Exports and Intergenerational Mobility*

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Abstract

Using eight rounds of the Vietnam Household Living Standards Surveys (VHLSSs) spanning 16 years and exploiting the US-Vietnam Bilateral Trade Agreement (BTA) in 2001, we investigate the impact of this large export shock on intergenerational occupational mobility in Vietnam. We find that the BTA has, on average, led to greater upward absolute occupational mobility among sons and daughters, with effects following roughly a U-shape by age for sons and an inverse-U for daughters. However, relative occupational mobility, inversely related to the gradient of the child's occupational rank as a function of the parent's, decreased on average as a result of the BTA, with this effect also varying across individual age groups. Our results suggest that while the BTA improved occupational mobility for an average child, children born to top-ranked parents benefited disproportionately. Also, the BTA increased human capital investment in college education for both genders and vocational training only for sons. Furthermore, higher individual and initial province-level human capital facilitated this trade-induced mobility.

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JEL Codes: F13, F16, F66, J62, O19

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"The King's heir becomes King,

The pagoda keeper's kid sweeps the banyan leaves."

(Vietnamese folk proverb)

1 Introduction

Intergenerational mobility refers to the extent to which socioeconomic status is able to change across generations. It reflects the ability of individuals to improve their economic and social status relative to their parents, thus it is a key element of economic development. An increase in intergenerational mobility is found to be highly associated with higher economic growth, faster poverty reduction, lower inequality, and a more stable society (Narayan et al., 2018). Given that globalization is believed to have played a significant role in promoting economic growth worldwide, especially in the developing world during the past decades, it is important to understand whether international trade reinforces or diminishes the persistence of socioeconomic status across generations.

In this paper, we examine to what extent trade liberalization affects intergenerational mobility, which we define as upward movement on skill-based or education-based occupational ladders, in a small but rapidly developing country, namely Vietnam. Since 2001, Vietnam has experienced massive growth in exports to the U.S. due to the United States-Vietnam Bilateral Trade Agreement (henceforth, BTA), which has resulted in a significant reallocation of resources towards export-oriented sectors in response to an increase in demand (McCaig and Pavcnik, 2018). Despite the extensive research on intergenerational mobility in the labor economics and public economics literature (see, for example, recent studies Solon (1999), Long and Ferrie (2013), Chetty et al. (2014*a*,*b*), Chetty and Hendren (2018*a*,*b*)), besides the studies by Ahsan and Chatterjee (2017) and Colantone, Ottaviano and Takeda (2024) on India and the U.S. respectively, very little is known about how trade expansion affects intergenerational mobility. The trade liberalization episode in Vietnam provides an ideal context for studying and understanding how trade can break down social structures and impact mobility.[1]

We focus our attention on *occupational mobility* as our main dimension of mobility. This has several advantages. First, a person's occupation is likely to be directly related to their welfare through income and job stability. The occupational outcomes, in turn, are affected by the nature of a country's specialization and consequent skill demand, which are influenced by international trade. In addition, in the context of a developing country, such as Vietnam, the proportion of formal-sector jobs (often associated with higher-level occupations) in the economy plays a particularly important role in poverty alleviation and worker welfare, as those are the relatively good jobs that offer higher wages and greater stability (Emran and Shilpi, 2011; World Development Report, 2006).[2,3] Recent literature in trade also argues that occupation is a crucial dimension where trade affects labor markets (Artuç and McLaren, 2015; Traiberman, 2019; Keller and Utar, 2022). Finally, in developing countries, occupation data are better available and more reliable than income data, and, therefore, provide a better measure of mobility.

The U.S.-Vietnam BTA took effect in December 2001 and was a major trade shock that has been shown to have had a large impact on Vietnam's trade and economic development. Following its implementation, U.S. tariffs on imports from Vietnam decreased from an average of more than 23% to about 2.5%. These significant tariff reductions allowed Vietnam immediate access to the vast and diverse U.S. market. An attractive feature of the BTA shock is that U.S. tariff reductions on their imports from Vietnam were arguably exogenous as those reductions took place just by switching from Column 2 tariffs on imports from socialist countries to Column 1 (MFN) tariffs, the former vector determined through the

[1]In this paper, unless otherwise noted, we refer to " intergenerational occupational mobility" as "mobility" for brevity.

[2]In Emran and Shilpi (2011), Vietnam is considered a "rural" economy with a very large share of workers in agriculture. In our data, this is indeed the case. Until 2016, 44.53% of workers were still working in farm-related sectors.

[3]Relatedly, McCaig and Pavcnik (2018) study the effect of the US-Vietnam Bilateral Trade Agreement (BTA) on job formality in Vietnam and find that the BTA increases the likelihood of Vietnamese workers moving to formal sectors.

Smoot-Hawley Act (1930) and the latter at the GATT's Uruguay Round (1986-94) (McCaig, 2011; McCaig and Pavcnik, 2018). We, therefore, exploit the BTA tariff reductions to identify the impact of trade shocks on the occupational mobility of sons and daughters in Vietnam.

We deliver several key contributions to the literature. First, one of the main gaps in our understanding of trade and inequality is that the literature primarily builds on import liberalization episodes, as these natural experiments are more common in history. In addition, most of our knowledge and analysis of economic inequality focuses exclusively on the change in cross-sectional inequality as an outcome, which could divert attention from persistent social structures (such as caste systems) or economic barriers (such as credit constraints) that prevent new generations from moving out of low-skilled occupations associated with low incomes and poverty. In this paper, we document evidence of the intergenerational impact of an export expansion in a developing country through a partner country's tariff cuts.

Second, we investigate the effect of the BTA on not only *absolute occupational mobility* but also *relative occupational mobility*. While absolute mobility refers to the likelihood that the child's occupation is higher ranked than the parent's, relative mobility is captured by the gradient between the child's and parent's occupation ranks or the responsiveness of the former to the latter (Chetty et al., 2014*a*,*b*). Akin to the concepts of poverty and inequality, studying both the absolute and relative concepts of mobility is important since trade can influence these in opposite directions. To our knowledge, this is the first paper studying the impact of trade, in particular export expansion, on relative occupational mobility as a major outcome of interest.[4]

In addition, we consider gender differences by investigating the effects on both daughter-mother and son-father pairs, whereas the existing work on intergenerational mobility in developing countries focuses mostly on son-father pairs and abstracts away from gender

[4]The only other work we are aware of that looks at the impact of trade (import competition) on relative income mobility is Colantone, Ottaviano and Takeda (2024). However, relative mobility is considered an alternative measure to absolute mobility in their study and serves as a robustness check; we interpret this outcome differently as we review the related literature below.

aspects. It is well-established that international trade has gender-specific effects on wages and employment, specifically working through changes in human capital investments and on fertility, potentially resulting in changes in women's endowments and allocation of their skills, in turn affecting productivity.[5] Abstracting away from these gender disparities within a generation, the extent of which can vary from one generation to next, we also study robustness of our mobility effects by comparing sons and daughters with *the highest-achieving parent* in the household. While an extensive body of work has investigated the effects of trade on gender inequality, to our knowledge, this is the first paper that studies how an export expansion has differential multi-generational effects on men and women in a developing country.

To construct a measure for occupational mobility, we first capture each occupation's skill content with a set of occupation fixed effects and partialling out compositional and aggregate factors from the education of workers in those occupations. We then construct the occupational ranking using these estimates. Our absolute mobility measure is defined as the probability that a child has a better occupation than their parent, similar to Chetty et al. (2017). The measure of relative mobility is based on (inversely related to) the gradient between the child's and parent's occupation ranks (Chetty et al., 2014*a*).[6] We construct our mobility measures for each of the two samples: (a) a sample with son/father pairs and (b) a sample with daughter/mother pairs. We explain how we construct our samples in Section 3.

The empirical model estimating the effect of the U.S.-Vietnam BTA tariff reductions is based on a local labor market approach, as in Topalova (2007), Hasan, Mitra and Ural (2007), McCaig (2011), Kovak (2013), and Hakobyan and McLaren (2016). More specifically, we compare mobility outcomes of children across provinces/central cities, that differ in terms of their initial composition of industries, before and after the implementation of the BTA.[7] In

[5]See, for example, Berik, Rodgers and Zveglich (2004); Black and Brainerd (2004); Menon and Rodgers (2009); Galor and Weil (1996); World Bank (2012).

[6]See Ray and Genicot (2023) for a clear review and explanation of measures of intergenerational mobility.

[7]Provinces and central cities are equivalent administrative units in Vietnam. To simplify the narrative, we use provinces to represent both the actual provinces and central cities in this paper.

addition to comparing the outcomes of an average son and daughter (relative to those of their parents) across provinces, we investigate how the effect varies by age, as the occupational outcomes are expected to vary across the life cycle of individuals with varying cumulative investments in their present occupations.

Summarizing the results on absolute occupational mobility, we are clearly able to reject the null hypothesis of no impact of the BTA on average mobility for the entire period 2001-2015 for sons relative to fathers or daughters relative to mothers for all age groups combined. The BTA clearly increased average mobility for sons and daughters over all age groups combined for our sample of working offsprings within the overall age range of 15-40. For a 1 log point increase in BTA tariff cut, we see 1.47 and 1.3 percentage point increase in absolute mobility for sons and daughters respectively. For an average province that received a 9.2 log point BTA tariff cut, this would mean that mobility would have decreasedinstead if we had the counterfactual of an absence of any BTA tariff reduction.

Digging deeper, the results show that this overall impact masks the heterogeneous impacts for different age groups. Specifically, a reduction in the BTA provincial tariff, defined as a province's initial employment-weighted average BTA tariff relative to its initial employment-weighted average pre-BTA tariff, leads to an increase in the probability of upward intergenerational occupational mobility for sons in the age groups of 15-20, 26-30 and over 30, but for daughters only in the age groups 21-25 and 26-30. The estimates suggest a roughly U-shaped effect for sons and a somewhat inverse-U shaped effect for daughters across the age spectrum, potentially due to some possible overlap of working-age years with peak fertility years and gender differences in educational outcomes. Comparing sons and daughters with the highest-achieving parent, we find significant effects of BTA on upward mobility, albeit smaller in magnitude and precision as expected.

On relative mobility, we find evidence that the BTA has led to a *decrease* in relative occupational mobility for an average son as well as daughter. In particular, we find that the BTA leads to a steepening of the gradient between the child's and parent's occupation ranks for both son/father and daughter/mother pairs for age group 15-20 for both sons and daughters, and age group 21-25 for sons. The degree of gradient steepening due to the BTA amounts to 24% (sons/fathers) and 12% (daughters/mothers) of magnitude compared to the gradients under the counterfactual of no BTA tariff change. The magnitudes of these effects are thus sizable. The results based on the highest-achieving parent samples provide qualitatively similar results with small changes in magnitudes. Our results on relative mobility, combined with the results on absolute mobility, suggest that while the BTA might have led to an increase in absolute mobility for some age groups, it has benefited particularly young sons and daughters born to higher-ranked parents disproportionately more than those born to lower-ranked parents (the rank-rank fitted lines shift up but more so on the higher end).

We explain the divergence in absolute and relative mobility results using the argument in Becker et al. (2018) that in the child's human capital production function, the parent's investment in their child's education and the parent's own human capital are complementary inputs. As a result, higher-skilled parents, i.e., those with higher amounts of human capital, have children who will also be higher-skilled. In Becker et al's one-sector model, if there is more convexity in earnings as an increasing function of human capital where returns increase more than in proportion to human capital (e.g., due to biased technological change), the responsiveness of the child's human capital (or earnings) to the parent's human capital (or earnings) is greater, which means relative mobility is lower. In a two-sector model, opening to trade can similarly generate an increase in the convexity of the earnings function as a function of human capital. Given that greater production for the markets of developed countries requires Vietnam to produce more of their high-end products and improve the quality of their products, one would expect the rate of return on relatively high levels of skills or human capital to increase proportionally more. We find empirical results that are consistent with this theoretical channel.[8] Thus, the responsiveness of the child's human

[8]These results are available in Mitra, Pham and Ural Marchand (2022). We omit these results from this draft for brevity, but they are also available upon request.

capital (or earnings) to parents increase as a result of the BTA tariff cuts. Overall, thus would mean a reduction in relative intergenerational mobility in the presence of an increase in absolute mobility.

Our results on the mechanism through human capital investments are consistent with these findings. To shed light on this channel, we estimate the effect of the BTA on the completed education levels of sons and daughters, as well as on the likelihood of receiving vocational training, which is a novel feature of the VHLSS. The results reveal that sons and daughters living in provinces that received a relatively large BTA shock generally had a higher likelihood of getting a college education, with larger coefficients for daughters. However, the BTA increases the likelihood of vocational training only for sons. Furthermore, higher individual and initial province-level human capital facilitates occupational mobility through the BTA.[9]

Related Literature

Our study first relates to the broad literature on trade, development, and inequality. The literature on trade and inequality has provided empirical evidence that even though trade is beneficial overall, it can raise inequality (see for examples, Harrison, McLaren and McMillan (2011), Verhoogen (2008), Helpman et al. (2017) to name a few). In most of these studies, the main empirical interest is cross-sectional inequality that does not incorporate intergenerational aspects.

Recently, researchers in labor, public, and development economics have extensively studied another dimension of growth and inequality: intergenerational mobility. For instance, for developed countries, Solon (1999), Aaronson and Mazumder (2008), Lee and Solon

[9]Arguably, one of the reasons why Vietnam was able to take full advantage of BTA was because it already had a relatively educated labor force. While Vietnam was classified as a low-income country in 2001 according to the World Bank Country Classification, education spending as a percentage of GNI (3.2%) was much higher than average for low-income countries (2.5%), even for lower-middle-income countries (2.8%), but was comparable to upper-middle-income countries (3.4%). In 2009, Vietnam moved up in the world rankings to the lower-middle-income country category, and by 2015, Vietnam's spending on education as a share of GNI (4.6%) had surpassed all other groups and was comparable to high-income countries (4.5%) (World Bank, 2021).

(2009) and Chetty et al. (2014*a*,*b*) empirically study mobility trends in the U.S. Boserup, Kopczuk and Kreiner (2013) and Corak and Heisz (1999) examine mobility trends in Denmark and Canada, respectively. Long and Ferrie (2013) compare historical occupational mobility rates between Great Britain and the U.S. On developing countries, recent studies include Hnatkovska, Lahiri and Paul (2013) and Asher, Novosad and Rafkin (2024) for India, Lambert, Ravallion and Van de Walle (2014) and Alesina et al. (2021) for Africa, and Xie et al. (2022) for China. In that context, surprisingly few studies look at the link between globalization and intergenerational mobility.

Most related to our study is the work by Ahsan and Chatterjee (2017), which examines the impact of India's trade liberalization on occupational mobility. They find that following India's import liberalization in 1991, sons living in urban districts with greater exposure to import competition were more likely to have better occupations relative to their fathers. The proposed mechanism was that import competition forces firms at or close to the efficiency frontier to innovate, thereby increasing the demand for skilled labor. Their study is the first to examine international trade as a potential determinant of intergenerational mobility. Colantone, Ottaviano and Takeda (2024) study the effect of Chinese import competition from 1991-2007 on measures of income mobility for the U.S. in Chetty et al. (2014*a*). They find that import competition leads to lower mobility in locations most exposed and proposed a theory for their empirical results.[10] While Colantone, Ottaviano and Takeda (2024) focuses on absolute mobility as the outcome of interest, they run a robustness check to examine relative mobility as an alternative outcome, and find that relative mobility in the U.S. also declines due to import competition. As shown theoretically in Becker et al. (2018), relative mobility captures a crucial aspect of intergenerational inequality. However, despite being a key outcome, how international trade affects relative mobility is still a largely unexplored area in the literature.

Our paper is also related to the literature on gender-specific effects of trade and its

[10]Colantone, Ottaviano and Takeda (2024)'s theory is based on path dependence of intergenerational sectoral choice and labor-market mobility frictions.

gender-inequality implications. Trade tends to increase competition and reduce discriminatory practices in a Becker-type framework (see Berik, Rodgers and Zveglich (2004), Black and Brainerd (2004), and Menon and Rodgers (2009)). Keller and Utar (2022) find that female workers respond to a trade shock by increasing the likelihood of marriage and childbirth, leading to long-run losses in labor earnings. Mansour, Medina and Velasquez (2022) find that import competition had longer-lasting negative effects on female workers (compared to male workers) in Peru, while Erten and Keskin (2021) finds that trade liberalization increased domestic violence incidents in Cambodia. Our paper adds to this literature by investigating the gender-specific effects of trade along the intergenerational mobility dimension.[11]

Finally, this paper contributes to the literature on the effects of the US-Vietnam Bilateral Trade Agreement (BTA) on Vietnam's development outcomes. McCaig (2011) and Fukase (2013) are pioneering studies examining the BTA's impact on Vietnam's poverty and labor markets. Follow-up papers include McCaig and Pavcnik (2017), McCaig and Pavcnik (2018), McCaig, Nguyen and Kaestner (2022) and study the outcomes such as structural change, informality, and children's human capital. Our paper adds to this literature by providing evidence that access to export markets can improve absolute intergenerational mobility in developing countries.

2 Background on Vietnam's International Trade

The United States-Vietnam Bilateral Trade Agreement (BTA)

The United States-Vietnam Bilateral Trade Agreement (BTA) took about five years to negotiate and entered into force in December 2001.[12] The trade agreement was negotiated

[11] This paper is also related to the literature on technological improvements in exporting firms that reduce the demand for physical skills (or strength) and thus increase the relative demand for female workers (Juhn, Ujhelyi and Villegas-Sanchez, 2014). On the other hand, sometimes the types of jobs in these exporting firms may not be as suitable for female workers (Bøler, Javorcik and Ulltveit-Moe, 2018).

[12] The primary sources of information for the description of the BTA in this section are STAR-Vietnam (2003) and McCaig (2011).

following the formal normalization of diplomatic relations between the U.S. and Vietnam in 1995. Following the BTA, the most significant change on the U.S. side was to grant Normal Trade Relations (NTR)/Most Favored Nation (MFN) status to Vietnam, allowing Vietnam's exports immediate access to the U.S. market. In exchange, Vietnam made extensive commitments to changing its laws, regulations, and administrative procedures to comply with international trade norms and standards. However, due to its status as a developing country, Vietnam's commitments are "phased-in," meaning they are scheduled for implementation in several years following the BTA. Although Vietnam also committed to cut tariffs for 250 out of more than $6,000$ HS-6 U.S. products, the average tariff reductions were negligible since Vietnam had already applied low tariffs on its imports from the U.S. before the BTA.[13]

Upon being granted NTR/MFN status, Vietnam was moved from "Column 2" to "Column 1" (MFN) of the U.S. tariff schedule. Importantly, although the BTA was subjected to a lengthy negotiation process on both sides, the magnitude of changes to U.S. tariffs on imports of Vietnamese products was largely *predetermined* and not influenced by either U.S. or Vietnam's bargaining positions. In particular, the "Column 2" tariffs are those assigned to nonmarket economies under the Smoot-Hawley Tariff Act of 1930. On the other hand, the MFN tariffs are the tariffs offered to all WTO members by the U.S. and determined through a multilateral bargaining process with other countries long before 2001.[14] To this extent, the BTA tariff reductions by the U.S. on Vietnamese products are plausibly exogenous to any domestic conditions or political processes or forces within Vietnam (see also similar exogeneity arguments in McCaig (2011), Fukase (2013), McCaig and Pavcnik (2018)).[15]

[13] 80% of these 250 tariff concessions were in the agriculture sector.

[14] Upon China's accession to WTO in 2001, China also experienced similar treatment from the U.S., which was exogenous from the U.S. and China's industry perspectives. However, in the case of China, such treatment is interpreted as the removal of trade policy uncertainty rather than an actual trade policy change. See also Pierce and Schott (2016) for details.

[15] Vietnam initiated the Doi Moi reforms in 1986. These reforms included privatization, restructuring of state-owned enterprises, major agricultural reforms including very significant decollectivization, elimination of price controls and movement to a market economy (with liberalization of goods and factor markets), financial reforms in the form of exchange rate and interest rate liberalization, and foreign investment and trade reforms consisting of significant tariff reforms, which continued well into the 1990s and were prior to our sample period. We argue this is not a concern for our identification strategy. These reforms are unlikely to be correlated with industry-level BTA tariffs, which involved a switch by the United States from

The BTA tariff reductions are also large in magnitude. Following the BTA, the ad valorem U.S. tariffs on Vietnam's products went down from an average of 23.4% to 2.5%. The decrease is most significant for the manufacturing sector, from an average of 33.8% to 3.6%, and is much more modest for the agriculture and other primary sectors. As we show next, the BTA was followed by immediate and extensive changes in Vietnam's exports to the U.S. In all of our analyses, we use the BTA tariff data at the 2-digit industry level that matches with Vietnam's industrial classification constructed by McCaig and Pavcnik (2018).[16]

Vietnam's Exports to the U.S. and the Exogeneity of BTA Tariffs

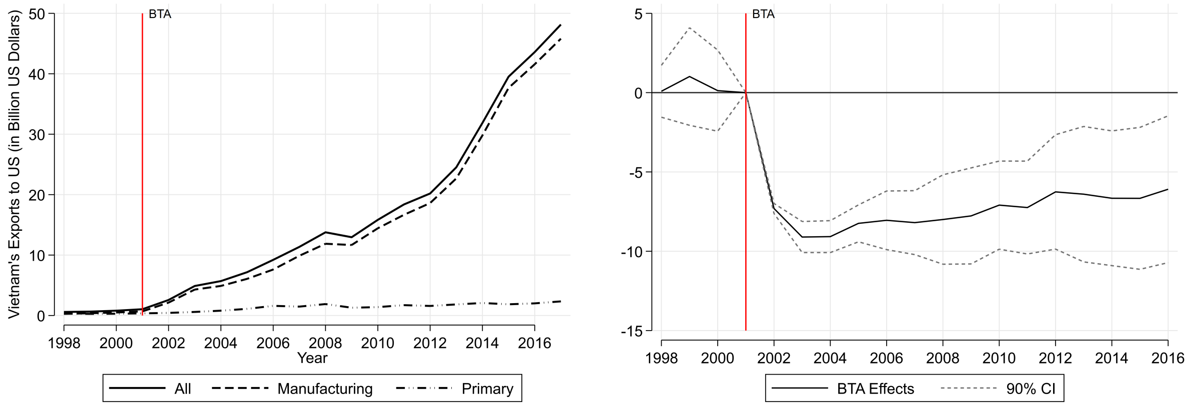
Panel (a) of Figure 1 illustrates Vietnam's export value to the U.S. from 1998 to 2016. Before the BTA, exports to the U.S. were about 1.04 billion U.S. dollars, representing only 6.5% of total exports (and 3.2% of GDP in 2001). In 2002, immediately after the BTA came into force, exports to the U.S. grew to 2.6 billion U.S. dollars, a 2.5-fold increase in one year. By 2016, Vietnam exported 43.6 billion U.S. dollars worth of its products to the U.S., which represented 20% of total exports (and nearly 21% of GDP). Figure 1 shows that manufacturing represents the bulk of the increase in Vietnam's exports to the U.S. The share of Vietnam's manufacturing exports increased from an average of 40% before the BTA to around 87% in 2006 and 92% in 2016, respectively.

To further illustrate the significant effects of the BTA on Vietnam's manufacturing ex-

a historically set vector of their columnn 2 tariffs (on imports from nonmarket economies) to another preset vector of U.S.'s column 1 (MFN) tariffs, and thus were exogenous to any policies in Vietnam. As will be argued in detail later, our shift-share empirical strategy satisfies the conditions on the minimum number of regions (provinces in our case) and industries in Borusyak, Hull and Jaravel (2022) for proper identification, even when industry shares in the shift-share measure are not exogenous, provided that the industry tariffs here are exogenous or as good as random. The results of our pre-trend analysis presented in Appendix F are consistent with this claim.

[16]The reason for this is that the data we use for individual and labor market information (the VHLSS and Vietnam Census) only record industry affiliation of each individual at the 2-digit industry level.

Figure 1: Vietnam's Exports to the U.S. from 1998-2016 following the BTA



(a) Vietnam's Exports to the U.S.

(b) Changes in Vietnam's Manufacturing Exports to the U.S. Due to BTA

Notes: Panel (a) illustrates Vietnam's exports to the U.S. from 1998-2016 for manufacturing and primary sectors (agriculture and mining). All values are in nominal terms. Panel (b) plots the effects of BTA shock on Vietnam's manufacturing exports to the U.S. at 10-digit product levels across years. The effects are obtained from the regression $\ln(Exports)_{ht} = \sum_{y=1998,y\neq 2001}^{2016} \theta_y \mathbb{1}\{y=t\} \times \tau_j^{BTA} + \lambda_h + \lambda_t + \varepsilon_{ht}$, where h is the H.S. 10-digit level product category and τ_j^{BTA} is the BTA tariff change measured at 2-digit industry level. The graphs are based on the authors' calculations with the international trade data from the U.S. Census.

ports to the U.S. and the exogeneity of BTA tariffs, we consider the following regression:

$$\ln(Exports)_{ht} = \sum_{y=1998,y\neq 2001}^{2016} \theta_y \mathbb{1}\{y=t\} \times \tau_j^{BTA} + \lambda_h + \lambda_t + \varepsilon_{ht}, \tag{1}$$

in which $\ln(Exports)_{ht}$ is the log of exports of the 10-digit level product category h in year t (in manufacturing). τ_j^{BTA} is the BTA tariff change measured at 2-digit industry level j, which is computed as the difference between the Column 1 and Column 2 U.S. tariffs. λ_h and λ_t are product and year fixed effects, respectively. We plot the estimates of $\hat{\theta}_y$ in the panel (b) of Figure 1.[17] As demonstrated in Figure 1, the effects of the BTA were immediate and significant. The coefficients imply that a one percentage point reduction in the BTA tariff has led to a 7 to 9 percent increase in exports. The effects are permanent and have

[17] Note that in regression Equation (1), the coefficient at the year 2001 is omitted as the base year (i.e. $\hat{\theta}_{2001} = 0$). Standard errors are clustered two-way at the 2-digit industry and year level.

overall brought about a 180% increase in Vietnam's exports to the U.S. by 2006.[18]

More importantly, our regression results in Figure 1 demonstrate no pretrend at the industry level before 2001. While the BTA has been used as a well-identified shock to study the effects on other outcomes in the previous literature, our regression here further serves as a strong argument for the exogeneity of the BTA tariffs concerning industry domestic outcomes. In later sections, we will utilize such exogeneity as the exogeneity of shifts in our shift-share identification.

We also estimate Equation (1) for female-dominated and male-dominated industries separately, where a female-dominated industry is defined as one where more than 50% of workers are female in VHLSS 2001/2002. The results presented in Figure G1 show that the BTA has led to a larger expansion of exports in female-dominated industries, particularly in the earlier years of liberalization.

WTO Accession in 2007

Between 2001 and 2015, Vietnam implemented another major trade reform following its accession to WTO in January 2007. Upon WTO accession, Vietnam immediately cut average tariffs by about 3 percentage points across all industries. Tariffs had already been cut gradually before Vietnam's WTO accession, where the average tariff went down from 17.3 percentage points to 13.4 percentage points between 1998-2007. In 2008, the average tariff dropped sharply by another 3 percentage point. After a few ups and downs, the average tariff level remained at around 9 percentage points.[19]

There was much expectation about the beneficial prospects of Vietnam's WTO accession at the time (and before) it happened. Pham (2011) and Vo and Nguyen (2009) find that

[18] As a robustness check, we perform a Poisson pseudo maximum likelihood (PPML) regression for a multiplicative form of Equation (1) where exports are included in level. The results virtually do not change.

[19] Accession to WTO was a lengthy process, and Vietnam had been preparing for this event by implementing reforms on three major fronts: (1) administrative procedures, (2) gradual removal of trade barriers, and (3) conformation of their legal system to international trade laws. For our purpose, we focus on the removal of tariffs during Vietnam's accession to the WTO (as a control). Pham (2011) briefly describes these reforms.

Vietnam's imports and inward foreign direct investments (FDI) appeared to have increased due to its WTO accession. However, WTO membership did not seem to impact Vietnamese exports directly. Baccini, Impullitti and Malesky (2019) find that WTO accession increased the productivity of domestic firms but not state firms via import competition. We control for Vietnam's tariffs in our analyses because of the evidence on the impact of increased import competition on intergenerational mobility and other labor-market outcomes in developing countries (Ahsan and Chatterjee, 2017; Topalova, 2007; Hasan, Mitra and Ural, 2007). However, we find that industry-level WTO tariff reductions are not correlated with the BTA tariff reductions, and we find limited evidence that Vietnam's WTO tariff changes are associated with mobility outcomes in our analysis.

3 Vietnam Household Labor Standard Survey

We use eight rounds of the Vietnam Household Living Standards Surveys from VHLSS 2001/2002 to VHLSS 2015/2016 for the analysis. These surveys are representative and implemented biennially by Vietnam's General Statistics Office. The VHLSSs contain rich information on household- and individual-level demographics, employment, household expenditures, health, and other aspects. For each VHLSS round, the recall period for expenditures and employment modules is 12 months, meaning that answers to their questionnaire inform us about what happened during the most recent 12-month period.[20] For brevity, we provide more detailed information on data and descriptive statistics in Appendix A and refer the reader to this section for survey details.[21]

Using the VHLSS rounds, we construct two samples to measure mobility for two separate groups. The first sample focuses on son-father pairs, where each son represents a unit of

[20]This detail is important for our subsequent analyses on the impacts of the BTA because the BTA came into force in December 2001. This means that VHLSS 2001/2002 captures information in the pre-BTA period. See also McCaig (2011) and McCaig and Pavcnik (2018).

[21]The earlier but smaller surveys, Vietnam Living Standard Surveys (VLSSs) 1992/93 and 1997/98 are not comparable, and, thus, are not used in the analysis. Details on the VLSS rounds are also available in the Appendix A.

observation, and the second sample focuses on daughter-mother pairs, where each daughter represents a unit of observation. The inclusion of females in our analysis improves upon previous related work in developing countries where the focus is on males, and mobility for daughters is not considered (Hnatkovska, Lahiri and Paul (2013), Ahsan and Chatterjee (2017)). Unlike many other developing countries, female household heads are prevalent in Vietnam, with about 25% of the households reporting a female as the household head. We thus identify the mother and father in the data as the household heads or the spouses of the household heads.

In our construction of son-father and daughter-mother pairs, we include both biological as well as in-law children. Except for the VHLSS 2001/2002 survey round, the household survey data do not contain enough information to clearly distinguish between biological and in-law children. But according to the VHLSS 2001/2002 survey round, data indicate that the share of sons-in-law of all sons in our working sample is 3.47%, whereas the corresponding share of daughters-in-law of all daughters is 25.37%, therefore it is crucial to include in-laws as we are interested in gender differences in mobility outcomes. It also allows more consistent comparisons between son-father and daughter-mother pairs as the co-resident likelihood is expected to differ between biological sons and daughters. More importantly, as the in-law children are also likely to reflect the socio-economic status of the next generation in a household overall (as marriages are likely to take place between families of similar socio-economic status), understanding their mobility pattern is of interest.

Our final working samples are comprised of sons/daughters aged between 15 and 40. Following the common practice in the intergenerational mobility literature, the sample is truncated at 40 since the parents of those aged above 40 are more likely to have retired, which can potentially bias our subsequent analyses. Also, the majority of the second generation workers in our sample are within this age range. As our main outcome of interest is occupational mobility, our samples are restricted to son-father and daughter-mother pairs in which both members simultaneously participate in the labor market.

Table 1: Summary Statistics

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	2001	2003	2005	2007	2009	2011	2013	2015
					Sons			
Years of Education	7.28	7.91	8.23	8.63	8.80	9.02	9.34	9.45
Urban	0.16	0.16	0.17	0.17	0.19	0.20	0.21	0.23
Age	21.61	21.82	22.32	22.60	22.88	23.41	24.28	24.83
Minority	0.20	0.22	0.22	0.23	0.26	0.27	0.26	0.26
Father's Education	6.03	6.36	6.43	6.48	6.60	6.56	6.80	6.70
Father's Age	51.73	51.60	51.90	52.01	51.80	51.94	52.88	53.28
					Daughters			
Years of Education	7.18	7.77	8.18	8.57	8.75	9.11	9.49	9.70
Urban	0.16	0.17	0.18	0.19	0.21	0.22	0.24	0.25
Age	21.40	21.41	21.91	22.15	22.42	23.11	23.89	24.39
Minority	0.21	0.23	0.24	0.27	0.29	0.26	0.26	0.28
Mother's Education	4.76	5.25	5.31	5.53	5.49	5.74	6.00	5.92
Mother's Age	49.74	49.33	49.76	49.78	50.09	50.80	51.67	51.97

Notes: The table presents summary statistics based on seven rounds of Vietnam Household Living Standard Survey from 2001/2002 to 2015/2016. Sons and daughters between the ages of 15 to 40 are included in the analysis. Appendix Figure B1 illustrates the age distributions of the child and parent across households in our raw samples

The summary statistics for the sons and daughters samples are presented in Table 1. In 2001, sons had an average of 7.28 years of education, which rose to 9.45 years by 2015. Similarly, daughters saw an increase in the average number of years of education from 7.18 to 9.70. The share of sons and daughters living in urban areas increased from 16 to approximately 25 percent, reflecting the broader trend in urbanization rates in Vietnam. Fathers generally had higher levels of education than mothers, although the education gap decreased between 2001 and 2015. Additionally, both fathers' and mothers' average ages (as well as those of sons and daughters) have increased over this period. Because our samples only include sons and daughters who are in the labor market, higher years of schooling would mean that they participate in the labor market later in life, increasing the average age. Similarly, the share of minorities increases over time in our sample as more minority individuals enter the labor force.

For an important robustness check on our results, we also create additional mobility measures by comparing sons and daughters to their parents with the highest occupation ranks (the higher of the two between mother and father), regardless of gender.

4 Measuring Intergenerational Occupational Mobility

Skill Content of Occupations

Our first task is to construct a ranking of occupations. Conceptually, we generally think of a "good job" as one with a high skill intensity/requirement, measured based on information about the education level of workers within each occupation. A commonly used method is to compute an education index for each occupation, using the average education level, and rank occupations based on this index (Hoffmann, 2010; Ahsan and Chatterjee, 2017). We improve upon this approach by capturing each occupation's skill content, and then performing pairwise statistical tests to distinguish between occupations. This allows us to rank the occupations based on their skill intensity, ensuring that the ranking satisfies statistical dominance.

Specifically, for the set of occupation $o \in O$, we estimate a vector of fixed effects μ_o from the following regression that capture occupation o's skill content:

$$Edu_{iopt} = \sum_{o \in O} \mu_o + \mathbb{Z}'_{it}\alpha + \lambda_{pt} + \varepsilon_{it}, \tag{2}$$

where Edu_{iopt} is the education level of individual i, having occupation o, living in province p in survey year t. $\mathbb{Z}'_{it}$ is a vector of individual characteristics, comprising age, age squared, and gender. λ_{pt} is the vector of province-by-year fixed effects, which we partial out to control for common local demand or supply shocks in affecting skill content, and ε_{it} is an error term. Education is measured by years of education completed, including years in K-12 school, vocational training, and college. This will help us distinguish, for example, workers who complete grade 8 versus workers who complete grade 5 only or workers who complete vocational training versus those who finish college. We use the full sample of workers aged between 15 and 65 and the survey weights for this estimation.

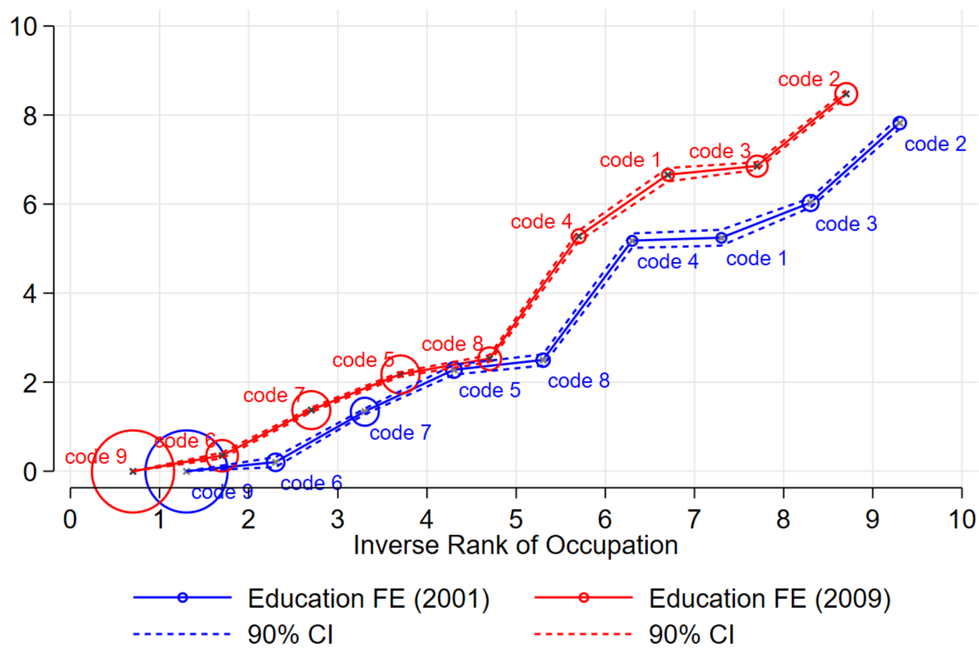
To consistently compare the skill content, our approach treats occupations as clustered bins along a continuous skill distribution. It ranks them based on skill level at each bin, after partialling out individual characteristics and province-year fixed effects. The VHLSSs have consistent 2-digit occupation codes within two periods: 2001-2007 and 2009-2015, but the occupation classification was updated in the 2009 survey round, which resulted in some overlaps and differences across occupations between the two periods.[22] We address this by estimating the rankings within each period and constructing the mobility measures for each son-father and mother-daughter pair in each period. To remove any additional concern that our occupational ranking can change over time, we use the data in VHLSS 2001/2002 to construct the rankings for the period 2001-2007 and the data in VHLSS 2009/2010 for the period 2009-2015. Whenever mobility outcomes across periods are compared, we remove any level differences with a set of year-fixed effects.

We construct our mobility measure in several steps: first, we estimate Equation (2) to obtain the coefficients for occupation fixed effects within each period using VHLSS 2001/2002 and VHLSS 2009/2010. For our absolute mobility measure, we then conduct pairwise t-tests at 5% significance level on the estimated fixed effects coefficients to determine if they are statistically distinct. Children and parents who are matched with different occupations are assigned a mobility indicator depending on the results of these tests.[23] For relative mobility,

[22]This is not a concern at the more aggregate 1-digit occupation codes. In the previous version of this paper (Mitra, Pham and Ural Marchand, 2022), we use the 1-digit occupation codes and find similar results, but we can add several findings based on this improved measurement, including results on relative mobility. The 1-digit codes might be too aggregate, especially at the bottom of the skill distribution. Thus, we choose to move further to the 2-digit level and construct rankings using a more rigorous statistical procedure.

[23]For example, in Figure C1, occupation code 11 (officials in the National Assembly, including people's councils at all levels) is not statistically distinguishable from neighboring codes such as 31, 33, 34 (mid-level professionals in natural sciences and technologies, life and health sciences, education and training,

Figure 2: Skill Intensity Ranking and Distribution of Employment across 1-digit ISCO Occupations



Notes: The figure shows occupation fixed effects, their ranking, and the distribution of workers based on Equation (2) across 1-digit ISCO occupations for illustration purposes. 2001 rankings are applied to period 2001-2007 and 2009 rankings are applied to period 2009-2015. The ranks are inverse, so a higher number means a better occupation. The fixed effect for the lowest-ranked occupation is normalized to zero. The list of occupations are:

1-Leaders	2-High-Level Professionals
3-Technicians and Associate Professionals	4-Clerical Support Workers
5-Services and Sales Workers	6-Agriculture, Forestry and Fishery (Skilled) Workers
7-Crafts and Related Trades Workers	8-Machine Operators and Assemblers
9-Elementary Occupations	

since the occupations cannot be binned when there are multiple ties, we use the raw rankings and bypass the t-test results.[24]

For illustration purposes, Figure 2 shows the estimated occupation fixed effects, their

respectively). In Figure C2, occupations 63 (Labourers in agriculture, fisheries, hunting, and collection of farm produce for self-subsidy) and 92 (Low-skilled labourers in agriculture, forestry, and fisheries) are not distinguishable, but 63 and 93 (Workers in mining, construction, industry, and transport) are distinguishable. The pairwise t-tests help to improve the mobility measure, but we also find qualitatively similar results without using the tests.

[24]One could ex ante choose a way to bin these occupations, but to avoid this more complex issue and consequent difficult decisions (for instance, based on pairwise t-tests, when occupation A and B are tied, occupation B and C are also tied, but A and C are not), we decided to proceed with the ranking that does not use the t-tests, at the cost of perhaps noisier rankings for relative mobility.

ranking, and the distribution of workers across the 1-digit International Standard Classification of Occupations (ISCO) occupations for the two periods 2001-2007 and 2009-2015.[25] As can be seen in the figure, the fixed effects for occupations are precisely estimated and remain stable across the two periods. The top occupation category is (2) High-level Professionals. This category includes jobs such as scientists, high-level experts in technical fields, and high-level experts in life and health sciences. The subsequent categories are (3) Technicians and Associate Professionals and (1) Leaders. The next group of occupations are (4) Clerical Support Workers, (8) Machine Operators and Assemblers, (5) Services and Sales Workers, and (7) Crafts and Related Trade Workers with education levels indicating that they generally completed secondary schooling. The final occupation group comprises (6) Agricultural, Forestry, and Fishery (Skilled) Workers and (9) Elementary Occupations. The stability of estimated fixed effects and ranking at a 1-digit level assures that our approach can capture the essence of the skill content for each occupation. We observe some heterogeneity in the skill content of 2-digit occupations within and across 1-digit groups, such as the group (1) Leaders, (4) Clerical Support Workers, (5) Services and Sales Workers, and (7) Crafts and Related Trade Workers, as illustrated in Figures C1 and C2. Our main analysis will capture this heterogeneity at the 2-digit occupation level.

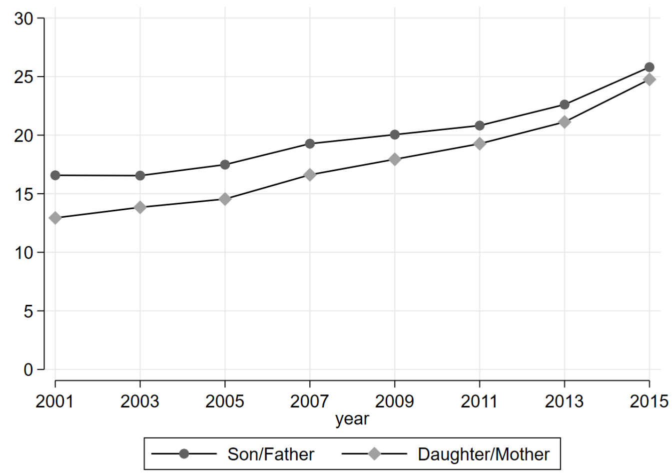
Absolute Mobility

With the rankings of occupations, we construct an indicator variable of upward absolute occupational mobility $Upward_i$. Here, we use the definition most well-known in the literature; see, for example, in Chetty et al. (2017).[26] In particular, in the son-father database, this indicator equals 1 if the son i works in a higher-ranked occupation than his father and equals 0 otherwise. Similarly, in the daughter-mother database, this variable indicates observations with a value of 1 where the daughter i has a higher-ranked occupation than her mother.

[25]The more disaggregated 2-digit version described above, which we use for our subsequent analyses, are presented in Figures C1 and C2 in the Appendix. In all of these figures, we normalize the fixed effect for the lowest-ranked occupation to zero.

[26]See also explanation and a related measure in Ray and Genicot (2023).

Figure 3: Absolute Occupational Mobility from 2001 to 2015



Notes: Figure presents upward occupational mobility as a fraction of sons/daughters that have higher skilled occupations than their fathers/mothers each year. The working sample is restricted to sons/daughters aged between 15 and 40 who are in the labor market.

Specifically, upward mobility is defined as follows:

$$Upward_i = \begin{cases} 1 & \text{if } \text{ child's occupation is ranked higher than parent's,} \\ 0 & \text{otherwise.} \end{cases} \tag{3}$$

The above definition applies to our sample of sons or daughters who co-reside with their parents. One concern is that the BTA may have affected the probability that working-age sons or daughters live independently from their parents. We do not find evidence supporting the endogeneity of co-residence (see Section 5.3). On the other hand, to the extent that more successful children are more likely to live independently, we would tend to underestimate the degree of mobility. Thus, such scenarios would generally bias our results towards zero rather than inflate them.

Figure 3 shows aggregate upward occupational mobility statistics, measured as a share of sons/daughters with better jobs than their fathers/mothers each year. We observe gradual increases over time for both genders, with a faster increase for daughter/mother pairs. In particular, the probability that a son has a better occupation than his father increases from 16.6% to 25.8% during the period 2001-2015, corresponding to a 9.2 points increase. Meanwhile, the probability that a daughter has a better occupation than her mother rises from 12.9% to 24.8% during the same period, 11.9 points increase from a lower baseline.

Relative Mobility

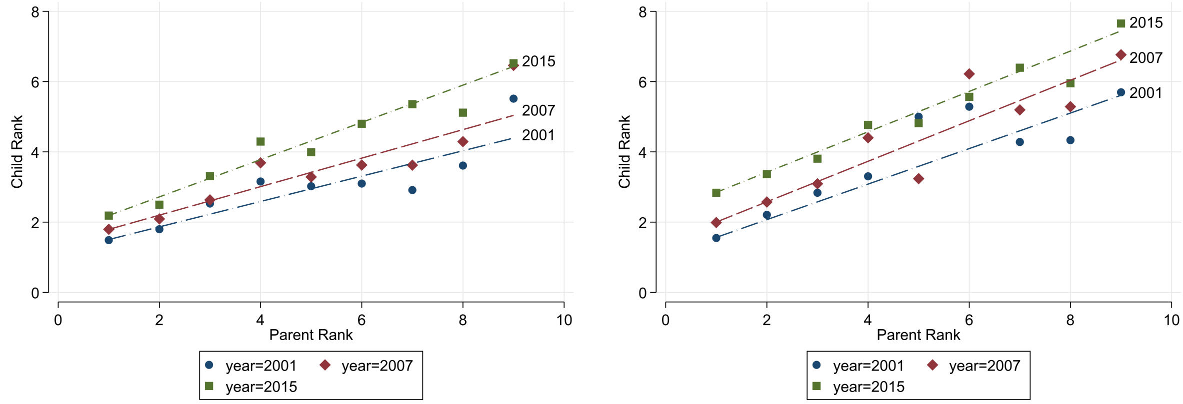
Using the constructed ranking of occupations, we also measure the degree of relative mobility. Defined analogously to relative income mobility in Chetty et al. (2014*a*), relative occupational mobility captures the difference in occupation ranks between children born to top versus those born to bottom-occupation parents. We measure relative mobility by the rank-rank gradient of sons'/daughters' occupational ranks with respect to those of fathers'/mothers'. A steeper gradient indicates lower relative mobility, while a flatter gradient indicates higher relative mobility.[27]

Figure 4 shows the rank-rank gradient of sons'/daughters' and fathers'/mothers' occupational ranks based on 1-digit ISCO occupations across the years 2001, 2007, and 2015. In both panels (a) and (b), the figure suggests a relatively steep gradient of Vietnamese children's with respect to parents' occupation ranks (indicates relatively low relative mobility). Our formal estimates at the 2-digit occupation level, which we show in Section 6, suggest the overall gradients in our samples for son/father and daughter/mother pairs are 0.357 and 0.434, respectively. These estimates are higher than the income rank-rank gradient estimates for some developed countries (about 0.341 for the cohort born 1980-1982 in the US, 0.180 for Denmark, and 0.174 for Canada for similar cohorts).

Our analysis of relative mobility over time reveals a consistent decline, evidenced by steepening rank-rank gradients for both son/father and daughter/mother pairs in our sample period. This is especially true for the son/father sample, with slopes getting steeper from 2001 to 2015, while for the daughter/mother sample, the slope gets steeper from 2001-2007 but sees a slight decrease between 2007-2015. The steeper rank-rank gradient (combined

[27]The intercept captures the expected occupation rank for children of the bottom occupation parents.

Figure 4: Relative Occupational Mobility between 2001-2015



(a) Son/Father (b) Daughter/Mother

Notes: The figure presents the rank-rank gradient of sons'/daughters' and fathers'/mothers' occupational ranks based on 1-digit ISCO occupations. Note that the ranks are inverse, so a higher number indicates a better occupation. See Figure 2 for occupation codes and titles corresponding to the ranks.

with the upward shift) suggests that over time, while all children have seen some improvement in their occupation, the children born to the top occupation parents see the most improvement. On the other hand, children born to the bottom parents remain stuck at the bottom occupations or see relatively less improvement.

The measurement of relative mobility concludes our measurement part. With these measures in hand, our next step is to study the effect of BTA on these mobility measures.

5 Impact of the BTA on Absolute Mobility

5.1 Theoretical Considerations on Trade and Absolute Mobility

Using the parlance of international trade theory, in the high-skilled and low-skilled labor space, Vietnam's factor endowment places it within the diversification cone consisting of Food and Light Manufactures, with Light Manufactures expected to be more skill-intensive than Food, which means that the country specializes in these two groups of goods under trade. With the U.S. lying in a much more skilled labor-intensive diversification cone consisting of heavy manufactures and high-end services. Consequently, a trade pattern emerges where the U.S. then imports light manufactures and maybe some food from Vietnam.

Our data show that under the BTA, the biggest tariff reductions by far by the U.S. were on imports of manufactures from Vietnam. Thus, we can think, for simplicity, that tariffs were reduced mainly on imports of light manufactures (the type of manufactures Vietnam exports). This increases the world price of light manufactures faced by Vietnam, since, as a result of this tariff reduction, Americans demand more of these Vietnamese light manufactures. Alternatively, we can think of Vietnam having a bigger market for their light manufactures as a result of tariff reductions by the U.S. This, by the well-known Stolper-Samuelson theorem, leads to an increase in the demand for high-skilled relative to low-skilled labor and, in turn, an increase in the relative wage of high-skilled labor, which is the ratio of high-skilled wage to low-skilled wage, w_H/w_L.

An increase in w_H/w_L leads to an increase in the returns to human capital or skills. This increases the incentive to invest in human capital, as a result of which parents increase their investment in the human capital of their children. Thus, the partner country U.S.'s tariff liberalization (the BTA), through an increase in w_H/w_L in Vietnam, leads to more individuals acquiring skills in Vietnam, facilitating intergenerational occupational mobility, as in the next generations more skilled workers than merely the offsprings of current ones will emerge in equilibrium. Even if the offspring of highly high-skilled workers have an advantage in acquiring human capital over others, there will be others (additional people) acquiring skills in the new equilibrium, thereby contributing to enhanced intergenerational mobility. In other words, even if all offsprings of high-skilled workers become high-skilled, the additional demand will create the need for some offsprings of low-skilled workers to also become high-skilled, and that will constitute an increase in absolute intergenerational mobility.

The above channel is a minor modification of the one highlighted in the well-known model of trade and endogenous human capital by Findlay and Kierzkowski (1983). This is also consistent with economic intuition in a more recent theory of intergenerational mobility by Becker et al. (2018). The Becker et al. (2018) model also generates theoretical results consistent with our results on the impact of the BTA on relative intergenerational mobility, which we explain and present in Section 6.

5.2 Measuring the BTA Exposure

Our empirical approach compares changes in the fractions of sons/daughters within provinces who have experienced upward mobility (relative to their parents) before and after the BTA and are exposed differentially to the BTA shock due to differences in the initial composition of employment in provinces. We adopt a local labor market approach that is widely used in international trade and labor literature. In particular, following Hasan, Mitra and Ural (2007), McCaig (2011), Topalova (2010) and Kovak (2013), we exploit provincial variation in the BTA exposure arising from differences in the initial industrial employment structure across provinces. Our measure of provincial exposure is as follows:

$$\tau_p^{BTA} = ln(1 + \tau_p^{MFN}) - ln(1 + \tau_p^{\text{Column 2}}) < 0, \tag{4}$$

where τ_p^{BTA} is the BTA tariff exposure of province p. τ_p^{MFN} and $\tau_p^{\text{Column 2}}$ are the provincial MFN and "Column 2" tariffs respectively, defined as:

$$\tau_p^X = \sum_j s_{jp} \times \tau_j^X, \tag{5}$$

where $X \in \{MFN, \text{Column 2}\}$ and τ_j^X is the US tariff measure for industry j.[28] The share s_{jp} captures the variation in initial industrial structures across provinces and is computed

[28]Note that all tariffs are measured in percent and smaller than 1. we take the natural log of $(1+x)$ here, instead of the natural log of x, and all tariffs are small in values (see map below), so $ln(1+x) \approx x$. Taking the natural log of $(1+x)$ here merely to provide a scale for provincial tariffs, a constructed variable.

as:

$$s_{jp} = \frac{\sum_i w_{ijp}}{\sum_{k,m} w_{kmp}}, \tag{6}$$

where w_{ijp} and w_{kmp} are individual weights. In this equation, i, k index individual and j, m index industry. We use the 3% Vietnam Census data in 1999 obtained from IPUMS to construct the initial industry shares.[29] In economic terms, s_{jp} represents the employment share of industry j within province p before our sample period.[30] Similar to Hasan, Mitra and Ural (2007) and Kovak (2013), yet slightly different from McCaig (2011) and Topalova (2010), we compute the employment shares only within traded industries (scaled exposure) rather than including the non-traded sectors. This empirical approach is grounded in a specific-factors model of a local economy as suggested by Kovak (2013).[31] The identification in our empirical approach can be motivated by both the exogeneity of the industry-level BTA tariff changes and predetermined industry shares across provinces, as demonstrated in Borusyak, Hull and Jaravel (2022) and Goldsmith-Pinkham, Sorkin and Swift (2020), which we discussed more below.

Figure 5 illustrates a map of Vietnam's provinces/central cities with variation in the BTA exposure. In the figure, lighter areas were exposed to smaller BTA tariff cuts. Across 60 provinces and central cities, the BTA tariff exposure, measured as provincial tariff reductions in Equation (4), ranges from 7.09 log points to 26.41 log points, with average BTA tariff exposure across provinces being 9.28 log points.[32] The top-4 BTA exposure locations are Ho Chi Minh City, Da Nang, Binh Duong, and Thua Thien-Hue, while the bottom-4 BTA exposure locations are Ca Mau, Ha Giang, Lai Chau, and Bac Kan. As is clear from the map, the Red River Delta, Central Coast, and Mekong Delta are among the regions that

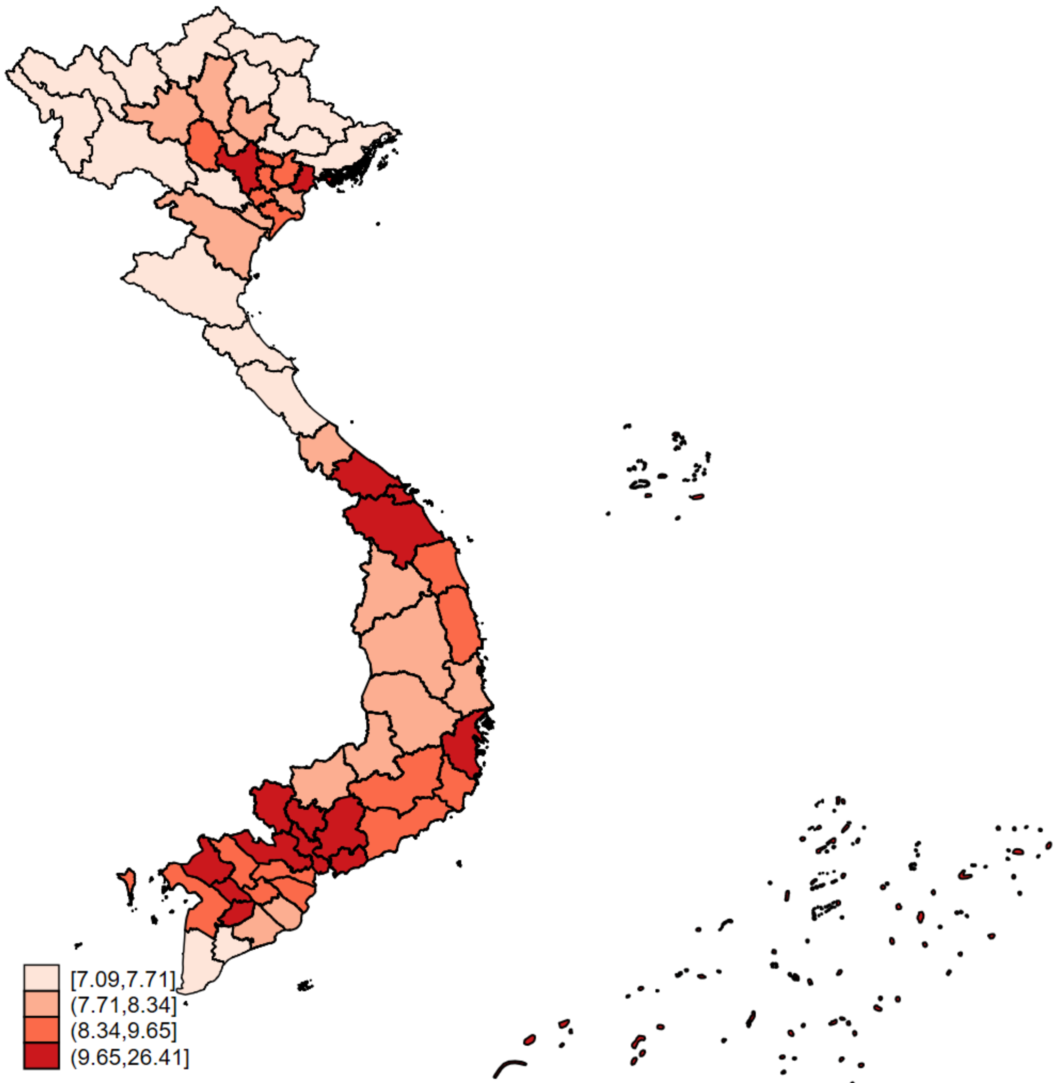
[29] See for details of the IPUMS data Ruggles et al. (2024).

[30] As in Equation (2), we restrict our sample in Equation (6) to workers aged between 15 and 65 recorded in the 1999 Census.

[31] Similar to Kovak (2013), we find that including the non-traded sectors in the BTA exposure computation magnifies our estimates of the effects of BTA and makes these estimates more statistically significant.

[32] Prior to 2003, Vietnam had 61 provinces and central cities. From 2003 to 2008, several provinces were split into smaller administrative units, and this number increased to 64. From 2008 until now, the number has decreased to 63 due to an administrative merger of Hanoi and Ha Tay. We concord provinces to a common code with 60 provinces across survey years.

Figure 5: The BTA Exposure across Vietnam's Provinces and Central Cities



Notes: The BTA exposure is measured as the weighted average of tariffs in which the weights are employment shares of the various traded industries within each province/central city, computed from 3% Vietnam Census Data in 1999 obtained from IPUMS, following Equation (5). Traded industries comprise industry codes ranging from 1 to 34 using Vietnam's industrial classification system (industry codes 40, 74, 92, 93 are excluded). The top-4 BTA exposure locations are Ho Chi Minh City, Da Nang, Binh Duong, and Thua Thien-Hue. The bottom-4 BTA exposure locations are Ca Mau, Ha Giang, Lai Chau, and Bac Kan.

have been exposed the most to the BTA shock. BTA exposure is much smaller for inland provinces in the northern and central mountainous areas.[33]

5.3 Identification and Selection Considerations

In this paper, we exploit exogenous changes in BTA tariffs at the industry level in combination with initial differences in industrial composition across provinces to identify the effects of BTA on mobility. Borusyak, Hull and Jaravel (2022) and Goldsmith-Pinkham, Sorkin and Swift (2020) provide two sufficient conditions for identification in the shift-share design, the former based on the exogeneity of industry-level shocks (treating industry shares as weights) and the latter based on the exogeneity of initial industry shares (treating industry shocks as weights). In our application, the strongly exogenous nature of the BTA industry tariffs provides an argument for identification aligned with the shift-share framework proposed in Borusyak, Hull and Jaravel (2022). We have 24 two-digit industries and 60 provinces, with the average employment share of an industry within a province being sufficiently small ($\approx$ 0.04), which makes it ideal for this empirical design. In their simulation, Borusyak, Hull and Jaravel (2022) suggest that their identification approach performs well with 20 two-digit industries and regions as few as 25. We do better than this along each of the two dimensions. Under these conditions, industry shares do not need to be exogenous if the tariffs are exogenous or as good as random. This should apply to local labor market conditions as reflected in intergenerational mobility outcomes.

Our measure of BTA exposure is the same as that in the literature that uses this episode of trade liberalization to study how exports affect Vietnam's domestic outcomes, for exam-

[33]The exposure map suggests that southern provinces might be exposed more to the BTA tariffs and thus may drive some of our subsequent results. We check the heterogeneity in our subsequent analysis by splitting the sample North and South of the 17th parallel (due to the historical division of the country in 1954 and reunification in 1975) and find BTA effects in both North and South Vietnam. The BTA effects on outcomes are surprisingly stronger and very significant in the North. While qualitatively similar in terms of signs, they are not as statistically significant for the South. The reason is that there is considerably greater variation in BTA tariffs across the northern provinces as compared to the southern provinces even as BTA tariff cuts were deeper on average for the latter. Institutional differences are certainly very important, and we believe that they are certainly worth exploring in a separate paper.

ple, McCaig (2011), McCaig and Pavcnik (2018), McCaig, Nguyen and Kaestner (2022). These studies provided some additional arguments for identification. In particular, they demonstrate absence of correlation between the BTA tariff exposure and pre-BTA changes in outcomes using the Vietnam Living Standard Surveys (VLSS) 1992/1993 and 1997/1998. As we described in the Appendix A, the VLSSs have a markedly different sampling design compared to the VHLSS; in addition, the occupation codes in VLSS 1992/1993 are also different from VLSS 1997/1998, even at the aggregate 1-digit level. Nevertheless, in Table F1 we provide the results of the pre-trend check using VLSS 1997/1998 and VHLSS 2001/2002 (pre-BTA periods), with occupational mobility based on 1-digit occupation codes, as only at the 1-digit occupation level are the VLSS 1997/98 occupational codes comparable to the VHLSS (VLSS 1992/1993 codes are not comparable or consistent with these). Our BTA exposure variable is uncorrelated with upward absolute mobility outcomes in 1998 (relative to 2001). Thus, trends in the outcome variable in the pretreatment period are not correlated with the BTA shock. In other words, these results show that there are no underlying pre-trends. However, we should not fully rely on this exercise, given differences in sample design between VLSS and VHLSS, as mentioned above. Therefore, additionally at the industry level, similar to McCaig and Pavcnik (2018), we have shown in Section 2 that the BTA tariffs are not correlated with exports in pre-BTA years. All of the above in combination with the checks on this front provided by the previous literature give us confidence that our BTA exposure measure provides suitable and virtually exogenous variation for our identification.

Although measuring mobility using occupation data significantly alleviates incomplete-data issues (relative to income data) in developing countries, some selection considerations for our mobility measure also warrant highlighting. The first potential bias to consider is that the BTA might affect the likelihood of a child co-residing with parents, which might affect our mobility measure because children who live independently from their parents might be more (or less) likely to have better occupations and, thus, higher (or lower) mobility. The selection bias can go in both directions. On one hand, trade liberalization could make it more

Table 2: Selection on Household Composition and Cohabitance

	(1) Household Size	(2) Number of Working-Age Adults	(3) Cohabitance
Dependent Variable: Household Characteristic			
$PostBTA_t \times \tau_p^{BTA}$	-0.458	-0.025	0.069
	(0.849)	(0.411)	(0.167)
Observations	317,099	317,102	317,103
R-squared	0.070	0.283	0.050
Initial Traded Share × Year Dummies	✓	✓	✓
Province Fixed Effects	✓	✓	✓
Year Fixed Effect	✓	✓	✓
Clustering Province-Year	✓	✓	✓

Notes: This table presents regression results at the household level where the dependent variables are defined as household size, number of working-age adults in the households and cohabitance, where cohabitance is defined as an indicator variable on whether more than two working-age adults in the households.***p<0.01, ** p<0.05, * p<0.1.

likely for young adults to move away from their parents (and potentially more so for better occupations). On the other hand, trade liberalization could also increase the likelihood of co-residing if trade-induced demand changes make housing or other aspects of independent living more expensive. To check for this potential bias, we run a series of regressions that test the effect of BTA on household size, number of working-age adults in the households, and cohabitance, where cohabitance is defined as an indicator variable on whether more than two working-age adults live in a household. These results are shown in Table 2. We find that BTA did not have a significant effect on these outcomes.

Since our later analysis also explores the effects of BTA by age groups, we also examine here the possibility that these biases could operate differently across age groups, specifically regarding the co-residing choice. In Table 3, we define a cohabitation indicator as equal to one for a household with more than two working-age adults and that has at least one member of the household within each age group. Defining these indicators this way allows us to check whether an individual within that age group co-resides with at least two other adults and allows for consistent comparison across age groups.[34] We again do not find that

[34]Working-age adults are individuals aged between 18 and 65.

Table 3: Selection on Cohabitance for Different Age Groups

	(1) Age 15-20	(2) Age 21-25	(3) Age 26-30	(4) Age $\geq$ 31
Dependent Variable: Cohabitance Indicator				
$PostBTA_t \times \tau_p^{BTA}$	-0.162	-0.195	0.065	0.082
	(0.136)	(0.149)	(0.102)	(0.167)
Observations	317,103	317,103	317,103	317,103
R-squared	0.040	0.026	0.015	0.050
Initial Traded Share × Year Dummies	✓	✓	✓	✓
Province Fixed Effects	✓	✓	✓	✓
Year Fixed Effect	✓	✓	✓	✓
Clustering Province-Year	✓	✓	✓	✓

Notes: This table presents regression results at the household level. Cohabitance is defined as an indicator variable for a household with more than two working-age adults and that has at least one member of the household within each age group. ***p<0.01, ** p<0.05, * p<0.1.

the potential cohabitance selection operates differently across age groups.

A limitation of the VHLSS data is that it is a repeated cross-sectional survey and does not include questions on migration. Using Census data, McCaig, Nguyen and Kaestner (2022) finds that modest migration effects are present for younger groups. Assuming that migrants are more likely to be upwardly mobile and positively selected on education or occupation, this would imply our estimates constitute a lower bound on the true effect.

In addition, mobility measures based on occupation codes capture individuals presently participating in the labor market. At any given cross-section, individuals decide between working, obtaining more education, or staying out of the labor market, where the opportunity cost and potential benefits of each of these options determine the equilibrium outcome observed in the survey. This issue appears in almost all studies that measure mobility based on survey data (arguably a more severe problem using income data).[35] In some studies, selection-on-observables approaches are employed, but no perfect solution exists due to the lack of an instrument for labor market participation (Hnatkovska, Lahiri and Paul, 2013;

[35]The measurement literature, particularly in developed countries, often requires high-quality administrative data (Dahl and DeLeire, 2008; Chetty et al., 2014*a*).

Ahsan and Chatterjee, 2017). We follow this approach. In our analysis, we control for a vector of demographic characteristics that can influence the labor market decision, and we control for children's education attainment to see whether the BTA affects occupational mobility through the choice of education. In doing so, we assume that our vector of controls can capture labor market participation decisions, and we consider the choice of education as a potential channel rather than a selection issue.

5.4 Empirical Specification

To examine the impact of the BTA on intergenerational occupational mobility, we begin with a baseline difference-in-differences (DID) model specified as follows:

$$Upward_{ipt} = \theta \times PostBTA_t \times \tau_p^{BTA} + \kappa \tau_{pt}^{VN} + X'_{ipt}\beta + \delta_t s_p + \lambda_p + \lambda_t + \varepsilon_{ipt}. \quad (7)$$

where $Upward_{ipt}$ is an upward mobility indicator for son/daughter i in province p and year t, defined as in Equation (3). τ_{pt}^{VN} is Vietnam's import tariff change following WTO accesssion in 2007 for province p in year t and is defined as $\tau_{pt}^{VN} = Post_t^{WTO-2007} \times \ln(1+\sum_j s_{jp} \times \Delta\tau_j^{VN})$ where $\Delta\tau_j^{VN}$ is the change in Vietnam's applied tariff between 2007 and 2009 for industry j. The inclusion of τ_{pt}^{VN} controls for the province-level import protection and potential effects of Vietnam's WTO accession in 2007 as described in Section 2. X_{ipt} is a vector of demographic and household controls including age, age squared, father/mother's age, father/mother's age squared, marriage status, urban status, minority status, household size, share of male members within the household, number of working-age adults, and the cohabitance indicator. λ_p and λ_t are province and year fixed effects, respectively. Denoting the initial share of tradable industries in province p's employment by s_p, along with a time-varying coefficient δ_t, we capture the time-varying effect of this initial share by the term $\delta_t s_p$. In other words, this interaction term captures the impacts of the interactions between the initial share of tradable industries in each province's employment and the various year dummies. Given traded industries do not account for the same proportion of employment across provinces, it is important to condition on the differential changes over time in provinces with different initial traded sector shares in employment. Standard errors are clustered at the province-by-year level, which is the level of variation of the BTA shock. In this model, identification is obtained by comparing the changes in the fractions of sons (or daughters) who have experienced upward mobility across provinces before and after the BTA, and who are exposed differentially to the BTA shocks due to differences in the initial industrial composition of provinces.

The impact of the BTA on intergenerational occupational mobility is expected to vary over the life cycle as individuals gain experience and advance in the workforce over the course of their working years. As individuals age, they are also less likely to switch occupations if they have already invested a substantial part of their working-age years in their occupations. To gain insight into how the effects may vary over the life cycle, we allow the effect of BTA to vary by age groups of sons and daughters. The age groups are defined in about 5-year intervals starting from the earliest working age, 15. Since, ex ante, one does not expect much mobility variation over age 30, we group together individuals over 30 years old.

The worker's attachment to their present occupation and their capacity to respond to new incentives are an important determinant of how BTA can influence mobility. These factors are closely tied to age. The individuals below the age of 21 might not have achieved their full potential in terms of their education level and occupation. For instance, they may be temporarily working in a lower-skilled job to pay their bills while going to school part-time, leading to likely display lower observed upward mobility. For individuals over 30, the capacity to respond may be limited. During the first period (2001-07), they were mostly beyond college age by the time the BTA was agreed upon, which lead to limited opportunities to enhance their education levels in response to the BTA. Many in this age bracket during the second period (2009-2015), particularly those over 35, would still have had limited opportunities to enhance their education and skills by the time the BTA was signed. We, thus, expect those above 30 to display a limited increase in mobility during our entire sample period as a result of the BTA.[36]

McCaig and Pavcnik (2017) show that export liberalization led to export expansion and movement from the informal to the formal sector from the end of the 1990s until almost the end of the first decade of the 2000s. Clearly, this meant that there was a movement from low-paying, low-education jobs to higher-paying, higher-education jobs, potentially leading to intergenerational mobility attributable to forces generated by the BTA. We control for sectoral shifts over time to the extent that the share of tradable sector employment varies across provinces and over time, as a function of initial employment share. There, of course, could be some remaining variation in sectoral shifts that may be associated with or even explain our results. It is important to mention in this context that several structural changes were uncovered by McCaig and Pavcnik (2017) for the period 1990-2008. As they show, from the late 1990s to 2008, Vietnam's share of its workforce in agriculture went down from 70% in the late 1990s to 54% by 2008. During the same period, McCaig and Pavcnik show that the manufacturing sector's share went up from 8% to 14% and the service sector's share from 18% to 32%. This meant a significant move to more productive sectors, which propelled overall growth. They also document that jobs in manufacturing grew by 10 percent annually, with specific sectors like garments and office/computing machines reaching job growth rates of 15% and 30% respectively.

Our first main parameter of interest, θ in Equation (7), captures the average effect of the BTA on intergenerational occupational mobility. More precisely, it measures the effect of a change in provincial exposure relative to the average province and to the pre-BTA period on the change in intergenerational occupational mobility. Since the BTA shock involves tariff reductions, a negative θ suggests a positive effect of the BTA on outcomes.

[36] An alternative approach would allow the impact of the BTA to vary by birth cohorts. However, the trade liberalization occurs at the beginning of the available survey samples; thus, the younger birth cohorts are a very small to nonexistent part of the sample during the early part of our sample period, while the reverse is the case in the later years of our sample. Therefore, the timing of the BTA and available years for VHLSS rounds makes identification by birth cohort difficult, especially while controlling for cohort or cohort-by-year effects.

Table 4 presents the results for absolute occupational mobility for sons and daughters. Column (1) presents the results for the full sample (Equation (7)) and Columns 2 to 5 present the results in split samples according to age groups. The estimates for θ in Column (1) of Panel A indicate that the BTA had a significant and positive effect on absolute mobility for sons compared to their fathers, and that provinces more exposed to BTA tariff cuts experienced a greater increase in mobility. In particular, the coefficient -1.466 shows that a 1 log point decrease in the BTA provincial tariff leads to a 1.466 percentage point additional increase in the probability of upward occupational mobility. However, this average effect conceals a distinct U-shaped pattern across different age groups. The impact was strong and statistically significant for the youngest sons (age 15-20) who spent more of their school-age years under the BTA regime, and for older age groups (age 26-30 and age $\geq$31) who may have accumulated more work experience under the BTA regime. However, the BTA had no statistically significant effect on the mobility of sons in the 21-25 age group. For the age groups 15-20 and 21-25, the impacts may be underestimates due to higher schooling rates among these groups. We explore this point further in Section 7

The analogous estimates for the daughter-mother sample are presented in the Panel B of Table 4. Unlike the U-shaped pattern observed for sons, the benefits for daughters were concentrated among those in their prime working years. The effect of BTA on absolute mobility was statistically insignificant for the youngest (15-20). Again, this underestimation may be due to higher schooling rates of girls in this age group and the potential true impact with no selection bias due to schooling may be stronger. For the same reason, there may be some underestimation in the case of the age group 21-25 as well. The largest effect was experienced by women in the age group 26-30, potentially due to completing fertility by that age in a developing country. The previous age group (21-25) shows some but a considerably weaker effect, as many complete their intended education by that age and only some may have also completed their fertility by the end of this age interval, in addition to underestimation stemming from selection effects. Finally, the effect for the oldest daughters

(≥31) was insignificant.

Table 4: The Effects of the BTA on Absolute Occupational Mobility

	(1) All	(2) Age 15-20	(3) Age 21-25	(4) Age 26-30	(5) Age≥31
Dependent Variable: Upward Mobility					
	Panel A: Son-Father				
$PostBTA_t \times \tau_p^{BTA}$	-1.466**	-1.497***	-1.004	-1.718*	-2.193**
	(0.634)	(0.579)	(0.741)	(0.958)	(0.908)
τ_{pt}^{VN}	-1.295	-2.027	1.662	0.865	-5.379*
	(1.677)	(2.342)	(1.678)	(2.539)	(2.768)
Observations	76,816	29,168	26,450	14,628	6,570
R-squared	0.113	0.071	0.117	0.149	0.158
	Panel B: Daughter-Mother				
$PostBTA_t \times \tau_p^{BTA}$	-1.307**	-0.501	-1.327**	-3.025***	-1.101
	(0.646)	(0.893)	(0.594)	(0.914)	(1.061)
τ_{pt}^{VN}	-2.504	-2.976	-1.525	-2.143	-0.894
	(1.702)	(2.097)	(2.164)	(2.966)	(2.971)
Observations	59,829	26,055	19,493	9,212	5,069
R-squared	0.195	0.119	0.207	0.221	0.199
Household and Individual Controls	✓	✓	✓	✓	✓
Initial Traded Share × Year Dummies	✓	✓	✓	✓	✓
Province Fixed Effects	✓	✓	✓	✓	✓
Year Fixed Effects	✓	✓	✓	✓	✓
Clustering Province-Year	✓	✓	✓	✓	✓

Notes: This table presents estimation results for equation (7) based on eight rounds of VHLSS from 2001 to 2015. The household and individual level controls include age, age squared, father/mother's age, father/mother's age squared, marriage status, urban status, minority status, household size, share of male members within the household, number of working-age adults, and the cohabitance indicator. ***p<0.01, ** p<0.05, * p<0.1.

We also check our results by comparing sons and daughters to their parents with the highest occupation ranks (the higher of the two between mother and father), regardless of gender. We expect the results to generally weaken, as the occupational rank of the best parent will be higher, making it harder for the younger generation to surpass it. Results presented in Table D1 show that, compared to the highest achieving parent, the effect of BTA becomes slightly smaller and less precise, particularly for sons. However, the overall effect was significant, suggesting that the BTA was effective at helping young men and women break from their family's occupational background, regardless of the gender disparity in the previous generation.

It is possible that the BTA improves upward mobility while not having the mirrored effect on downward mobility. In addition to these robustness checks, we investigate the effect of BTA on absolute downward mobility and find evidence that the BTA leads to a decrease in downward mobility across the board. This is consistent with the effect of BTA that "lifts up" the average child in terms of occupational opportunities. The results presented in Appendix Table E1 show that BTA reduced downward mobility for sons aged 26-30 and those over 30, and for daughters aged 26-30. However, when all age groups are combined, the effect of BTA on downward mobility is not statistically significant. These results suggest that the improved likelihood of upward mobility for all age groups combined has mainly come through a reduction in the likelihood of no mobility in either direction and not through a reduced likelihood of downward mobility.[37]

6 Impact of the BTA on Relative Mobility

Theoretical Considerations on Trade and Relative Mobility

Relative mobility is often described in the literature as a measure of intergenerational persistence of inequality, captured by the rank-rank gradient between children and parents' socio-economic status. Whether the BTA affects relative mobility depends on whether it affects this rank-rank gradient.

Becker et al. (2018) present a model that looks at the determinants of relative mobility. They assume that the level of human capital of the offspring is a function of investment by the parent in the child's education as well as the parent's own human capital, these two

[37] We would like to thank our discussant, Kristina Manysheva, for recommending adding these results to strengthen the paper.

inputs being complementary to each other. As a result of this complementarity, higher-skilled parents (those with higher human capital) will have children who are also going to be higher-skilled, and more affluent parents will have richer children, in terms solely of each generation's own earnings.

Suppose that in this environment there is a shock that leads to an increase in the rate of return to human capital that is greater at higher levels of human capital, then there is an increase in the convexity of earnings as a function of human capital. Opening to trade through the BTA can be such a shock for Vietnam, given that greater production for the markets of a developed country requires Vietnam to produce more of their high-end products and improve their quality further, both of which require high levels of skills or human capital. We will then get bigger intergenerational increases in human capital at higher levels of human capital of parents. This could happen even if increases in human capital are experienced intergenerationally at each level of parent's human capital. Thus, we would see a reduction in relative intergenerational mobility concurrently with a possible increase in absolute mobility. This is analogous to poverty going down in the face of rising inequality, a common phenomenon in many developing countries.

Empirics of the BTA's Effects on Relative Mobility

We empirically investigate the effect of BTA on the rank-rank gradient by the following regression:

$$\begin{aligned} ChildRank_{ipt} =& \gamma_1 ParentRank_{ipt} + \gamma_2 \times PostBTA_t \times \tau_p^{BTA} \\ & + \gamma_3 \times PostBTA_t \times \tau_p^{BTA} \times ParentRank_{ipt} \\ & + \kappa \tau_{pt}^{VN} + X'_{ipt}\beta + + \delta_t s_p + \lambda_p + \lambda_t + \varepsilon_{ipt} \end{aligned} \quad (8)$$

In this specification, $ChildRank_{ipt}$ and $ParentRank_{ipt}$ are the inverse ranks of child's and parent's occupation. We use the inverse rank so that a higher number reflects a better occupation (as in Figure 4). γ_2 captures the effect of the BTA on the intercept of the rank-rank fitted line. γ_3 captures the effect of the BTA on the slope of the rank-rank gradient, our parameter of interest. A negative γ_3 indicates an increase in the slope due to the BTA.

Table 5: The Effects of the BTA on Relative Occupational Mobility

	(1) All Ages	(2) All Ages	(3) Age 15-20	(4) Age 21-25	(5) Age 26-30	(6) Age≥31
Dependent Variable: Child Rank						
	Panel A: Son-Father					
Parent Rank	0.357***	0.287***	0.073***	0.313***	0.403***	0.422***
	(0.009)	(0.018)	(0.017)	(0.022)	(0.032)	(0.046)
$PostBTA_t \times \tau_p^{BTA}$		-8.876	-7.471	-5.385	-23.412*	-20.978
		(7.127)	(7.176)	(9.224)	(13.414)	(13.889)
$PostBTA_t \times \tau_p^{BTA}$ × Parent Rank		-0.739***	-1.029***	-0.432**	-0.317	0.029
		(0.183)	(0.192)	(0.213)	(0.306)	(0.374)
Observations	76,816	76,816	29,168	26,450	14,628	6,570
R-squared	0.368	0.369	0.310	0.340	0.329	0.300
	Panel A: Daughter-Mother					
Parent Rank	0.434***	0.387***	0.177***	0.454***	0.511***	0.367***
	(0.013)	(0.025)	(0.032)	(0.029)	(0.059)	(0.071)
$PostBTA_t \times \tau_p^{BTA}$		-5.602	7.059	-13.317	-15.406	-6.735
		(11.181)	(11.105)	(12.625)	(17.228)	(19.093)
$PostBTA_t \times \tau_p^{BTA}$ × Parent Rank		-0.509**	-0.987***	0.289	0.280	-0.772
		(0.244)	(0.353)	(0.268)	(0.590)	(0.647)
Observations	59,829	59,829	26,055	19,493	9,212	5,069
R-squared	0.386	0.387	0.376	0.371	0.330	0.304
τ_{pt}^{VN}	✓	✓	✓	✓	✓	✓
Household and Individual Controls	✓	✓	✓	✓	✓	✓
Initial Traded Share × Year Dummies	✓	✓	✓	✓	✓	✓
Province Fixed Effects	✓	✓	✓	✓	✓	✓
Year Fixed Effects	✓	✓	✓	✓	✓	✓
Clustering Province-Year	✓	✓	✓	✓	✓	✓

Notes: This table presents estimation results for Equation (8) based on eight rounds of VHLSS from 2001 to 2015. The household and individual level controls include age, age squared, father/mother's age, father/mother's age squared, marriage status, urban status, minority status, household size, share of male members within the household, number of working-age adults, and the cohabitance indicator. ***p<0.01, ** p<0.05, * p<0.1.

The results are presented in Table 5 for the son-father sample in the first panel and the daughter-mother sample in the second panel below it. As in the case of absolute mobility, we control for household characteristics, Vietnam's tariff reduction upon its WTO accession, the interactions between the initial tradable employment share in each province and the various year dummies, province fixed effects and year fixed effects. Standard errors are once again clustered at the province-by-year level, which is the level of variation of the BTA shock.

Column 1 shows that a 1-rank improvement in the parent's occupation results in a 0.36 rank improvement for the son and 0.43 rank improvement in the case of the daughter. As previously mentioned, these overall estimates are similar in order of magnitude but higher than the income rank-rank gradient estimates for some developed countries (about 0.341 for the cohort born 1980-1982 in the US, 0.180 for Denmark, and 0.174 for Canada for similar cohorts).[38] As is clear, the gradient estimates are higher for daughter/mother pairs as compared to father-son pairs, indicating that overall relative mobility, which is low for Vietnam as a whole, is especially low for women.

Focusing on the coefficient γ_3, columns (2), (3), (4), (5) and (6) show that the BTA significantly increases the rank-rank gradients (as indicated by the negative sign of this statistically significant coefficient) for all age groups taken as a whole (within the age range of 15-40) for sons and for their individual age groups 15-20 and 21-25. The BTA does not have a statistically significant impact for the older age groups of sons. For daughters, there is also a similar overall effect for the whole sample as well as for the youngest age group. For the higher age groups, the effect is statistically insignificant. In particular, the overall effects of the BTA on gradients are captured by $-0.739 \times \tau_p^{BTA}$ and $-0.509 \times \tau_p^{BTA}$ for the son-father and daughter-mother samples respectively. Interpreting these results, between a province that sees no BTA tariff cut counterfactual and that sees an average BTA tariff change (-9.2 log points or $\tau_p^{BTA} = -0.092$), the BTA increases gradients by 0.07 for son/father and 0.05 for daughter/mother pairs, respectively. This is about 24% and 12% of the base gradient under no BTA tariff change (γ_1 in column (2), which are very sizable effects.

In Table D2 in the appendix we provide results of the relative mobility regressions based on comparing the rank of the son or daughter with that of the higher achieving of the

[38]For estimates for the developed countries, see Chetty et al. (2014*a*), Boserup, Kopczuk and Kreiner (2013), Corak and Heisz (1999).

two parents. The results remain qualitatively unchanged, with only modest changes in magnitude. The reduction in relative mobility due to the BTA again is concentrated in the younger age groups, showing up in a statistically significant way for the overall sample as well. In other words, the results on the impact of the BTA on relative mobility are robust to using the higher achieving parent for the rank-rank comparison with their offspring.

Summarizing the results in this section, the effect of BTA in decreasing relative mobility for the overall sample is substantial in magnitude. This effect is driven by the relatively younger workers both in the case of sons and daughters, but especially in the case of the latter. The older age groups do not see any change in relative mobility as a result of the BTA (as indicated by the statistically insignificant coefficient of γ_3 in their cases), the level of relative mobility being already low to begin with. Thus, while, overall, the offsprings of top-ranked parents benefit disproportionately from the BTA (to strengthen the intergenerational rank-rank association), breaking the sample into age groups, the increase in absolute mobility within any age group is also never accompanied by an increase in relative mobility within that age group. The positive association between the occupation ranks of parents and offsprings either remains preserved or becomes stronger. In other words, even if absolute intergenerational mobility is positively affected by the BTA, this effect is never, on average, stronger by a big enough margin for sons and daughters of poorer and less-educated parents than those of richer and more educated ones to weaken the intergenerational rank-rank association.

These results, combined with the results on absolute mobility, offer an interesting picture of the effect of the BTA on intergenerational occupational mobility: while the BTA has helped to increase absolute mobility for most age groups among working sons, it has also led to a significant decline in relative mobility among younger working sons. The results are qualitatively similar for daughters, even though slightly different in the details. Thus, on average, sons/daughters born to parents with higher occupation ranks benefit disproportionately more from the BTA relative to the sons/daughters born to parents with bottom occupation ranks.[39]

7 The Human Capital Channel

How do the education levels respond to the BTA shock? To understand the education channel, we start by estimating the following equation:

$$\begin{aligned} Edu_{ipt} = \theta \times PostBTA_t \times \tau_p^{BTA} + \kappa \tau_{pt}^{VN} + X'_{ipt}\beta \\ + \delta_t s_p + \lambda_p + \lambda_t + \varepsilon_{ipt} \end{aligned} \tag{9}$$

where the Edu_{ipt} indicating the highest education level of the individual i in province p, year t, and the control variables X_{ipt} includes age, age squared, father/mother's age, father/mother's age squared, marriage status, urban status, minority status, household size, share of male members within the household, number of working-age adults, and the cohabitance indicator. This model examines the differential effect of the BTA on the likelihood of the highest education level reported in the VHLSS: primary school, secondary school, high school, and college education.[40]

In addition, the VHLSS survey offers a significant advantage by including a crucial variable: whether the individual participated in *vocational training*, which aims to bridge formal education and the labor market. It might play a key role in allowing youth and adults to acquire skills that are in high demand in expanding export-oriented industries, contributing to upward mobility. The Vocational Education and Training (VET) is a fairly large program in Vietnam with 2.6 million admissions in 2016, which corresponds to about 4.8% of the labor force (National Institute for Vocational Education and Training, 2016). Unlike the

[39]For estimates for the developed countries, see Chetty et al. (2014*a*), Boserup, Kopczuk and Kreiner (2013), Corak and Heisz (1999).

[40]Here, we define an indicator for each variable as elementary ($5 \leq$grade < 9), secondary ($9 \leq$grade < 12), high school (grade$= 12$). The college education and the vocational training variables are already reported as indicator variables in the data. In results not reported, the effects allowed to vary by age group were consistent with the main results. We report the main results for brevity.

other education variables, vocational training in Vietnam can be pursued at any point after primary school and thus is not mutually exclusive to other degrees.

The results presented in Table 6 show that the BTA significantly restructured educational incentives for both sons and daughters, leading individuals towards higher levels of education. For sons, results show that the BTA reduced the likelihood of having only primary or secondary school education, as evidenced by positive and significant coefficients. This is consistent with sons having a higher incentive not to stop at lower levels of schooling. Concurrently, we find a negative and significant coefficient for college education, indicating that the BTA increased the probability of college education for sons.

This pattern is also observed for daughters. While there is no statistically significant BTA-induced effect on primary schooling, the BTA significantly reduced the likelihood that daughters would only have secondary education. This result was accompanied by a large and highly significant BTA-induced increase in the probability of completing a college degree. Overall, the evidence shows that the BTA shock has disincentivized individuals from stopping their education at basic schooling and has pushed them into higher education. This is consistent with an increased relative demand for skills and a higher skill premium due to trade. Another potential channel is through household incomes; with a BTA-induced increase in household incomes, and assuming education is a normal good, the older generation may have more resources to invest in children's human capital

Interestingly, the BTA has increased the likelihood of receiving vocational training only for sons, whereas the effect was insignificant for daughters (column 5). This is intuitive as the top five occupations following vocational training were traditionally male-dominated occupations, such as welding, industrial electrics, metal cutting, automotive technology, and air conditioning (National Institute for Vocational Education and Training, 2016). Our results on the effects of the BTA on the educational attainment of sons and daughters are consistent with recent results in McCaig, Nguyen and Kaestner (2022) using VHLSS data from 2001/2002 to 2007/2008, in which they find that the BTA leads to a slight increase in the

Table 6: The Effect of BTA on Completed Education

	(1) Primary	(2) Secondary	(3) High School	(4) College	(5) Vocational Training
Dependent Variable: Education Indicator					
			Sons		
$PostBTA_t \times \tau_p^{BTA}$	0.691*	1.230**	-0.162	-0.531***	-0.965**
	(0.354)	(0.607)	(0.299)	(0.190)	(0.426)
Observations	76,816	76,816	76,816	76,816	76,816
R-squared	0.082	0.069	0.119	0.105	0.096
			Daughters		
$PostBTA_t \times \tau_p^{BTA}$	0.026	0.990*	0.407	-0.805***	-0.072
	(0.418)	(0.532)	(0.310)	(0.202)	(0.466)
Observations	59,829	59,829	59,829	59,829	59,829
R-squared	0.095	0.105	0.122	0.150	0.069
τ_{pt}^{VN}	✓	✓	✓	✓	✓
Household and Individual Controls	✓	✓	✓	✓	✓
Initial Traded Share × Year Dummies	✓	✓	✓	✓	✓
Province Fixed Effects	✓	✓	✓	✓	✓
Year Fixed Effect	✓	✓	✓	✓	✓
Clustering Province-Year	✓	✓	✓	✓	✓

Notes: The dependent variables are indicator variables for having completed primary, secondary, high school education, college education, or vocational training. Vocational training can be pursued anytime after primary school. Regressions include controls for including age, age squared, father/mother's age, father/mother's age squared, marriage status, urban status, minority status, household size, share of male members within the household, number of working-age adults, and the cohabitance indicator. Standard errors are clustered at the province-by-year level. ***p<0.01, **p<0.05, *p<0.1

likelihood of school enrollment and a significant rise in educational expenditures, conditioning on enrollment. Our results add to their findings by looking at completed schooling levels, including college education and vocational training and investigating over a longer time period.

We then return to our intergenerational mobility model in Section 5 to investigate whether the mobility results are primarily driven by improving education levels in response to the BTA. In Table 7 column (1), we allow the effect of the BTA to vary by the education level of individuals. The results show that higher education levels are associated with greater BTA-induced increases in upward mobility, with coefficients increasing along the education spectrum. This result is consistent with lower relative mobility as the BTA induced greater increases in upward mobility for individuals with higher levels of education. In addition,

Table 7: Upward Mobility by Individual and Province-Level Education

	(1) K-12 and College	(2) Vocational	(3) Initial Province-level Education
Dependent Variable: Upward Mobility			
		Sons - Fathers	
$PostBTA_t \times \tau_p^{BTA}$	-0.711	-1.182**	-0.484
	(0.619)	(0.597)	(0.602)
$PostBTA_t \times \tau_p^{BTA} \times$ Primary	-0.314***		
	(0.113)		
$PostBTA_t \times \tau_p^{BTA} \times$ Secondary	-0.436***		
	(0.151)		
$PostBTA_t \times \tau_p^{BTA} \times$ High School	-0.628***		
	(0.191)		
$PostBTA_t \times \tau_p^{BTA} \times$ College	-0.907***		
	(0.215)		
Vocational		0.136***	
		(0.022)	
$PostBTA_t \times \tau_p^{BTA} \times$ Vocational		-0.052	
		(0.213)	
$PostBTA_t \times \tau_p^{BTA} \times$ Initial Province Edu			-0.347***
			(0.103)
Observations	76,816	76,816	76,816
R-squared	0.140	0.147	0.140
		Daughters-Mothers	
$PostBTA_t \times \tau_p^{BTA}$	-0.250	-1.042*	-0.624
	(0.575)	(0.563)	(0.637)
$PostBTA_t \times \tau_p^{BTA} \times$ Primary	-0.627***		
	(0.130)		
$PostBTA_t \times \tau_p^{BTA} \times$ Secondary	-0.743***		
	(0.138)		
$PostBTA_t \times \tau_p^{BTA} \times$ High School	-0.753***		
	(0.144)		
$PostBTA_t \times \tau_p^{BTA} \times$ College	-0.875***		
	(0.215)		
Vocational		0.132***	
		(0.019)	
$PostBTA_t \times \tau_p^{BTA} \times$ Vocational		-0.284	
		(0.176)	
$PostBTA_t \times \tau_p^{BTA} \times$ Initial Province Edu			-0.202**
			(0.093)
Observations	59,829	59,829	59,829
R-squared	0.235	0.243	0.235
τ_{pt}^{VN}	✓	✓	✓
Household and Individual Controls	✓	✓	✓
Initial Traded Share × Year Dummies	✓	✓	✓
Province Fixed Effects	✓	✓	✓
Year Fixed Effect	✓	✓	✓
Clustering Province-Year	✓	✓	✓

Notes: The dependent variable is an indicator variable that takes the value of 1 if the son/daughter is in a higher-ranked occupation than his/her corresponding father/mother. The household and individual level controls include age, age squared, father/mother's age, father/mother's age squared, marriage status, urban status, minority status, household size, share of male members within the household, number of working-age adults, and the cohabitance indicator ***p<0.01, ** p<0.05, * p<0.1

the magnitudes are generally higher for daughters, which may be partially because the BTA impacts on exports were more pronounced in female-dominated industries (as shown in Appendix Figure G1). Note that these coefficients show effects relative to those who do not have any formal education, even a primary education.

Next, we investigate the effect of vocational training in column (2). The positive and significant coefficient on the indicator for vocational training suggests that this is an important contributor to upward mobility in Vietnam for both sons and daughters. However, the interaction with BTA is insignificant for sons and weakly significant for daughters. This shows that while the BTA increased the likelihood of acquiring vocational training for sons (as shown in the previous table), it did not lead to any increase in upward mobility of such sons through their vocational training. It could be that they were substituting years of formal schooling with years of vocational training. In the case of daughters, the likelihood that they would obtain vocational training did not increase due to the BTA (as shown in the previous table), but vocational training does contribute to upward mobility, as evidenced by a positive and significant coefficient.

Finally, we investigate whether the effect of the BTA varied by the initial levels of education within provinces. While the BTA induced a labor demand shock, translating it to intergenerational mobility outcomes requires a labor force that has the capacity to absorb this shock. In Column (3), we differentiate provinces with respect to their initial education levels (a proxy for province-level educational infrastructure). The results show that sons and daughters in initially more educated provinces were indeed able to benefit more from the BTA shock.[41]

[41]Here, we use initial education level as a continuous measure. As a robustness test, we also run the regressions by splitting the sample by provinces with higher/lower than the median level of initial education and found similar results: higher than median education provinces see bigger effects of the BTA.

8 Concluding Remarks

In this paper, we study the impact of a large and exogenous export shock, namely the US-Vietnam Bilateral Trade Agreement (BTA), on intergenerational occupational mobility in Vietnam, a small and rapidly developing economy. We measure occupational mobility and examine BTA's effects on absolute and relative mobility for both sons and daughters. We find that the BTA leads to an increase in upward absolute mobility for sons in the under-20 and over-25 age groups and daughters in their 20s. The effects are sizable in that mobility may have decreased in the absence of the BTA. On the other hand, we find that the BTA also leads to a decrease in relative mobility for the relatively younger working sons and daughters, with the BTA steepening the rank-rank gradients between 24% and 12% for sons and daughters respectively, suggesting that children born to top-ranked parents benefit disproportionately more compared to those born to bottom-ranked parents. We also find that the BTA generally benefits daughters slightly more than sons in terms of mobility outcomes.

As a key mechanism through which the BTA affects intergenerational mobility, we examine the effects on the acquisition of human capital. We find that sons and daughters with high human capital levels of their own and/or residing in provinces with high average human capital levels see greater increases in absolute upward mobility. We also find that college education for sons and daughters and vocational training for sons have increased due to the BTA. These results are consistent with the theoretical mechanism proposed by Becker et al. (2018), adapted for a trade shock of the kind we are studying, where the export shock lifts all boats regarding occupational opportunities but more so for the offspring of the top-ranked parents.

To our knowledge, our study is the first to uncover the result of a reduction in relative mobility along with an increase in absolute mobility due to an export expansion, and our extension to the gender dimension is an important departure from the existing literature.

Our findings have several important implications. First and most importantly, our paper shows that trade may help overcome frictions, social structures, or barriers that impede intergenerational mobility. Trade opens new opportunities for younger generations, leading to more upward absolute mobility. However, the playing field is not getting leveled, as implied by the decline in relative mobility. This is an important impact of trade that is not well-studied in the trade and development literature. Second, if trade can promote mobility and help high-ability individuals obtain better jobs, it can generate additional long-term gains through a more efficient allocation of human capital and move a country's mobility pattern out of an undesirable equilibrium. However, the declining relative mobility is likely to increase inequality and, hence, class conflict. In the case of a developing country with a non-negligible level of poverty, a policy shock that reduces poverty, even at the cost of increasing overall inequality, can be quite desirable. Similarly, a policy that increases absolute mobility at the cost of reducing relative mobility can be considered desirable, at least at the early to middle stages of development.

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Online Appendix

A Description of the VHLSS

Our main data source is the Vietnam Household Living Standard Surveys (VHLSS) series from 2001/2002 to 2015/2016. The stated goals of the VHLSSs are to "monitor systematically the living standard of Vietnam's societies" and to "exercise the monitoring and assessment of the implementation of the Comprehensive Poverty Alleviation and Growth Strategy defined in Country Strategy Paper approved by the Government Prime Minister" (World Bank, 2015). Additonally, the VHLSSs also "serve the evaluation of realization of the Millennium Development Goals and the Socio-economic Development Goals set out by Vietnamese Government" (see also in World Bank (2015)). These surveys are designed and implemented with UNDP and the World Bank technical assistance. In this paper, we use the VHLSS demographic and employment modules.

Table A1 provides information on the size of our datasets.[42] In each round of the VHLSS, about 45,000 households are interviewed. However, due to current data restrictions from Vietnam's GSO, for two of the rounds, we only have access to samples of about 30,000 households (for the 2001 round) and 9,000 households (for the 2011 round). Breaking down using the urban-rural criterion, the fraction of households in urban areas increases over time, from 23% in 2001 to 30% in 2015. Furthermore, the average household size decreases significantly over time, from about 4.5 heads per household in 2001 to 3.8 heads per household in 2015. In terms of individuals in the sample, the fractions of males and females remain relatively balanced, with the share of males being about 50% across years.

Table A2 illustrates the allocation of workers across occupational categories over time according to the International Classification of Occupations (ISCO 2008).[43] In 2001, more

[42]We refer to the survey rounds by the first year the survey was initiated for brevity.

[43]The occupational codes in VHLSS are consistent with ISCO 2008 at the one digit, although we used the concordance table to build a complete concordance. These concordances are available upon request. The subsequent analyses in the paper are based on the 2-digit occupational classification.

Table A1: Number of Households and Individuals in VHLSSs across Years

	2001	2003	2005	2007	2009	2011	2013	2015
				Household Level				
Urban	6,909	11,240	11,520	11,760	13,245	2,703	13,905	13,890
	(23%)	(24%)	(25%)	(26%)	(28%)	(29%)	(30%)	(30%)
Rural	22,621	34,670	34,425	34,185	33,750	6,696	33,090	32,490
	(77%)	(76%)	(75%)	(74%)	(72%)	(71%)	(70%)	(70%)
No. of Households	29,533	45,910	45,945	45,945	46,995	9,399	46,995	46,381
Average Household Size	4.5	4.4	4.3	4.2	4.0	3.9	3.8	3.8
				Individual Level				
Male	65,535	99,655	96,835	93,965	91,165	18,034	89,089	86,162
	(50%)	(49%)	(49%)	(49%)	(49%)	(49%)	(49%)	(49%)
Female	66,849	102,930	100,300	97,467	94,531	18,621	91,830	89,079
	(50%)	(51%)	(51%)	(51%)	(51%)	(51%)	(51%)	(51%)
No. of Individuals	132,385	202,585	197,135	191,432	185,696	36,655	180,919	175,242

Notes: Calculated by authors using eight rounds of the Vietnam Household Labor Standard Survey (VHLSS) from 2001 to 2015. The number of households in 2011 was smaller due to data restrictions by the General Statistics Office of Vietnam.

Table A2: Employment Shares across Occupations (%)

Occupation	2001	2003	2005	2007	2009	2011	2013	2015	Δ 2001-2015
0. Army	0.41	0.32	0.33	0.32	0.32	0.27	0.30	0.27	−0.14
1. Leaders	1.02	1.24	1.47	1.33	1.11	1.13	1.22	1.17	+0.15
2. High-level Professionals	1.83	2.27	2.83	3.61	4.58	5.04	5.50	5.25	+3.42
3. Technicians & Associate	2.86	3.08	3.31	3.41	3.68	3.50	3.31	3.27	+0.41
4. Clerical Support	1.20	1.47	1.45	1.38	1.77	1.89	2.01	1.93	+0.73
5. Services & Sales	2.71	2.94	3.65	4.11	4.19	4.61	4.80	5.13	+2.42
6. Skilled Agricultural, Forestry, Fishery	3.11	2.05	2.42	3.87	6.08	7.11	7.12	6.12	+3.01
7. Crafts & Related Trade	8.97	9.85	10.96	11.58	12.64	12.97	13.24	13.65	+4.68
8. Machine Operators & Assemblers	2.06	2.29	2.58	3.06	4.85	5.69	5.63	6.69	+4.63
9. Elementary Occupations	75.82	74.50	71.00	67.31	60.78	57.77	56.88	56.51	−19.31
Total (%)	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	

Notes: Calculated by authors using eight rounds of Vietnam Household Labor Standard Survey (VHLSS) from 2001 to 2015. Shares are in percentage points. Observations are weighted by the sampling weights. Concordance tables are used to make occupation classifications consistent across rounds.

than 75% of workers were in elementary occupations, while by 2015, this share decreased significantly to 56.51%, recording a 19.31 percentage point reduction. Workers in elementary occupations have been mainly reallocated to other jobs, including Crafts and Related Trade Workers (4.68 percentage point increase), Machine Operators and Assemblers (4.63 percentage point increase), and Technicians and Associate Professionals (3.42 percentage point increase).[44] Large increases are also observed in the shares of Services and Sales Workers (2.42 percentage points) and Agricultural, Forestry, and Fishery Workers (3.01 percentage points). Table A2 demonstrates how Vietnam's occupation structure evolved, moving workers out of the unskilled and towards more skilled jobs.

Notes on VLSS 1992/93 and 1997/98

Two additional related data sets are sometimes used in household survey studies in Vietnam, the Vietnam Living Standard Surveys (VLSS) 1992/1993 and 1997/1998. Three main issues with these datasets prevent us from using them in our analysis. First, the number of households interviewed is much smaller in the VLSS as compared to VHLSSs. For example, in VLSS 1997/1998, there are only 6000 households in the sample.

Second, even though the VLSS is presumed to represent the population's living standards, the sampling design is different from that of VHLSSs. In particular, the sample VLSS 1997/1998 is designed to be representative of the rural areas of seven geographic regions at that time (Northern Mountains, Red River Delta, North Central, Central Coast, Central Highlands, Southeast, Mekong Delta) and three categories of urban domains (Hanoi and Ho Chi Minh City, other cities, other urban areas). In later geographic classifications, Northern Mountains are subdivided into Northwest and Northeast, making up a total of eight geographic regions. Because of this sampling design, no urban household was interviewed for 24 out of 61 provinces/central cities at that time. This, in turn, also leads to oversampling

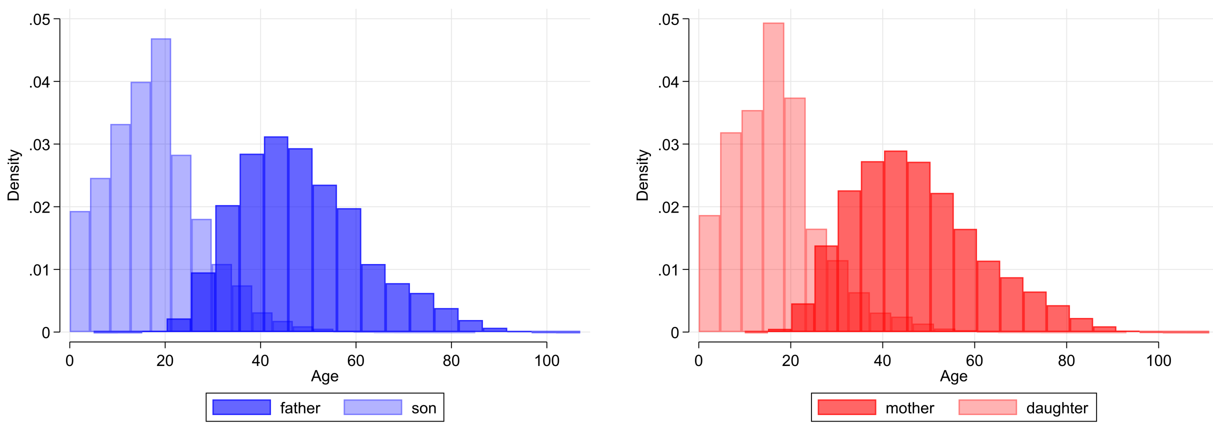
[44] Examples of elementary occupations include simple services on the street such as shoe shining, laundry, ironing, garbage collection, scavenging, letter delivery, unskilled work in agriculture, forestry, fishery, mining, construction, industry and transportation etc.

of some urban areas where they are surveyed.[45]

Third, even though VLSS 1992/1993 has a similar survey design to VLSS 1997/1998 (still with some differences in stratification), the occupation codes for VLSS 1992/1993 are also totally different from those in VLSS 1997/1998 and those of VHLSS in later years, even at 1-digit occupation level. This prevents us from using these two earlier survey rounds separately for potential pretend checks.

B Age Distribution

Figure B1: Age distribution of Sons/Fathers and Daughters/Mothers across Households



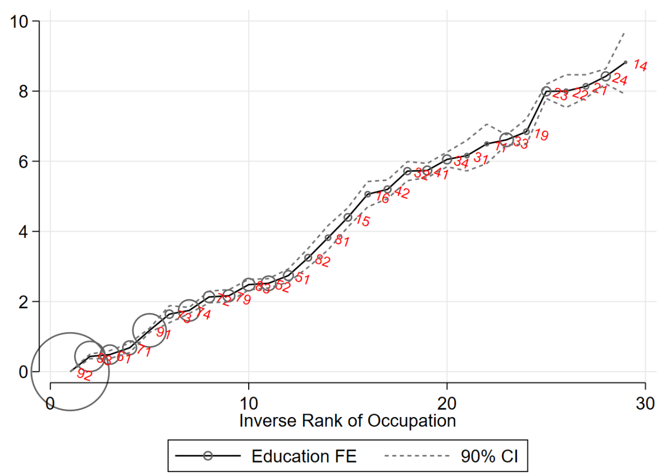
(a) Sons/Fathers (b) Daughters/Mothers

Note: The figures show the age distribution of Sons/Fathers and Daughters/Mothers across Households. Panel (a) shows the distribution for Sons/Fathers. Panel (b) shows the distribution for Daughters/Mothers.

[45]In addition, two province codes, 207 (Bac Kan) and 301 (Lai Chau), are missing in the VLSS 1997/1998. In 1996, Bac Kan (207) and Thai Nguyen (215) were created by splitting Bac Thai. It is likely that code 207 in VLSS 1997/1998 is 215 based on VLSS 1993's classification.

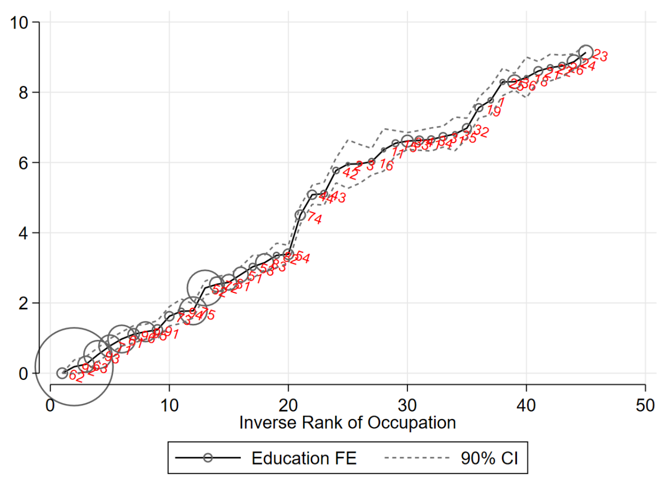
C Rankings of Occupations over Time

Figure C1: Occupational Rankings 2001-07



Notes: The figure shows occupation fixed effects, their ranking, and the distribution of workers based on Equation (2) across 2-digit ISCO occupations. Initial rankings based on VHLSS 2001 are used for the 2001-2007 period.

Figure C2: Occupational Rankings 2009-15



Notes: The figure shows occupation fixed effects, their ranking, and the distribution of workers based on Equation (2) across 2-digit ISCO occupations. Initial rankings based on VHLSS 2009 are used for the 2009-2015 period.

D Absolute Mobility based on Highest Achieving Parent

Table D1: The Effects of the BTA on Absolute Occupational Mobility - Highest Achieving Parent

	(1) All Ages	(2) Age 15-20	(3) Age 21-25	(4) Age 26-30	(5) Age≥31
Dependent Variable: Upward Mobility					
			Son - Highest Achieving Parent		
$PostBTA_t \times \tau_p^{BTA}$	-0.999*	-0.948*	-0.598	-1.281*	-1.410
	(0.573)	(0.520)	(0.769)	(0.712)	(0.930)
τ_{pt}^{VN}	0.541	-1.065	2.575	3.259	2.590
	(1.663)	(2.557)	(1.790)	(2.350)	(2.957)
Observations	95,389	33,282	32,113	19,442	10,552
R-squared	0.088	0.057	0.080	0.123	0.127
			Daughter - Highest Achieving Parent		
$PostBTA_t \times \tau_p^{BTA}$	-1.370**	-1.440**	-1.352**	-0.977	-1.264
	(0.572)	(0.676)	(0.535)	(0.898)	(0.881)
τ_{pt}^{VN}	-4.355***	-6.755***	-3.405*	0.396	1.325
	(1.618)	(2.303)	(2.041)	(2.838)	(2.681)
Observations	67,018	27,842	21,818	11,023	6,335
R-squared	0.115	0.077	0.126	0.153	0.157
Initial Traded Share × Year Dummies	✓	✓	✓	✓	✓
Province Fixed Effects	✓	✓	✓	✓	✓
Year Fixed Effects	✓	✓	✓	✓	✓
Clustering Province-Year	✓	✓	✓	✓	✓

Notes: This table presents estimation results for equation (7) based on eight rounds of VHLSS from 2001 to 2015. The household and individual level controls include including age, age squared, father/mother's age, father/mother's age squared, marriage status, urban status, minority status, household size, share of male members within the household, number of working-age adults, and the cohabitance indicator. ***p<0.01, ** p<0.05, * p<0.1.

Table D2: The Effects of the BTA on Relative Occupational Mobility - Highest Achieving Parent

	(1) All Ages	(2) All Ages	(3) Age 15-20	(4) Age 21-25	(5) Age 26-30	(6) Age≥31
Dependent Variable: Child Rank						
		Son - Highest Achieving Parent				
Parent Rank	0.349***	0.273***	0.064***	0.301***	0.410***	0.420***
	(0.008)	(0.018)	(0.014)	(0.019)	(0.030)	(0.037)
$PostBTA_t \times \tau_p^{BTA}$		-6.726	-9.411	-7.631	-18.514	1.947
		(7.517)	(6.681)	(8.785)	(12.624)	(12.082)
$PostBTA_t \times \tau_p^{BTA} \times$ Parent Rank		-0.824***	-1.015***	-0.522***	-0.283	0.085
		(0.175)	(0.154)	(0.174)	(0.287)	(0.281)
Observations	95,389	95,389	33,282	32,113	19,442	10,552
R-squared	0.362	0.363	0.315	0.343	0.331	0.281
		Daughter - Highest Achieving Parent				
Parent Rank	0.369***	0.297***	0.091***	0.352***	0.475***	0.418***
	(0.009)	(0.018)	(0.019)	(0.022)	(0.039)	(0.047)
$PostBTA_t \times \tau_p^{BTA}$		7.279	5.575	-1.724	3.577	6.431
		(9.922)	(9.019)	(10.807)	(16.998)	(13.747)
$PostBTA_t \times \tau_p^{BTA} \times$ Parent Rank		-0.780***	-0.697***	-0.233	0.251	-0.430
		(0.182)	(0.225)	(0.197)	(0.362)	(0.348)
Observations	67,018	67,018	27,842	21,818	11,023	6,335
R-squared	0.404	0.405	0.371	0.386	0.359	0.349
τ_{pt}^{VN}	✓	✓	✓	✓	✓	✓
Household and Individual Controls	✓	✓	✓	✓	✓	✓
Initial Traded Share × Year Dummies	✓	✓	✓	✓	✓	✓
Province Fixed Effects	✓	✓	✓	✓	✓	✓
Year Fixed Effects	✓	✓	✓	✓	✓	✓
Clustering Province-Year	✓	✓	✓	✓	✓	✓

Notes: This table presents estimation results for Equation (8). This table presents estimation results for Equation (8) based on eight rounds of VHLSS from 2001 to 2015. The household and individual level controls include age, age squared, father/mother's age, father/mother's age squared, marriage status, urban status, minority status, household size, share of male members within the household, number of working-age adults, and the cohabitance indicator. ***p<0.01, ** p<0.05, * p<0.1.

E Absolute Downward Mobility

Table E1: The Effects of the BTA on Absolute Downward Mobility

	(1) All	(2) Age 15-20	(3) Age 21-25	(4) Age 26-30	(5) Age≥31
Dependent Variable: Downward Mobility					
	Panel A: Son-Father				
$PostBTA_t \times \tau_p^{BTA}$	0.701	-0.129	0.821	1.271*	1.643**
	(0.436)	(0.569)	(0.702)	(0.738)	(0.701)
τ_{pt}^{VN}	-0.167	-1.664	-1.132	1.326	0.878
	(1.405)	(2.009)	(1.547)	(2.134)	(3.056)
Observations	76,816	29,168	26,450	14,628	6,570
R-squared	0.113	0.071	0.117	0.149	0.158
	Panel B: Daughter-Mother				
$PostBTA_t \times \tau_p^{BTA}$	0.659	0.422	0.391	1.608**	-0.400
	(0.689)	(0.829)	(0.778)	(0.759)	(1.200)
τ_{pt}^{VN}	-0.279	-0.392	-2.858	0.870	0.587
	(1.843)	(2.230)	(2.220)	(2.466)	(4.194)
Observations	59,829	26,055	19,493	9,212	5,069
R-squared	0.195	0.119	0.207	0.221	0.199
Household and Individual Controls	✓	✓	✓	✓	✓
Initial Traded Share × Year Dummies	✓	✓	✓	✓	✓
Province Fixed Effects	✓	✓	✓	✓	✓
Year Fixed Effects	✓	✓	✓	✓	✓
Clustering Province-Year	✓	✓	✓	✓	✓

Notes: This table presents estimation results for equation (7) based on eight rounds of VHLSS from 2001 to 2015, with downward mobility as the dependent variable. Downward mobility is defined analogously to upward mobility in (3) and indicates when a child has a lower-ranked occupation than their parent. The household and individual level controls include age, age squared, father/mother's age, father/mother's age squared, marriage status, urban status, minority status, household size, share of male members within the household, number of working-age adults, and the cohabitance indicator. ***p<0.01, ** p<0.05, * p<0.1.

F Pretrend Checks

This section reports the results for pre-trend checks using data from the VLSS 1997/1998 and VHLSS 2001/2002 (pre-BTA periods). 1-digit occupation codes are used as it is the most detailed concordance level available for these years. Similar to Equation (7), the pre-trend regressions are based on the equation below:

$$\begin{aligned} Upward_{ipt} &= \theta_{1998} \times \mathbf{1}\{t = 1998\} \times \tau_p^{BTA} + X'_{ipt}\beta \\ &+ \delta_t s_p + \lambda_p + \lambda_t + \varepsilon_{ipt}. \end{aligned} \tag{F1}$$

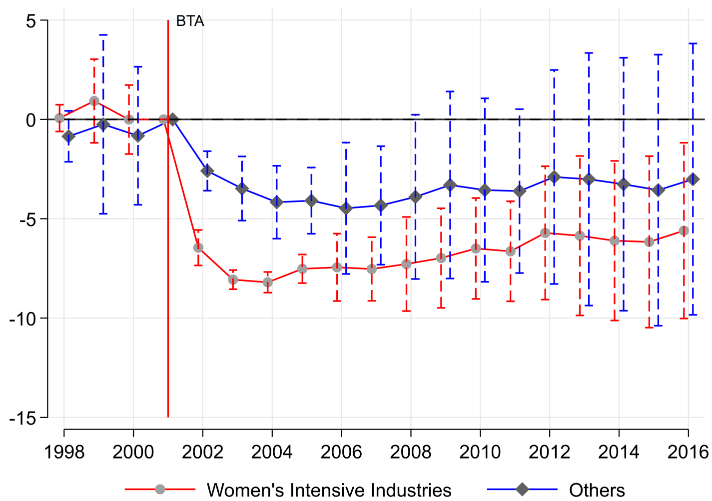
Table F1: Regression of the BTA Tariffs on Upward Mobility in 1998 and 2001

	(1) Sons/Fathers	(2) Daughters/Mothers
BTA Effects in Year 1998	0.223	-0.439
	(0.555)	(0.858)
Married	-0.030**	-0.077***
	(0.013)	(0.012)
Urban	0.075***	0.102***
	(0.016)	(0.017)
Minority	-0.093***	-0.093***
	(0.012)	(0.013)
Percent of Male	0.011	-0.006
	(0.032)	(0.031)
Household Size	-0.013***	-0.010***
	(0.002)	(0.003)
Household No. of Working-Age Adults	0.006	0.004
	(0.004)	(0.005)
Cohabitance Indicator	-0.012	0.025*
	(0.012)	(0.014)
Age	0.050***	0.064***
	(0.007)	(0.008)
Age Squared	-0.001***	-0.001***
	(0.000)	(0.000)
Age of Parent	0.003	-0.002
	(0.005)	(0.005)
Age of Parent Squared	-0.000	0.000
	(0.000)	(0.000)
Observations	9,514	8,883
R-squared	0.094	0.096
Initial Traded Share × Year Dummies	✓	✓
Province Fixed Effects	✓	✓
Year Fixed Effects	✓	✓
Clustering Province-Year	✓	✓

Notes: This table presents estimation results for equation (F1) based on VLSS 1998 and VHLSS 2001 at the one-digit occupation level. ***p<0.01, ** p<0.05, * p<0.1.

G Gender-biased Effect of the BTA

Figure G1: Gender-biased Effect of the BTA shock on Vietnam's Exports to the U.S.



Notes: The results from Equation (1) are presented for female and male-dominated industries separately, where a female-dominated industry is defined as and industry where more than 70% of workers are female. The blue line shows estimates of the BTA on Vietnam's exports to the U.S. for male-dominated industries, while the red line shows estimates for female-dominated industries. Female-dominated industries are classified based on the share of female workers in each 2-digit industry using Vietnam's Enterprise Survey in 2000. These results are robust when using thresholds such as 0.5 and 0.6 where more than 50% and 60% of workers are female, respectively.