	0.626	0.601
<b>Panel B: Decomposing changes in household business employment</b>			
Within industries	-0.017	-0.040	-0.059
Between industries	-0.016	-0.006	0.003
Total	-0.033	-0.046	-0.056

Notes: Authors' own estimates based on the 2002 and 2004 VHLSSs. Based on workers aged 20 to 64 inclusive. Survey sampling weights included.

Table 6: Employment in Household Businesses and Tariffs

	(1) Traded	(2) All	(3) Manufacturing
Tariff	0.210*** (0.0140)	0.125*** (0.0341)	0.164*** (0.0204)
Age	0.00227 (0.00319)	0.00176 (0.00227)	0.0168*** (0.00431)
Age squared	-1.69e-05 (3.16e-05)	-1.13e-05 (2.30e-05)	-0.000136*** (4.57e-05)
Indicator for primary education	0.00363 (0.00384)	0.00240 (0.00205)	-0.00972 (0.0209)
Indicator for lower secondary education	-0.00648 (0.00489)	-0.00963 (0.00835)	-0.0686** (0.0245)
Indicator for upper secondary education	-0.0802** (0.0388)	-0.106*** (0.0385)	-0.223*** (0.0412)
Indicator for female	0.00111 (0.00551)	0.000770 (0.00613)	-0.0167 (0.0229)
Indicator for ethnic minority	0.00355 (0.00328)	0.00257 (0.00361)	0.0403 (0.0267)
Rural indicator	0.0484** (0.0203)	0.0450*** (0.0114)	0.0766*** (0.0208)
Industry fixed effects?	Yes	Yes	Yes
Province fixed effects	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes
Number of industries	34	60	22
Observations	176,546	248,793	27,072
R-squared	0.415	0.591	0.293

Notes: Standard errors are clustered at industry level; \*\*\*, \*\*, and \* denotes significance at 1, 5, and 10 percent level, respectively. The sample is restricted to workers between the ages of 20 and 64 inclusive at the time of the survey. Column (1) includes all traded industries, column (2) includes all industries, and column (3) includes all traded manufacturing industries.

Table 7: Falsification test of the relation between tariffs and self-employment

	(1)	(2)	(3)
	Traded	All	Manufacturing
	Reform Period		
Tariff	0.212*** (0.0409)	0.127*** (0.0396)	0.201*** (0.0510)
Industry fixed effects?	Yes	Yes	Yes
Province fixed effects?	Yes	Yes	Yes
Year fixed effects?	Yes	Yes	Yes
	Pre-reform Period (1993-1998)		
Tariff	0.0360 (0.0337)	0.0142 (0.0350)	-0.00480 (0.102)
Industry fixed effects?	Yes	Yes	Yes
Province fixed effects?	Yes	Yes	Yes
Year fixed effects?	Yes	Yes	Yes

Notes: Standard errors are clustered at industry level; \*\*\*, \*\*, and \* denotes significance at 1, 5, and 10 percent level, respectively. The dependant variable is an indicator for whether an individual is self-employed. In the lower panel, the pre-BTA tariffs (Column 2 rates in 2001) are assigned to industries in 1993 and the post-BTA tariff (MFN rates in 2004) are assigned to industries in 1998. All regressions include the following worker characteristics: age, age squared, education level indicators, female indicator, ethnic minority indicator, and rural indicator.

Table 8: Employment in Household Business and Tariffs by Age, Gender, Education, and Location

Sample of workers	(1) Traded	(2) All	(3) Manufacturing
<b>Panel A: Age</b>			
Age 20 to 29 in 2002	0.328*** (0.0508)	0.220*** (0.0425)	0.178*** (0.0621)
Age 30 to 39 in 2002	0.139*** (0.0196)	0.0780*** (0.0291)	0.0852*** (0.0224)
Age 40 to 49 in 2002	0.125*** (0.0295)	0.0385 (0.0414)	0.148*** (0.0384)
Age 50 to 59 in 2002	0.113* (0.0648)	0.0381 (0.0635)	0.165* (0.0867)
Age 60 to 64 in 2002	-0.0211 (0.109)	-0.0694 (0.0855)	-0.136 (0.180)
<b>Panel B: Gender</b>			
Males	0.230*** (0.0387)	0.101* (0.0528)	0.164** (0.0603)
Females	0.197*** (0.0178)	0.147*** (0.0219)	0.164*** (0.0340)
<b>Panel C: Education</b>			
5 or fewer years of education	0.269*** (0.0365)	0.177*** (0.0462)	0.192*** (0.0407)
6 to 9 years of education	0.177*** (0.0177)	0.106** (0.0402)	0.145*** (0.0307)
10 or more years of education	0.212*** (0.0353)	0.123*** (0.0364)	0.189*** (0.0574)
<b>Panel D: Location</b>			
Less than the median distance from a major seaport	0.227*** (0.0215)	0.140*** (0.0340)	0.191*** (0.0273)
At least the median distance from a major seaport	0.149*** (0.0335)	0.0670* (0.0381)	0.0609 (0.0446)

Notes: Standard errors are clustered at industry level; \*\*\*, \*\*, and \* denotes significance at 1, 5, and 10 percent level, respectively. The table shows the estimated coefficient on industry tariffs from regressing an indicator for working in a household business for the indicate sample. All regressions include the usual controls for worker characteristics, and province, industry, and year fixed effects.

Table 9: Household business employment and tariffs, panel-level analysis

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	Traded			All		Manufacturing			
Tariff	0.152*** (0.0256)	0.144*** (0.0196)	0.111*** (0.0301)	0.0748** (0.0319)	0.0633** (0.0294)	0.0440* (0.0240)	0.164*** (0.0552)	0.180*** (0.0493)	0.0867** (0.0418)
Industry fixed effects?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Province fixed effects	Yes	Yes	No	Yes	Yes	No	Yes	Yes	No
Individual fixed effects	No	No	Yes	No	No	Yes	No	No	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	57,686	57,686	57,686	79,880	79,880	79,880	7,584	7,584	7,584
R-squared	0.445	0.445	0.868	0.625	0.625	0.911	0.356	0.357	0.886

Notes: Standard errors are clustered at industry level; \*\*\*, \*\*, and \* denotes significance at 1, 5, and 10 percent level, respectively. Tariff in column 1, 4, and 7 is contemporaneous industry tariff. Tariff in columns 2, 3, 5, 6, 8, and 9 is tariff associated with industry of initial employment. The sample is based on workers age 20 to 64 as of the 2002 VHLSS that reported working in the 2002 and 2004 VHLSSs. The groupings into traded, all, and manufacturing are based on the initial industry of employment reported in the 2002 VHLSS. All regressions that do not include individual fixed effects include individual covariates (age, age squared, education levels, gender, ethnic minority status and urban indicator).

Table 10: Household business employment, industry switching and tariffs in manufacturing

	1	2	3	4	5	6	7	8
	All workers			Same Industry		Industry Switchers		
Initial tariff	0.180*** (0.0493)	0.0867** (0.0418)	0.0801 (0.0510)	0.0447** (0.0186)	0.0351 (0.0263)	0.302*** (0.0930)	0.409** (0.194)	0.127* (0.0668)
Industry fixed effects?	Yes	Yes	No	Yes	No	Yes	Yes	No
Province fixed effects?	Yes	No	No	Yes	No	Yes	No	No
Individual fixed effects?	No	Yes	Yes	No	Yes	No	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	7,584	7,584	7,584	3,956	3,956	3,628	3,628	3,628
R-squared	0.357	0.886	0.873	0.383	0.937	0.383	0.825	0.796

Notes: Standard errors are clustered at industry level; \*\*\*, \*\*, and \* denotes significance at 1, 5, and 10 percent level, respectively. The sample is panel individuals age 20 to 64 as of 2002, that worked in both 2002 and 2004, and initially worked in a traded manufacturing industry. The sample in columns 4 and 5 is restricted to individuals that worked in the same industry in 2002 and 2004 while the sample in columns 6 through 8 is workers that switched industries.

Table 11: Household business employment, industry switching and tariffs, traded industries and all industries

	1	2	3	4	5	6	7	9
	All workers			Same Industry		Industry Switchers		
Panel A: Traded Industries								
Initial tariff	0.144*** (0.0196)	0.111*** (0.0301)	0.0741** (0.0319)	0.0577*** (0.0130)	0.0582*** (0.0187)	0.219*** (0.0419)	0.171*** (0.0576)	0.148** (0.0712)
Industry fixed effects?	Yes	Yes	No	Yes	No	Yes	Yes	No
Province fixed effects?	Yes	No	No	Yes	No	Yes	No	No
Individual fixed effects?	No	Yes	Yes	No	Yes	No	Yes	Yes
Agriculture in 2002 x Year FEs?	No	No	Yes	No	No	No	No	Yes
Year Fixed Effects?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	57,686	57,686	57,686	45,220	45,220	12,466	12,466	12,466
R-squared	0.445	0.868	0.831	0.459	0.920	0.417	0.794	0.731
Panel B: All Industries								
Initial industry tariff	0.0633** (0.0294)	0.0440* (0.0240)	0.0741** (0.0319)	0.0121 (0.0217)	0.0110 (0.0310)	0.107** (0.0420)	0.103* (0.0527)	0.148** (0.0712)
Industry fixed effects?	Yes	Yes	No	Yes	No	Yes	Yes	No
Province fixed effects?	Yes	No	No	Yes	No	Yes	No	No
Individual fixed effects?	No	Yes	Yes	No	Yes	No	Yes	Yes
Agriculture in 2002 x Year Fes?	No	No	Yes	No	No	No	No	Yes
Nontraded in 2002 x Year Fes?	No	No	Yes	No	No	No	No	Yes
Year Fixed Effects?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Notes: Standard errors are clustered at industry level; \*\*\*, \*\*, and \* denotes significance at 1, 5, and 10 percent level, respectively. The sample is panel individuals age 20 to 64 as of 2002, that worked in both 2002 and 2004, and initially worked in a traded industry. The sample in columns 4 and 5 is restricted to individuals that worked in the same industry in 2002 and 2004 while the sample in columns 6 through 9 is workers that switched industries. The sample in panel B includes all workers that worked in both 2002 and 2004.

Table 12a: Industry Employment and Tariffs

Dependent variable: Share of employment in the indicated set of industries

	(1)	(2)	(3)
	Traded	All	Manufacturing
Tariff	-0.00445 (0.00557)	-0.000137 (0.00256)	0.00410 (0.0336)
Industry fixed effects?	Yes	Yes	Yes
Year fixed effects?	Yes	Yes	Yes
Observations	68	120	44
R-squared	1.000	0.998	0.984

Notes: Standard errors are clustered at industry level; \*\*\*, \*\*, and \* denotes significance at 1, 5, and 10 percent level, respectively. The dependent variable is the share of workers and is calculated as the number of workers in industry  $j$  divided by the total number of workers in the respective group. The total number of workers includes workers in (i) traded industries for column (1), (ii) all industries for column (2), and (iii) traded manufacturing industries for column (3). The industry employment shares are based on workers between the ages of 20 and 64 inclusive.



Table 12b: Industry Employment and Tariffs in the Enterprise Sector  
Dependent variable: Share of employment in the indicated set of industries

	(1) Traded	(2) All	(3) Manufacturing	(4) Traded	(5) All	(6) Manufacturing
<b>Panel A: VHLSS Data (Non-household Business Employers)</b>						
Tariff	-0.0171 (0.0219)	-0.00303 (0.00654)	-0.0193 (0.0455)	0.0159 (0.0146)	0.00513 (0.00460)	0.0426 (0.0343)
(Tariff) x (RCA)				-0.0212*** (0.00577)	-0.00780*** (0.00215)	-0.0375*** (0.00641)
Industry fixed effects?	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects?	Yes	Yes	Yes	Yes	Yes	Yes
RCA*year fixed effects?	No	No	No	Yes	Yes	Yes
Observations	68	120	44	68	120	44
R-squared	0.956	0.992	0.965	0.971	0.994	0.981
<b>Panel B: Enterprise Survey Data</b>						
Tariff	-0.0254** (0.0114)	-0.0105* (0.00540)	-0.0235 (0.0174)	-0.00555 (0.00845)	-0.00181 (0.00387)	0.00299 (0.0129)
(Tariff) x (RCA)				-0.0128*** (0.00270)	-0.00838*** (0.00153)	-0.0169*** (0.00331)
Industry fixed effects?	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects?	Yes	Yes	Yes	Yes	Yes	Yes
RCA*year fixed effects?	No	No	No	Yes	Yes	Yes
Observations	66	110	44	66	110	44
R-squared	0.986	0.992	0.993	0.990	0.994	0.995

Notes: Standard errors are clustered at industry level; \*\*\*, \*\*, and \* denotes significance at 1, 5, and 10 percent level, respectively. The industry employment shares are based on workers between the ages of 20 and 64 inclusive. RCA is revealed comparative advantage and it is the ratio of industry j's proportion of Vietnamese exports to industry j's proportion of world exports in 2000. All non-traded industries are assigned an RCA value of 0. The dependent variable is the share of workers and is calculated as the number of workers in industry j divided by the total number of workers in the respective grouping.

Appendix Table A.1: Descriptive statistics

Variable	2002 & 2004		2002		2004	
	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.
Worked in a household business	0.686	0.464	0.701	0.458	0.672	0.469
Self-employed	0.830	0.375	0.847	0.360	0.814	0.389
Work in a household business or without benefits in a larger firm	0.850	0.357	0.862	0.345	0.838	0.368
Indicator for urban	0.239	0.427	0.240	0.427	0.238	0.426
Age	37.8	11.1	37.4	11.0	38.3	11.1
Indicator for female	0.505	0.500	0.507	0.500	0.503	0.500
Indicator for ethnic minority	0.123	0.328	0.121	0.326	0.124	0.329
Indicator for primary education	0.264	0.441	0.275	0.447	0.252	0.434
Indicator for lower secondary education	0.438	0.496	0.437	0.496	0.439	0.496
Indicator for upper secondary education	0.247	0.432	0.233	0.423	0.261	0.439
Indicator for agriculture, forestry and aquaculture	0.542	0.498	0.561	0.496	0.524	0.499
Indicator for manufacturing	0.123	0.329	0.118	0.322	0.128	0.334
Indicator for services	0.327	0.469	0.313	0.464	0.341	0.474
Indicator for state sector	0.118	0.322	0.115	0.319	0.120	0.325
Indicator for foreign sector	0.013	0.111	0.010	0.097	0.016	0.124
ln(hourly compensation)	1.368	0.726	1.234	0.791	1.494	0.634
Number of observations	248795		152388		96407	

Notes: The sample is all observations from 2002 and 2004 that worked and were 20 to 64 years of age inclusive at the time of the survey. The number of observations for wages are lower: 46,309 and 29,758 in 2002 and 2004 respectively.

Appendix Table A.2: Summary statistics of employees in enterprises

<b>Enterprise employees in:</b>	<b>Shares</b>		<b>Number</b>	
	<b>2000</b>	<b>2003</b>	<b>2000</b>	<b>2003</b>
Agriculture, forestry, and aquaculture	0.076	0.049	267,304	252,132
Mining	0.043	0.031	152,327	162,512
Manufacturing	0.452	0.494	1,598,485	2,557,296
Services	0.430	0.426	1,519,766	2,202,820
State	0.585	0.422	2,070,885	2,184,985
Collective	0.052	0.031	182,320	160,949
Private	0.248	0.380	876,941	1,968,567
Foreign	0.115	0.166	407,736	860,259
Total	1.000	1.000	3,537,882	5,174,760

Notes: Data from Vietnam's Enterprise Survey. The industry of the firm is based on the first industry of operation listed by the firm. The employment numbers are based on the end of the year reports.