Easy Come, Easy Go? Economic Shocks, Labor Migration and the Family Left Behind*

André Gröger†

Abstract

This article investigates how labor market shocks abroad affected families left behind through their international migrants during the Great Recession. I combine plausibly exogenous variation in the magnitudes of labor market shocks with outcomes from a panel of families left behind in Vietnam. Based on a quasi-experimental approach and controlling for a large range of factors, I find that the shocks had large and heterogeneous effects on households' migration decisions, labor supply and demographic composition. In response, poor remittance-dependent migrant households substituted domestic migrants (-50%) with international ones (+20%). These effects were driven by labor migration in particular, and new foreign migrants were predominantly female and targeted the US. Previous migrants with intimate partners left behind sorted selectively into returning to the origin, leading to an increase in cohabitation and resulting in a large increase in fertility (+50%). In contrast, rich households with low remittance-dependence remained largely unaffected. I provide a theoretical framework, which rationalizes this heterogeneity by the relative magnitudes of income and substitution effects caused by the shock. My findings contribute to different literature in Development, Labor, and Migration by providing the first evidence of a trade-off between domestic and international labor migration strategies, highlighting the role of kinship networks for chain migration, and providing novel evidence on migrant selection patterns during times of crisis. The results have important implications for policy makers and research concerned with the effects of migration in both origin and destination.

***JEL classification*:** D13, F22, J13, J61, O15, P36, R23

***Keywords*:** International Migration, Domestic Migration, Fertility, Gender, Labor Supply, Migrant Selection, Family Left Behind, Unemployment, Vietnam

---

*I am grateful to Guido Friebel and Rainer Klump for their support and Taryn Dinkelman, Pascaline Dupas, Francesco Fasani, Albrecht Glitz, Libertad González, Clement Imbert, Dany Jaimovich, Gianmarco León, Joan Llull, Andreu Mas-Colell, Florian Morath, Rajesh Ramachandran, Devesh Rustagi, Steven Stillman, Alessandro Tarozzi, Matthew D. Webb, Dean Yang, and Yanos Zylberberg for useful comments and discussions. I also thank conference and seminar participants in 2017 at the NEUDC, IZA workshop on Labor and Development, EALE, Lindau Meeting on Economic Sciences, Int. Conference on Migration and Development, BGSE Summer Forum, VfS AEL, CSAE, RES PhD Meeting, University of Economics Ho Chi Minh City, Trinity College Dublin, Stockholm School of Economics, Universidad Autònoma de Barcelona, and in 2016 at the SAEe, EUDN PhD Workshop, Workshop on the Economics of Migration Frankfurt, and Pompeu Fabra University. I am grateful to Khue Le Diem Boi and Fangying Xu for excellent field work and data preparation assistance. Financial support from the Spanish Ministry of Economy and Competitiveness through grant ECO2015-67602-P and through the Severo Ochoa Programme for Centres of Excellence in R&D (SEV-2015-0563) is acknowledged. Any remaining errors are my own.

†Universitat Autònoma de Barcelona (UAB) and Barcelona Graduate School of Economics (BGSE). Contact: Dep. Economia i Història Econòmica, Edifici B, 08193 Bellaterra, Spain. Fax: +34-93581-2012, phone: +34-93581-4324, e-mail: andre.groger@uab.cat.

1 Introduction

Migration has been growing rapidly over the past decades,[1] both within and across countries (The World Bank 2009), and this trend is expected to continue (IOM/Gallup 2011, Hanson and McIntosh 2016). Migration typically yields substantial income gains to workers from developing countries (McKenzie et al. 2010) and remittance receipts have become a major source of income for families left behind in the developing world (WorldBank 2017). In this environment of increasing migration and remittances, households at origin become dependent on overseas incomes through remittances and exposed to economic shocks through their migrants abroad. While there is a growing literature investigating the impact of migration on the family left behind, several important aspects remain unexplored, such as subsequent migration decisions and migrant selection patterns, the relationship between domestic and international migration, as well as interrelated outcomes such as the demographic composition of the family left behind or fertility choices.

This article intends to fill these gaps by providing causal evidence on these questions in the country context of Vietnam. I exploit a quasi-experiment relying on plausibly exogenous variation in labor market shocks during the Great Recession that had a strong negative effect on migrant incomes abroad and the remittance receipts of their families left behind at the origin. I find that the shocks had large and heterogeneous effects on households' (domestic and international) migration decisions, fertility choices, and demographic composition at origin. With respect to migration, I find that families left behind increased international migration in response to negative labor market shocks abroad, while decreasing domestic migration by a similar margin. This response was driven by labor migration among poor remittance-dependent migrant households. This behavior can be rationalized theoretically by the income effect of the shock outweighing the substitution effect for this subgroup. Rich migrant households with low remittance-dependence remained largely unaffected. With respect to migrant selection, interestingly, new labor migrants were predominantly females and targeted mostly the US. I find no

[1] The stock of domestic migrants was estimated to be 763 million in 2005 (Bell and Charles-Edwards 2013) and 191 million for international migrants, with the latter having increased to 243 million in 2015 (Hongbo 2015).

evidence of changes in skill selection among new migrants, a diversification in households' destination portfolios or of switching among earlier migrants as a reaction to the crisis. This is consistent with the presence of strong kinship migration networks. With respect to the demographic composition of the family left behind, the results show that selective sorting related to the changes in migration patterns resulted in a reunification of intimate partners at the household of origin. This lead to a strong increase in fertility and in the size of poor remittance-dependent households at origin. The results have important implications for policy makers and research concerned with the effects of migration in both origin and destination countries.

Vietnam provides an interesting setting for this study as the country has been experiencing a sharp increase in both domestic and foreign migration since the beginning of the economic and political liberalization of the early 1990s (*Doi Moi*) (Abella and Ducanes 2011). The number of domestic migrants in Vietnam was estimated to be 6.6 million in 2009 (8.6% of the total population) (Marx and Fleischer 2010). Simultaneously, around 1 million Vietnamese (1.2% of the total population) were living abroad in a diverse set of destination countries (Dang et al. 2010), putting Vietnam among the top 10 net emigration countries (United Nations 2013). Remittance receipts amounted to 6.2 billion USD in 2007, constituting almost 8% of GDP (World Bank 2018).[2]

Estimating the effects of migration on the family left behind is complicated as selection into migration and return tends to be correlated with unobserved characteristics. In addition, microeconomic data on migrants and their origin households tends to be scarce. Following McKenzie and Yang (2012), this study overcomes these issues by adopting a quasi-experimental approach, taking advantage of unique survey data from a panel of 500 migrant households in Vietnam, which was collected in two waves in 2008 and 2013.[3] I rely on the fact that families left behind were exposed to differential shocks conditional on

[2]As an open economy in the lower middle-income category with a medium-sized population of approximately 90 million people and no common land borders with any major migrant destination country, the case of Vietnam might also be informative for other developing country contexts sharing similar characteristics.

[3]The follow-up survey was implemented by the author. The household panel relies on individual information from 670 international migrants in 26 different destination countries and approximately 2,200 household nucleus members and domestic migrants.

the destination choices of their international migrants and exploit the plausibly exogenous variation in those shocks generated by the Great Recession. I conducted a difference-in-difference analysis comparing origin households with differential shock exposure, before and after the crisis occurred. This estimation strategy enables me to control for time-invariant characteristics of the household of origin as well as for changes in the province of origin over time. This setting allows identifying the causal effects of economic shocks abroad on the outcomes of families left behind. I address a number of potential concerns regarding the empirical approach by providing evidence of the presence of pretreatment parallel trends for my key outcome variables as well as the plausibly exogenous assignment of shocks with respect to observable characteristics.

This study contributes to at least three different strands of the literature in Development, Labor, and Migration, emphasizing the causal identification of: 1) the effects on the family left behind; 2) determinants of migration; and 3) selection into migration. The existing literature dedicated to studying the effects of migration on the family left behind is concerned with the multifaceted development impacts that (domestic or international migration) unfold in origin communities.[4] Despite of the large body of empirical evidence, previous work has focused exclusively on the effects of either domestic or international migration. This is mainly due to the scarcity of household survey data that captures both domestic and international migration. To the best of my knowledge, this study is the first one to show that domestic and foreign migration are interrelated and jointly determine outcomes among families left behind. I find that households make use of both migration strategies for labor motives in a flexible way to cope with income shocks. This finding has important implications for both policy makers concerned with migration in sending countries as well as for migration research in general and calls for a joint analysis of the two types of migration, especially in research concerned with the effects of

[4]See Antman (2012) for an overview. Outcomes include, for example, education (Edwards and Ureta 2003, Beine et al. 2008, Antman 2011, 2006, McKenzie and Rapoport 2011, Alcaraz et al. 2012, Batista et al. 2011, de Brauw and Giles 2017), health (Hildebrandt and McKenzie 2005, Macours and Vakis 2007, Stillman et al. 2012), labor supply (Amuedo-Dorantes and Pozo 2006, Lokshin and Glinskayai 2008, Binzel and Assaad 2011, Mu and de Walle 2011, Mendola and Carletto 2012), or insurance (Rosenzweig and Stark 1989, De La Brière et al. 2002, Yang and Choi 2007), while some studies investigate multiple topics (Yang 2008, Gibson et al. 2011, Gröger and Zylberberg 2016, Gibson 2015) among family members left behind at origin.

international migration on the family left behind. Another contribution to this literature is to provide evidence on the effect of migration on fertility among families left behind.[5] One hypothesis in this literature is that migration reduces fertility while the migrant is away and increases it when the migrant returns. While a disruption of fertility seems mechanical in the absence of an intimate partner, the effect upon return is ex-ante not obvious. The results provide novel evidence of a "postponed fertility effect" in reaction to the shock, in which previous migrants sorted selectively into returning to their origin household, which lead to an increase in the cohabitation of (formerly separated) intimate partners and resulted in a 50% increase in the number of children subsequently.

The findings in this paper also contribute to the literature on the determinants of migration in general, and those on migration responses to changes in the returns to migration in particular. Most existing work finds a positive elasticity of migration with respect to changes in the returns from migration.[6] Other studies find evidence of contradicting patterns in which increases in the returns to migration lead to lower migration, which may be explained through high migration costs in the presence of credit constraints.[7] The results from this paper are consistent with the latter studies in that they imply a negative elasticity of international migration with respect to the returns to migration, but in the opposite direction. I find a decrease in the returns from foreign migration, driven by negative labor market shocks at destination, to cause an *increase* in foreign migration among families left behind.[8] A distinguishing feature of my study is that it allows me to look at domestic migration within the same household and the results show that

[5]See Beine et al. (2013) for a review of this literature. Most existing work has studied the effect of migration on migrant fertility (Hiday 1978, Hervitz 1985, Stephen and Bean 1992, Sato and Yamamoto 2005, Sato 2007, Lindstrom and Saucedo 2007, Guillaume et al. 2018) or the transfer of fertility norms through migration (Fargues 2007, Blau et al. 2011, Fargues 2011, Bertoli and Marchetta 2015).

[6]For example, Hatton and Williamson (1993), Hanson and Spilimbergo (1999), Munshi (2003), Hanson and McIntosh (2012), Hornbeck (2012), Marchiori et al. (2012), Bohra-Mishra et al. (2014), Gröger and Zylberberg (2016), Abarcar (2017), Missirian and Schlenker (2017), Boustan et al. (2017), Baez et al. (2017), Mahajan and Yang (2017), Minale (2018), Kleemans and Magruder (2018) rely on shocks in origin areas that change the returns to migration, while Yang (2006), Wozniak (2010), McKenzie et al. (2014), Bertoli and Bertoli (2017) use destination shocks.

[7]See, Halliday (2006), Yang and Choi (2007), Yang (2008).

[8]This finding is also linked to earlier work on the "added-worker effect", which investigates how unemployment of one household member affects the labor supply of remaining members (Lundberg 1985, Stephens, Jr. 2002). Along these lines, this finding could be interpreted as an "added-migrant effect" among remittance dependent families left behind.

domestic migration decreased simultaneously, providing novel evidence of a substitution of domestic with international migration among families left behind. Additionally, I find these migration responses to be heterogeneous along households' initial distribution of remittance dependence of home consumption and driven mainly by labor migration to the US among the high dependence subgroup in particular. Low dependence households, on the other hand, remained largely resilient.[9]

Theoretically, this finding can be rationalized by the relative magnitudes of income and substitution effects caused by the shock, with the former dominating the latter among highly dependent households in particular. Labor market shocks which affect migrants abroad lead to a deterioration of household income at the origin through remittances and create a substitution and income effect for the family left behind. The substitution effect implies that the returns to foreign migration decrease in response to the shock, which makes migration to that destination less attractive. On the other hand, the income effect makes households at origin poorer and, thereby, create incentives to send more members abroad (conditional on the returns abroad still being superior to alternative locations). For highly remittance dependent households, for whom remittances constitute a large share of their consumption, the income effect dominates the substitution effect, leading to a net increase in foreign migration. For low dependence households, in turn, the substitution and income effects should be rather balanced or going the other way, suggesting no or an opposite reaction.

The literature on selection into migration typically investigates the observable characteristics of migrants in comparison to the population at origin or destination.[10] One important dimension of comparison in this literature is migrant human capital as measured by education or skills.[11] The results in this study provide novel evidence that

[9]The paper closest to the finding on international migration is Fajardo et al. (2018), who analyze the Mexico–US migration corridor exclusively. They find that low-income Mexican households increased migration to the US in response to negative shocks at destination, while high-income ones decreased it.

[10]See, for example, Greenwood (1985), Borjas (1987), Taylor (1987), Borjas (1991), Stark and Bloom (1985), Chiswick (1999), Beine et al. (2001), Feliciano (2005), Chiquiar and Hanson (2005), Clark et al. (2007), Ibarraran and Lubotsky (2005), Beine et al. (2008), Dolfin and Genicot (2010), McKenzie and Rapoport (2006), Akee (2010), Abramitzky et al. (2012), Ortega and Peri (2013), Bertoli et al. (2013), Bertoli and Bertoli (2017).

[11]See Docquier and Rapoport (2012) for an overview of this literature and, for example, Fernández-Huertas Moraga (2013) for empirical evidence on domestic and Grogger and Hanson (2011) for interna-

the shock did not have an effect on the skill selection of international migrants within the household (i.e. new migrants had about the same education level as previous ones), but across households as new migrants left exclusively from the poorer subgroup with lower education levels. Additionally, I find a strong effect on gender selection as foreign migration was driven mainly by females. These finding help to better understand migrant selection patterns in the face of negative income shocks at origin and can also help policy-makers predicting migration outcomes at destination during times of crisis.

Since skills tend to be positively correlated with income (and negatively with poverty), another strand of the selection literature investigates to which extent household wealth constraints constitute barriers to migration. Most empirical studies are indicative of binding financial constraints, but there is no consensus whether income shocks at origin lead to more or less migration.[12] The findings in this paper contribute to this literature by providing novel evidence that financial constraints among migrant households are not strictly binding, as they achieve to finance (costly) international migration in the face of an income shocks. The results indicate two reasons: First, their wealth levels are superior to those of the average household in Vietnam, implying lower initial constraints. Second, the results also indicate the presence of strong kinship migration networks as additional foreign migrants target the same destinations of earlier migrants from the same household. This suggests that migration networks play an important role in reducing the fixed costs of migration and facilitate chain migration through family sponsorship.

The remainder of the paper is structured as follows. Section 2 introduces a simple theoretical framework to guide the empirical analysis. Section 3 provides the background and data used. Section 4 outlines the empirical strategy. Section 5 presents the main results and section 6 the robustness checks. I briefly conclude in Section 7.

tional migration.

[12]Studies with results consistent with binding financial constraints are, for example, Chiquiar and Hanson (2005), Ardington et al. (2009), McKenzie and Rapoport (2006), Bryan et al. (2014), Angelucci et al. (2015), Chernina et al. (2014), De Janvry et al. (2015), Bazzi (2017), Boustan et al. (2017). In contrast, Imbert and Papp (2018) find that an easing of financial constraints in rural India does lead to less domestic migration, which they attribute to the presence of high non-monetary costs from living and working in the city. Mahajan and Yang (2017) find that negative income shocks at origin lead to a positive effect on international migration, which is mediated through the size of existing migration networks between origin and destination.

2 Theoretical Framework

I provide a simple theoretical framework in which migration decisions are determined at the household level (Stark and Bloom 1985, Borjas 1991, Chen et al. 2003) and agents choose to send family members away for work in two competing markets: the domestic and the foreign one. The objective of this exercise is to understand how remittance-dependent migrant families left behind revise their migration decisions when they are hit by an economic shock that decreases overseas incomes and, ultimately, leads to a negative income shock at home through remittances. The goal of this section is to provide a framework for guiding the empirical analysis, and not to provide a theoretical contribution as such.

Consider a family consisting of n members. There are three potential locations, the origin area of the household (subscript h for home), the domestic migration destination (subscript d), and the foreign migration destination (subscript f), over which the family can allocate its labor supply. Following Roy (1951) and using the notation of Chiquiar and Hanson (2005), I assume that household members' wage equations are of the following type: $w_i = \mu_i + \delta_i s$, where w_i is the wage in location i ($i \in \{h, d, f\}$), μ_i is the minimum wage for unskilled labor, s is the individual level of schooling, and δ_i is the return to schooling. Because minimum wages tend to be lower in developing countries (such as Vietnam) compared to developed countries (such as the major destinations countries among Vietnamese migrants), I assume $\mu_f > \mu_d$. In contrast, the returns to schooling are typically lower in developed compared to developing countries: $\delta_f < \delta_d$.[13] For simplicity, I normalize the wage at home to zero. The economic shock is assumed to depress foreign wages, while the returns to skills remain unchanged. This implies that the deterioration of the relative wage premium is stronger for low-skilled compared to high-skilled migrant workers, both in absolute and relative terms.[14]

[13]Note that the wage comparison in the context of this study is between Vietnam, a relatively poor developing country, and a range of foreign destination countries as listed in Panel A of Table 1, which mainly belong to the group of developed countries. For empirical evidence supporting these assumptions, see Chiquiar and Hanson (2005) and Patrinos and Montenegro (2014).

[14]This is consistent with the descriptive statistics presented in Panel B of Table 1 that labor market shocks during the Great Recession affected the former stronger than the latter.

Income from the family's labor supply is pooled at the household level[15]. Household utility is determined by a concave function with respect to the number of household members left behind, which has arguments for h, d, and f. Households maximize their utility by keeping as many members as possible at home while allocating labor optimally across domestic and foreign locations in order to secure a minimum level of consumption ($\underline{c}$). The intuition behind this is that securing home production is imperative and requires a minimum number of members at home, but that productivity is marginally decreasing with labor supply (Jayachandran 2006).[16] Migration incurs constant psychic costs to the household which arise when sending their members away and materialize in the form of disutility (Sjaastad 1962). This disutility is assumed to be constant over time and smaller for domestic (α) than for foreign migration (β) due to distance and higher ease of return ($\alpha < \beta$). For simplicity, my framework abstracts from (plausibly heterogeneous) monetary migration costs, assuming that wages are net of the respective costs for each location. Consequently, the household maximization problem is:

$$\begin{aligned} \underset{m_h, m_d, m_f}{\text{Max}} \quad & U(m_h, m_d, m_f) = u(m_h) - \alpha m_d - \beta m_f, \\ \text{subject to} \quad & m_h + m_d + m_f = n, \\ \text{and} \quad & w_d m_d + w_f m_f \geq \underline{c}. \end{aligned}$$

This setup highlights how the choice of families left behind between keeping the family together and sending members away for work is affected by changes in foreign wages. Securing a certain pay-off from migration corresponds qualitatively to a situation in which falling below $\underline{c}$ puts the family's welfare at risk.[17] The main goal of this simple framework is to illustrate how migrant households with different levels of remittance dependence in terms of home expenditure respond to income shocks with respect to domestic and

[15] This assumption is not restrictive since it suffices for results to hold that only a share of migrant labor income in domestic and foreign destinations is pooled through remittances.

[16] The incentive of keeping family members at home is very prevalent in the Vietnamese context due to the historic household registration system (*Ho Khau*), which conditions property rights and access to social services on the presence of a minimum number of family members in origin areas (Hardy 2001).

[17] An alternative way of interpreting this assumption is that $\underline{c}$ are the minimum returns from migration needed 1) to make the household migration investment profitable over a fixed migration duration when financed through household assets or, 2) to service debt repayments when financed through credit and that falling below this threshold corresponds to default.

foreign migration decisions. Note that abstracting from the adaptation of the minimum consumption level is of analytical convenience and helps focusing the model's comparative statics on the essential effect of labor allocation across different destinations.[18] Solving this model and deriving the elasticities of domestic and foreign migration with respect to foreign wages yields that they are determined by the sign of the following expressions respectively (see Appendix Section 7 for a step-by-step solution):

$$sgn(\frac{\mathrm{dm_d^*}}{\mathrm{dw_f}}) = sgn(-\frac{w_d}{w_f^2}u'(m_h^*) + \frac{(w_d - w_f)m_d^*}{w_f^2}u''(m_h^*) - \beta\frac{w_d}{w_f^2}), \tag{1}$$

$$sgn(\frac{\mathrm{dm_f^*}}{\mathrm{dw_f}}) = sgn(\frac{1}{w_d}u'(m_h^*) + \frac{(w_f - w_d)m_f^*}{w_d^2}u''(m_h^*) + \alpha\frac{1}{w_d}). \tag{2}$$

Intuitively, changes in the foreign wage cause income and substitution effects to the households at origin. Due to the negative shock at destination, foreign labor markets become relatively less attractive, constituting a substitution effect that pushes all families to reduce the amount of foreign labor supply. Simultaneously, the reduction in remittances from foreign migrant wages makes families left behind poorer, which implies an income effect that increases the incentive for additional migration. The difference between these two effects ultimately determines the elasticity of domestic and foreign labor supply with respect to foreign wages. The specific sign of each elasticity depends on the shape of the utility function, the cost parameters, on the relative wage premium of foreign to domestic migration and, most importantly, on the magnitude of the shock.[19] With respect to the latter, heterogeneous household responses originate from households' differential remittance dependence, i.e. the share of foreign remittance ($w_f m_f$) over local expenditure (c). On the other hand, I expect low dependence households to remain resilient or react in the opposite way.[20] For simplicity, this framework abstracts from the selection aspect of the

[18] A modification of this assumption that allows positive decreasing marginal returns to additional consumption does, however, qualitatively yield similar predictions.

[19] Note, that the comparative statics of this theoretical framework are ambiguous and can, theoretically, vary to the extent that the signs of expressions 1 and 2 become positive or negative.

[20] In Appendix Section 7, I provide a calibration exercise for my theoretical framework which demonstrates that the elasticities of domestic and foreign migration with respect to the foreign wage can, under certain assumptions, be positive and negative for poor households respectively. At the same time, rich households remain unaffected.

household migration decision. Given a discrete number of family members, it remains an empirical question how families select additional foreign migrants.

Although this framework relies on the change of the foreign wage level as the exogenous parameter, there is evidence that the period of study during the Great Recession was characterized by nominal wage rigidities in several destination countries, especially for low-skilled workers receiving minimum wages (McKenzie et al. 2014, Cadena and Kovak 2013). Therefore, in my empirical strategy, I use changes in the level of unemployment, which is a more suitable proxy for economic shocks in this case. Alternatively, one could also change the definition of w_i to capture the expected wage, which is a weighted average of the effective wage and the probability of being employed at destination. In such a framework, the empirical effects would then capture changes in the probability of being employed given a constant level of wages.

3 Background

3.1 Migration in Vietnam

Since the opening of Vietnam's economy in the wake of the post-Soviet liberalization reforms of the early 1990s (*Doi Moi* - renovation), the country has experienced rapid GDP growth, averaging 7% per year, accompanied by an impressive reduction in the poverty headcount. These economic reforms also triggered a liberalization of the historic household registration system (*Ho Khau*), which closely regulated people's movement and constituted high barriers to migration (Hardy 2001). The result was a sharp increase in both domestic and, subsequently, foreign migration and remittances receipts (Abella and Ducanes 2011). Nowadays, domestic migration is widespread and the number of internal migrants in Vietnam was estimated to be 6.6 million as of 2009 (Marx and Fleischer 2010). This corresponded to 8.6% of the total population, compared to 4.5 million (6.5%) during the previous census round in 1999.

The surge in domestic migration alongside the release of comprehensive panel datasets covering this theme, has led to a growing literature dedicated to the causes and conse-

quences of domestic migration in Vietnam. Similar to patterns found in other developing countries, domestic migrants tend to be relatively young and more educated than the average citizen in Vietnam (Coxhead et al. 2015). The main motive for domestic migration in Vietnam is economic and migrants predominantly seek employment opportunities in the industrial sector of urban centers and surrounding provinces, mainly Ho-Chi-Minh-City (*Saigon*) in the South, as well as Hanoi in the North. Wages paid in these urban centers are considerably higher compared to rural areas.

Domestic migration tends to be relatively inexpensive in Vietnam and migrants usually find low-skilled jobs rather quickly. Due to the high concentration of capital investments and off-farm job creation in certain sectors and provinces, domestic labor mobility has been identified as an important mechanism for spreading welfare gains across the country (Phan and Coxhead 2010). Especially for the low-skilled population in rural areas, seasonal migration is an important way of increasing household expenditure and alleviating poverty (Brauw and Harigaya 2004). Furthermore, domestic labor migration is also used as a shock-coping strategy in rural areas in order to smooth negative shocks to agricultural incomes, both ex-ante, through remittances from existing migrant networks, and ex-post, through additional out-migration (Gröger and Zylberberg 2016).

In contrast, there is a general lack of data and empirical evidence on international migration in Vietnam. Existing aggregated data confirms that the stock of foreign migrants from Vietnam has been increasing in recent years, with the result that Vietnam was listed among the top 10 net emigration countries over the 2000 to 2010 period (United Nations 2013). For 2008, Dang et al. (2010) estimated that 1 million Vietnamese were living abroad, corresponding to 1.2% of the total population.[21] Simultaneously, remittance receipts from international migrants grew rapidly and reached approximately 8.3 billion USD in 2010, constituting 7% of GDP (World Bank 2018). During recent years, an important channel of international migration was the country's temporary labor export program (Ministry of Foreign affairs of Vietnam 2012).[22] Alternative channels of interna-

[21]Note that these figures refer to recent flows and stocks of Vietnamese migration after 1998 and exclude the approximately 2 million political refugees who left the country between 1975 and 1995.

[22]See Nguyen (2014) for an institutional description of Vietnam's labor export program.

tional migration in Vietnam are overseas family reunification and other forms of kinship sponsorship. Independent of the channel of migration, economic motives are the main driver of foreign migration and migrants typically remit large shares of their overseas income to their families left behind. Apart from descriptive statistics, empirical evidence in this country context is thus far very limited.[23]

3.2 Household and Migrant Data

The analysis in this paper focuses on Vietnamese households with international migrants having left prior to the onset of the Great Recession and who were, therefore, exposed to the deterioration of labor market conditions abroad through their migrants. Data on households and their migrants was collected in two rounds in 2008 and 2013 among a stratified random sample in Vietnam.[24] Households were selected into the sample if they had at least one migrant abroad during the baseline in 2008 who had left the household within ten years prior to the baseline survey.[25] Detailed information on all nucleus member as well as domestic and international migrants was collected through proxy respondents, usually the head of the household. Out of the initial sample of 576 migrant households interviewed in the baseline survey, 546 of them could be successfully tracked in the follow-up survey. Accounting for missing observations, in the empirical analysis I am left with a sample size of 507 households[26] This translates into an attrition rate of 12% over 5 years or 2.4% per year, which is remarkably low compared to similar

[23]This is mainly due to sample sizes of international migrants in random population surveys being too small for rigorous quantitative analysis. I know of only three studies conducting econometric analyses on the impact of international migration on families left behind in Vietnam: while Nguyen et al. (2011) find that remittances have a positive impact on per capita expenditures, Nguyen and Mont (2012) show that this does not translate into a significant decrease of consumption-based poverty. Binci and Giannelli (2018) find that remittances increase schooling and reduce child labor.

[24]The first round of this survey was commissioned by the Global Development Network and the Institute for Public Policy Research as part of a global project under the name *Development on the Move* (DOTM). See Tchaidze and Torosyan (2010) for a technical report on the global project and Dang et al. (2010) for details on the survey in Vietnam, including the sampling procedure. The follow-up round in 2013 was organized by the author.

[25]Apart the migrant household sample, the survey also included a sample of non-migrant and returned migrant households. I exclude these observations from the main analysis as, by definition, they did not experience the shock of interest. In robustness checks, I rely on the non-migrant sample in order to demonstrate the exogeneity of destination shocks to household outcomes in Vietnam.

[26]Including individual information from 665 foreign migrant individuals and 2,170 household members and domestic migrants in the balanced version.

datasets. In the robustness checks, I conducted additional tests which show that, in addition to being small, attrition does not bias my estimates.

[Table 1 here]

Panel A of Table 1 shows the geographical distribution of international migrant individuals from the sample households across the top 10 destination countries recorded in the baseline survey. Among those, the United States of America stand out as the single most important destination country with 27.7% of the total sample. Taiwan comes in second with 14.9%, followed by Malaysia (9.2%), South Korea (8.7%), Germany (6.6%), and Russia (6.3%). Together, the top 10 destination countries listed account for 87.5% of the total sample of migrants, with the remaining 12.5% spread over 20 other destinations.

Table 2 provides descriptive statistics on foreign migrant individuals. They tend to be relatively young, with a mean age of around 31 years. Due to the sampling strategy, migrants captured in the sample have left the household between 1998 and 2008, with the median migrant having left in 2005. 56% of migrants are female and the majority is reported to be married (62%). The majority of migrants have achieved at least a secondary level of education and 13% a tertiary degree before departure. As for migration motives, economic considerations are most frequently reported (55%), followed by family- (43%), and education-related reasons (17%). However, even if not explicitly reported, economic motives and remittance sending ultimately play a key role for any kind of migration decision among my sample households.

[Table 2 here]

Table 3 presents summary statistics on the main outcome variables of migrants' families left behind in Vietnam. Motivated by the theoretical considerations outlined above, the sample is divided into low- and high-remittance dependent households using their level of per capita expenditure in 2008 with respect to the median as a proxy. This approach is preferable compared to using the share of remittances over expenditure directly, as remittances is a noisy measure, which suffers from reporting bias for several reasons. The expenditure measure used is highly correlated with remittance dependence as shown

in the Finance section. Remittances among low expenditure households accounted for over 50% of total expenditure in 2008 on average, while this figure was only 17.7% for high expenditure households. By construction, low- and high-expenditure migrant households were different in many aspects. With respect to demography, low expenditure households were larger in size, with 4.6 nucleus members (excluding any migrants) compared to high expenditure ones (3.85) in 2008.

[Table 3 here]

In line with the subsample selection criteria, domestic income is rather different for the two subgroups with 1,694 USD per capita for the low versus 4,097 USD for the high expenditure households respectively.[27] In 2008, remittances receipts are slightly lower for the high subgroup in absolute terms, but constitute a much higher share of expenditure for the low subgroup.

Given the sample stratification strategy, all households have at least one foreign migrant abroad during baseline, such that: $p(migrant) = 1$, for both subgroups. The mean number of migrants per household is 1.2 for low- and 1.36 for high-skilled households during the baseline, with 84% (78%) of the former (latter) households having just one migrant, while 16% (22%) have two or more. While sample migrants are spread across many different destinations, the number of destinations is rather concentrated within households, with only 4% of the sample having migrants in different destination countries simultaneously. As expected given the subsample selection, the distribution of migrants' educational attainment prior to departure is also polarized between the two subgroups: low households' distribution is more concentrated in the lower tail and *vice versa* for high ones.

Turning to domestic migration patterns, we observe that about 20% report a domestic migrant, with the total number of domestic migrants being twice as high for the high compared to the low subgroup. While the incidence and number of domestic migrants increases for both subgroups over time, the trend is more pronounced for the low subgroup,

[27]Note that all monetary variables are expressed in real USD (PPP) per adult capita. Low expenditure households are still considerably richer than the average Vietnamese non-migrant household that earned 1,165 USD per capita in 2008 according to the World Development Indicators.

with 20% of the sample changing status over time and the mean number of domestic migrants increasing more than threefold.

3.3 Shock Measure Construction

To construct labor market shocks that households in Vietnam were exposed to through their migrants abroad, I combine cross-sectional information on foreign migrants' destinations and their skill-levels prior to migration with time-varying data reflecting the skill-specific change in unemployment rates at destination during the crisis years. Using unemployment rates instead of alternative measures of economic shocks, such as GDP, allows me to exploit migrant-specific dynamics within each destination.[28] Based on foreign migrants' location in 2008, Figure 1 depicts the evolution of unemployment rates in the top 12 destination countries before, during, and after the Great Recession.

[Figure 1 here]

While unemployment rates started to rise in most countries only in 2008, few countries experienced a rise in 2007 already (most notably Japan, UK, and the USA). After steep, but highly differential increases in the unemployment rates across countries, levels peaked in 2009. In order to capture the crisis impact, my analysis relies on the changes in unemployment rates from the start of the crisis in late 2007 to its peak in 2009. Consequently, the benchmark shock measure is calculated as follows:

$$Shock_h = \frac{\sum_{d=1}^{D}\sum_{s=1}^{S}(M_{h,d,s,2008} \times \Delta UR_{d,s,2007-2009})}{M_{h,2008}}, \tag{3}$$

with $M_{h,d,s,2008}$ being the number of foreign migrants from household h, at destination d, with skill level s in the baseline year 2008. $UR_{d,s,2007-2009}$ is the destination-skill-specific change in unemployment rates between the crisis years 2007 to 2009. In order to proxy for the level of skills, I use data on migrants' educational attainment prior to departure following the International Standard Classification of Education with 1997 levels

[28] Due to a lack of data on foreign migrants' sector of employment abroad, I am unable to repeat the same exercise for sector-specific GDP trends.

(ISCED97). As described in Table 3, there is considerable variation in migrants' educational attainment across households, such that the benchmark shock measure is strongly household-specific. Columns two to four in panel B of Table 1 report this measure for the main destinations.[29] The distribution of migrant skills across all destinations is concentrated in the secondary education cell (65% of the total number of migrants), followed by the primary (22%), and tertiary category (13%). On average, the effective shock measure decreases with the individual levels of educational attainment within destinations, i.e. low-skilled workers experienced stronger labor market shocks compared to high-skilled ones during the Great Recession.

In robustness checks, I also use an alternative shock measure which reflects the a simple destination-specific trend in unemployment rates and is calculated as follows:

$$Shock_d = \frac{\sum_{d=1}^{D}(M_{h,d,2008} \times \Delta UR_{d,2007-2009})}{M_{h,2008}}, \tag{4}$$

with $M_{d,2008}$ being the number of foreign migrants from household h at destination d during the baseline. $UR_{d,2007-2009}$ is the destination-specific change in unemployment rates between the crisis years 2007 to 2009. Note that this measure is destination country-specific for the vast majority of sample households (96%) with one destination reported in the baseline. For those households, the shock variable turns out to be the simple destination country average, as listed in Panel B of Table 1 (column 1) and depicted in Appendix Figure 2.

4 Empirical Strategy

In order to establish the causal impact of Great Recession labor market shocks abroad on families left behind at origin, this study adopts a quasi-experimental approach as recommended by McKenzie and Yang (2012). I rely on a unique panel data set of international migrant households in Vietnam, whose migrants were spread over a large set of destina-

[29]Note that for ease of exposition, the measure reported is collapsed over three education categories. The actual variation is, however, greater and relies on the complete ISCED97 system with seven categories.

tion countries worldwide before the Great Recession occurred. The identifying variation comes from plausibly exogenous unemployment shocks during the Great Recession that affected migrants deferentially, conditional on their destination choice and educational attainment prior to migration. I estimate the following difference-in-difference benchmark equation:[30]

$$Y_{ht} = \beta_0 + \beta_1(Shock_h \times Post_t) + \alpha(X_h \times Post_t) + \gamma_{p(h)t} + \delta_h + \varepsilon_{ht} \tag{5}$$

where h indexes the household in year t, with $t = 2008$ or 2013. Y_{ht}, the dependent variable will be will be either migration incidence as measured by the number of migrants, the demographic composition of the origin household, remittances, or income/consumption, depending on the specification. $Shock_h$ is the destination- and skill-specific shock measure as calculated in equation 3 and $Post$ is a time dummy which equals 1 for the post-shock period 2013. X_h is vector of pre-crisis household and migrant baseline characteristics. δ_h are household fixed effects and $\gamma_{p(h)t}$ are sets of province of origin-year-specific dummies. ε_{ht} is the error term and standard errors are clustered according to the baseline destination country of foreign migrants.[31]. In order to cope with concerns of over rejection in standard asymptotic tests due to a small and unbalanced distribution of clusters in this empirical setting, I rely on the effective degrees of freedom (EDF) correction proposed by Young (2016).[32]

The coefficient of interest, β_1, reflects the aggregate effect of a unit change in the unemployment rate at destination on the respective outcome among households at origin in Vietnam. The identifying assumption is that if destination labor market shocks faced by

[30]Note that, in the following regression equations, I omit those terms which are effectively absorbed by the set of fixed effects included.

[31]For households who had migrants to more than one destination, the error term is clustered according to the destination country of the eldest migrant (Yang 2008)

[32]Alternatively, I also report restricted wild bootstrap p-values as proposed by Cameron et al. (2008). However, as MacKinnon and Webb (2016) show, if the number of treated clusters is small like in the given empirical context, wild restricted bootstrap (WR) p-values have a tendency to over reject and unrestricted ones to under reject and neither of them can be trusted. For this reason, I rely on the EDF p-values as the benchmark criterion for establishing inference throughout the analysis. In line with theoretical expectations, EDF p-values lie between the unrestricted and restricted wild bootstrap p-values for the vast majority of estimations. As recommended by Solon et al. (2015), regressions are unweighted as the sampling probabilities in this setting can be assumed independent of the error term based on the estimation strategy.

migrants had been of the same magnitude, then changes in outcomes at origin would not have varied systematically across families left behind. The main concern with respect to this parallel trends assumption is if the shock measure was systematically correlated with household or migrant characteristics. If the latter were also associated with differential changes in outcomes among families left behind, independent of the shock, this would bias my coefficient estimates.[33] To investigate this potential issue, I conduct a balance test of household and migrant baseline characteristics with respect to the shock measure in Appendix Table 1. The results show no evidence of systematic correlations between the shock variable and household and migrant baseline characteristics. According to the EDF p-values, seven out of 40 variables are significantly correlated with the shock measure at conventional levels of significance. Consequently, I control for these variables in all regressions by including them in the vector of pre-crisis characteristics (X_h). Conditional on controlling for X_h, treatment allocation can be regarded as plausibly exogenous. Note that the inclusion of baseline controls makes little difference to the coefficient estimates in general and, in several instances, increases the estimation precision.

To summarize, I am conducting a difference-in-differences analysis comparing affected with unaffected households at origin depending on their migrants' shock exposure abroad, before and after the shock. Note that through the set of fixed effects included in the estimation equation, my benchmark specification fully controls for observed and unobserved time-invariant factors at the level of the origin household and province of origin-specific changes over time. In order to test whether households exposed to different treatment levels followed parallel trends ex ante, I conducted the following placebo experiment. Using data on the migration history of members and migrants from the baseline survey, I reconstructed the key outcome variables for my sample households in 2003, i.e. 5 years prior to the baseline survey. I then replicate my benchmark estimation regressing the pre-crisis household outcomes in 2003 and 2008 on the original shock measure 3, i.e. as if the Great Recession had happened five years earlier. Note that this specification is a di-

[33]For instance, this could occur if high expenditure households with more educated members sent migrants to more attractive destinations which, in turn, suffered from the crisis more severely and if these educational characteristics also lead to differential outcomes at origin at the same time.

rect test for the presence of pretreatment parallel trends and the results provide evidence in favor of the identifying assumption.

Based on the considerations outlined in the theoretical framework, I am particularly interested in the heterogeneous effects of the shock along the distribution of household remittance dependence. To explore this, following my benchmark estimation, I also conduct a subgroup analysis comparing the reactions of above ("rich") and below ("poor") median consumption households separately. Recall that "poor" households received more than 50% of their expenditure at baseline from remittance on average, three times as much as rich households. To explore this, I estimate the following triple difference equation:

$$\begin{aligned} Y_{ht} =& \beta_0 + \beta_1(Shock_h \times Post_t) + \beta_2(Shock_h \times Post_t \times Rich_h) \\ &+ \beta_3(Rich_h \times Post_t) + \alpha(X_h \times Post_t) + \gamma_{p(h)t} + \delta_h + \varepsilon_{ht} \end{aligned} \tag{6}$$

where $Rich_h$ is a subgroup dummy being equal to one if the household's expenditure per capita level is above the sample median and zero otherwise. For each outcome variable, I estimate the benchmark specification 5 first for the full sample and then the subgroup specification 6 in order to analyze households' heterogeneous reactions. In the following regression tables, I report β_1 (labeled "$Shock \times Post$" in the Tables) and the triple interaction term β_2 with the subgroup dummy (labeled "$Shock \times Post \times Rich$"), respectively. Note that in the subgroup specification 6, the coefficient on β_1 reflects the effect for the "poor" subgroup (i.e. below median expenditure), while β_2 measures the difference in treatment effects between the two subgroups. The separate effect for the "rich" subgroup is determined by the net effect of the two coefficients and I report p-values of the null hypothesis on the linear restriction ($\beta_1 + \beta_2 = 0$) based on WR standard errors.

Given the continuous character of the shock measure used, each coefficient reflects the impact of a one percentage point increase in the unemployment rate during the crisis years 2007 to 2009 that households in Vietnam were exposed to through their migrants abroad. However, since the shock measure effectively ranges between -2.0 and +8.9 pp, one can also interpret the estimates as follows: multiplying the coefficients by the mean

shock measure of 2.3 (4.8) gives the effect for the average shock (respectively of one additional standard deviation). In what follows, I refer to the effect of the average shock, unless otherwise indicated.

5 Results

5.1 Foreign Migration

Results from the analysis of households' foreign migration decisions are provided in Table 4 (gender and work outcomes) and Table 5 (destination and skill selection). Starting with Table 4, columns (1) and (2) in Panel A show the results for the total number of foreign migrants. The coefficient on the full sample in column (1) is positive and statistically significant,[34] indicating an aggregate increase of around 0.15 individuals migrating to foreign destinations in response to the average shock (0.067×2.3). This translates into a 12% increase compared to baseline levels. When analyzing the effects by subgroup in column (2), the coefficient on the poor subsample is positive, statistically significant and of larger magnitude compared to column (1). The point estimate indicates a strong increase of 0.17 in the number of foreign migrants (+14% compared to baseline levels). The coefficient on the subgroup difference is negative and of smaller magnitude, suggesting that total foreign migration among rich households reacted less. The point estimate implies an increase of 0.12 individuals among this subgroup ((0.074-0.023)×2.3), which translates into a 10% increase. Note that the test of joint significance joint significance indicates that the effect for the rich subgroup is statistically different from zero.

[Table 4 here]

In columns (3) through (6) of Panel A, I disaggregate total foreign migration by gender. Results on female migration are reported in columns (3) and (4). The coefficient on the full sample in column (3) is positive and statistically significant, indicating an increase of 0.08 women migrating abroad in response to the average shock (+10%). As

[34] Throughout the analysis, I refer to the bias corrected p-values based on the effective degrees of freedom (EDF) for interpretation (Young (2016)), unless otherwise indicated.

with total foreign migration, we observe that the coefficients carry opposite signs in the subgroup analysis. The point estimate on the poor subgroup in column (4) is positive and statistically significant. Its magnitude suggests an increase of 0.1 woman migrating internationally in response to the average shock (+14%). The point estimate on the subgroup differences is negative, statistically significant, and of smaller magnitude. Note however, that the net effect is not statistically different from zero as indicated by the p-value on the linear restriction. Results on male foreign migration are reported in columns (5) and (6). The coefficient on the full sample in column (5) is positive, but statistically insignificant based on the EDF p-value. The coefficients in column (6) indicate similar effects for both subgroups, but the point estimates are statistically insignificant. The results in Panel A provide evidence that the aggregate increase in international migration is mainly driven by female migrants from the subgroup of poor migrant households.

In panel B, I focus on international labor migration in particular, i.e. a subset of foreign migrants reported for having left for labor-related motives explicitly. The point estimate on aggregate labor migration in column (1) is positive, but statistically insignificant. The coefficients in column (2) again have opposite signs, large magnitudes, and are statistically significant. The point estimate for the poor subsample is positive and suggests an increase of 0.18 labor migrants in response to the average shock or 20% with respect to baseline levels. Comparing the magnitude of the point estimate for the poor subgroup with the one of Panel A, column (2), shows that the aggregate effect is entirely driven by labor migration among the poor subgroup. In contrast, the point estimate on the subgroup differences is negative, of similar magnitude than the one for the poor subgroup, and the test of joint significance indicates that the null hypothesis for the rich subsample cannot be rejected. This provides evidence that only poor households reacted to the shock in terms of labor migration and that the aggregate migration response among rich households was driven by non-labor motives exclusively. In the remaining columns of Panel B, I proceed as before and disaggregate total labor migration by gender. Columns (3) and (4) present the results for female labor migration. While the coefficient in column (3) is small and insignificant, the point estimates from the subgroup analysis in column

(4) again show that the total effect on labor migration is mainly driven by female labor migration. The coefficient on the poor subsample suggests an increase of 0.11 women migrating abroad (+25%). The point estimate on the subgroup differences is negative, statistically significant, and the test of joint significance suggests no change in female labor migration among rich households. For completeness, columns (5) and (6) report the results on male labor migration. The coefficients in this specification are similar to the ones on aggregate male migration, both in terms of magnitudes and statistical significance, suggesting no effect.

To explore which destinations new migrants selected into ex-post, Panel A of Table 5 provides results on migration flows by destination. Given the distribution of foreign migration destinations at baseline, I disaggregate flows into the US vs. non-US, with the latter mainly including European and Asian countries as listed in Table 1. Columns (1) and (2) capture total migration into non-US destinations. The coefficient on the full sample in column (1) is positive and significant, suggesting an overall increase of 0.11 foreign migrants (+12%) to non US countries.[35] Looking at the subgroup specification in column (2), the coefficient on the poor subgroup is marginally significant and the one on the subgroup differences is zero. This appears to confirm that there are no differential effects by subgroup. Comparing the magnitudes of the coefficient from column (1) with the one on total migration in Panel A of Table 4, shows that non-US migration accounts for approximately two thirds of overall migration flows. Columns (3) and (4) report the results on labor migration to non-US destinations and the coefficient on the full sample in column (3) is close to zero, suggesting no effect. Although the coefficients in column (4) become slightly larger in magnitude, the point estimates remain statistically insignificant, suggesting that the overall increase in migration to non-US destinations is motivated mainly by non-labor motives. Columns (5) and (6) report the results for labor migration to the US. The coefficient on the full sample in column (5) is positive and statistically significant, suggesting an increase of 0.06 individuals leaving to the US for

[35] In unreported regressions, I also disaggregate non-US destinations further, for example into Asian and EU countries. Despite those tests being underpowered, they provide suggestive evidence that most of the non-US flows are targeted towards Asian destinations.

work in response to the average shock (+25%). In the subgroup analysis in column (6), we again observe that the coefficients become larger in magnitude, carry opposite signs, and are statistically significant. The point estimate for the poor subgroup is positive, suggesting an increase of 0.13 individuals leaving for work to the US (+60%). On the other hand, the point estimate on the subgroup differences is negative and of similar magnitude, suggesting no effect among rich households. Comparing the magnitudes of the effect in column (6) with those on aggregate labor migration in Panel B of Table 4 shows that labor migration to the US accounts for 70% of the overall effect on labor migration.

[Table 5 here]

After having explored selection into specific destinations as a reaction to the crisis, further questions of interest are related to the comparison of established versus new migrants from a given household in terms of skill selection and destination diversification: are additional migrants more or less skilled than previous ones and do they target new destinations or those of previous migrants from the same household? Columns (1) and (2) report the results on skill selection. Here, the dependent variable is the average education level of foreign migrants in each household based on the ISCED-97 scale. The coefficient in column (1) is small, positive, and statistically insignificant. While the point estimate does not rule out a marginal increase in the average skill level, the magnitude appears economically insignificant compared to the baseline mean of 2.67. In column (2), the point estimates become larger in magnitude and carry opposite signs, but remain statistically insignificant. This implies no effect on changes in skill selection or, in other words, that new migrants are largely comparable to previous ones in terms of education levels.[36] Turning to the second question about households' destination diversification, columns (3) and (4) report the results from a specification taking the number of unique destination countries among international migrants from the same household as the dependent variable. Note that the descriptive statistics show very few households actually having

[36]In unreported regressions, I also analyze the average education level of labor migrants. The point estimate on the poor subsample is negative and slightly larger than the one for total migration, but it remains statistically insignificant.

a diversified destination country portfolio (approximately 4% report more than one at baseline). The coefficients from this specification are generally small and statistically insignificant, indicating no such effect whatsoever. This implies a high degree of path dependency in the selection of destinations among foreign migrants: despite of the shock abroad, additional foreign migrants targeted the same destinations of previous migrants instead of diversifying into new ones. This is consistent with an explanation of household migration networks or chain migration, in which the destination choice of established migrants is highly predictive of the one of subsequent ones. In columns (5) and (6), the dependent variable is a dummy which equals 1 if the destination country of the eldest migrant changes between baseline and follow-up. Note that the coefficients here turn out be statistically insignificant, providing no evidence of crisis related destination changes.

5.2 Domestic Migration

The results on households' domestic migration decisions are provided in Table 6.[37] Column (1) and (2) provide the results for the total number of domestic migrants in the household. The point estimate on the full sample in column (1) is negative and statistically insignificant. Looking at the coefficients in column (2), we again observe that the estimates becomes larger in magnitude, statistically significant and carry opposite signs. The point estimate for the poor subgroup is negative and suggests a decrease of 0.17 (0.075×2.3) in the number of domestic migrants in response to the average shock. This translates into a decrease of more than 50% compared to baseline levels of domestic migration. For the rich subsample, the effect is zero as indicated by the test of joint significance. Note that the magnitude of the point estimate on domestic migration among poor households is almost identical to the one on foreign migration with opposite signs, suggesting a one to one substitution of domestic migrants with foreign ones in net terms.

[37] Note that there are two different specifications in this table: coefficients in columns (1) and (2) are estimated according to equation 5 and 6, respectively, and can be considered causal effect estimates. Due to missing information on a range of domestic migrant characteristics in the baseline survey, the dependent variable in estimations in columns (3) through (6) is only cross-sectional and estimated as $Y_h = \beta_0 + \beta_1(Shock_h) + \beta_2(Shock_h \times Rich_h) + \gamma_{p(h)} + \varepsilon_h$ on the follow-up wave in 2013. For this reason, these coefficients should only be interpreted as suggestive evidence, reflecting correlations instead of causal effects.

[Table 6 here]

Columns (3) and (4) present suggestive evidence on domestic labor migration.[38] The results are similar to the previous ones in terms of sign and statistical significance, although of slightly lower magnitude. The coefficient on the poor subsample in column (4) indicates a negative correlation between the shock measure and the number of domestic labor migrants ex-post. This provides suggestive evidence that the aggregate decrease in domestic migration may be driven by labor migration in particular. Again, the null hypothesis for the test of joint significance cannot be rejected, implying no such correlation among the rich subgroup. In columns (5) and (6), labor migration is further diasggregated into flows targeting long-distance domestic destinations, i.e. outside of the households' province of origin. The results are qualitatively and quantitatively similar to the ones on labor migration, providing suggestive evidence that total domestic and labor migration is mainly driven by long-distance movements. Note that most of domestic migration in Vietnam is targeted towards the two industrial centers in the North (Hanoi) and South (Ho Chi Minh City), which tend to be located relatively far from most origin areas due to the geographical shape of the country. If anything, this indicates that families of domestic migrants left behind at the origin are likely to live separated from their migrants for most of the time throughout the year.

Summarizing the findings on foreign and domestic migration so far, the analysis provides evidence that labor market shocks abroad led to important changes in subsequent migration decisions among families left behind in Vietnam. Poor migrant households responded by increasing the number of foreign migrants by 0.17 individuals (+14%). This increase was driven entirely by labor migration and female labor migration and labor migration to the US accounted for 60 and 70% of the aggregate effect, respectively. Simultaneously, poor households also decreased the number of domestic migrants by the same margin (0.17 individuals) in response to the average shock and suggestive evidence was presented that indicates that this effect could be driven by long-distance domestic

[38]Note that this specification captures only permanent domestic migration in the sense that domestic migrants are not considered household nucleus members anymore, based on the survey definition. This also excludes temporary or seasonal migration as well as commuting household members.

labor migration. The differential reactions of poor households along the two migration dimensions can be interpreted as a substitution effect between domestic and international migration in response to the crisis abroad. In line with the theoretical framework, these findings suggest that the elasticity of foreign (domestic) labor migration with respect to foreign wages was negative (positive) for the poor subgroup. Interestingly, the magnitudes of the decrease in domestic and increase in foreign migration are almost identical, suggesting a one-to-one substitution among poor households in net terms. I find no evidence of changes in skill selection or a diversification in foreign destination portfolios. In contrast, rich migrant households remained largely resilient and did not revise their domestic or foreign labor migration decisions. If anything, they slightly increased the number of foreign migrants for non labor-related motives, mainly to Asian destination countries. For rich households, these changes in migration decisions should result in a net outflow of nucleus members or, in other words, a decrease in the household size at origin. In what follows, I take stock of the demographic composition of the family left behind and analyze how the changes in migration patterns presented are reflected at the origin.

5.3 Origin Household

Results on the demographic composition are presented in Table 7. The specification in columns (1) and (2) of Panel A captures the total number of household nucleus members (i.e. the household nucleus size, excluding any migrants). The point estimate on the full sample in column (1) is close to zero, but statistically insignificant. When looking at the subgroup analysis in column (2), however, the two coefficients turn out to be large in magnitude and carry opposite signs. The point estimate for the poor subsample is positive, but statistically insignificant. In contrast, the one on the subgroup differences is negative, statistically significant, and its magnitude is almost twice as large as the one for the poor subgroup. This suggests a decrease in the size of rich households at origin, consistent with the changes in migration patterns observed for this subgroup. Note, however, that the point estimates have relatively large standard errors and, therefore,

the net effect is not statistically significant.

[Table 7 here]

Looking at the subgroup of household members reported working at origin in column (3), the coefficient is small and positive, but insignificant. Once estimated separately for the two subgroups in column (4), both point estimates turn out to be small in magnitude and statistically insignificant, indicating no effect on labor supply at origin.[39] Reassuringly, this corresponds closely to the magnitudes of international and domestic labor migration, which seem to cancel out each other among poor households. Moving on to columns (5) and (6), which capture the number of male household members, the point estimate on the full sample is zero. In column (6), however, we again observe that the coefficients turn larger in magnitude and carry opposite signs. The point estimate on the poor subgroup is small and positive, but statistically insignificant, while the coefficient on the subgroup differences is twice as large in magnitude, suggesting a decrease in the number of male members. Note, however, that the net effect is not statistically different from zero. A potential explanation a decrease in the number of male members comes from the foreign migration results, which provide suggestive evidence of a small increase in the number of male international migrants.

The results from Panel A are consistent with those on migration for poor households as domestic and foreign migration is balanced in net terms and does not lead to a change in the household size for this subgroup. For rich households, the results provide suggestive evidence of a decrease in the household size at origin, which can be partly explained by the net outflow of members to foreign destinations for non-labor motives. Apart from migration decisions, an additional interesting factor that could explain changes in household size is fertility.[40] Therefore, I shed light on this dimension by focusing the analysis on the gender dimension, cohabitation of intimate partners, and fertility decisions

[39]Note that this specification captures only the extensive margin of labor supply through the number of household members reported working. Due to data limitations, I do not observe the intensive margin of labor supply as measured by the number of hours working.

[40]For completeness, mortality could also influence household size and I investigate this in unreported regressions. The coefficients from this exercise are, however, close to zero and statistically insignificant, providing no such indication.

at origin.

In columns (1) and (2) of Panel B, I first report the results on the total number of female members. While the coefficient in column (1) is zero, the ones from the subgroup analysis in column (2) are similar to the ones on male members (Panel A, column (6)), but of slightly larger magnitude. The point estimate for the poor subgroup is positive but statistically insignificant. If anything, it suggests an increase among poor households. The point estimate on the subgroup difference is negative, statistically significant, and of larger magnitude. However, the null hypothesis for the net effect cannot be rejected, suggesting no effect among the rich subgroup. Given that the gender balance among household members at origin did not change systematically, an open question is concerning the cohabiting situation of intimate partners, who might have been separated by distance during previous migration spells. In other words, do changes in migration decisions result in the reunification of couples? In columns (3) and (4), I therefore analyze the number of females of fertile age (16–50 years) who report living in the same household with their intimate partner. While the point estimate on the full sample in column (3) is close to zero and statistically insignificant, the coefficients in column (4) are large in magnitude, statistically significant, and carry opposite signs again. The point estimate for the poor subsample is positive and indicates an increase of 0.10 in the number of women of fertile age cohabiting with their partner (+20%). In contrast, the coefficient on the subgroup difference is negative, of similar magnitude, and the test of joint significance does not reject the null hypothesis, indicating no effect for the rich subsample. This provides evidence that the changes in migration patterns resulted in a reunification of intimate partners at the household of origin. Note that this result is also informative about the question: *who* returns to the household from domestic destinations and departs overseas? It provides indirect evidence that domestic migrants with an intimate partner left behind selected to return to the origin, while single members at origin left to go abroad instead. In other words, this suggests that the substitution of domestic with foreign migration was indirect and not driven by the same individual changing status from domestic to

international migrant.[41] Finally, I analyze the number of young children between the age of 0–5 years (i.e. those who were born only after the baseline survey). The coefficient for the full sample in column (5) is close to zero and statistically insignificant. When estimated separately in column (6), again we observe strong subgroup heterogeneity: the point estimate for the poor subsample is positive and indicates an increase in the number of young children (0–5 years) of 0.12 for the mean shock (+50%). Note that the magnitude is similar to the one in column (4), which suggests that every couple, previously separated due to migration of the partner, turns out to have had one child on average upon reunification, during the five years between baseline and follow-up. In contrast, fertility among rich households did not change. With respect to the suggestive evidence about the overall increase in family size among the poor, the increase in fertility appears to be the main driver.

Taken together, the results on the overall size of the family left behind correspond to balanced net migration among the poor subgroup. They also provide evidence of selective sorting of domestic migrants, resulting in increased cohabitation of intimate partners at the origin and a strong increase in fertility. In other words, the shock triggered parental reunification among the poor subgroup and lead to a realization of supposedly postponed fertility decisions. For rich households, they confirm once more that this subgroup remained largely unaffected by the crisis. In what follows, I turn to the analysis of remittances and household financial outcomes to evaluate the monetary consequences of the documented changes in migration and demographic composition.

5.4 Remittances and Household Finance

I first analyze how remittances responded to the changes in migration patterns and compare the results to those for household income, changes in liquid assets, and expenditure. A way to understand this exercise is to write down the household budget constraint. In period t, the household generates income y_t^h from its activities at home, receives transfers

[41] In unreported regressions, I also investigate whether household members married in reaction to the shock, so as to rule out that the increase in cohabitation was indeed due to changes in migration and caused by the formation of new partnerships among household members left behind. The results do not provide evidence of the latter explanation.

from domestic and foreign migrant sources $\tau_t = \sum_s \tau_t^s$ $(s \in \{d, f\})$, and adjusts its asset position Δb_t. Transfers are positive if there is a net inflow of remittances to the origin household and Δb_t is negative if the household depletes its assets during the period. Finally, the household consumes c_t, such that:

$$y_t + \tau_t - \Delta b_t = c_t.$$

The shock produced a strong decrease in remittances from foreign migrants (τ_t^f) initially,[42] and I want to study households' medium-term financial outcomes after demographic and labor supply adjustments, and whether $\tau_t - \Delta b_t$ is sufficiently large to allow the household to maintain constant consumption.

The results on remittances receipts from foreign migrants and household finance are presented in Table 8.[43] Columns (1) and (2) report the results on total remittance receipts from foreign migrants. The coefficient in column (1) is positive and large in magnitude, suggesting a 50% increase for the average shock. In the subgroup analysis in column (2), the point estimate on the poor subgroup is positive as well, although slightly lower in magnitude compared to column (1), suggesting a 30% increase among poor households. Finally, the coefficient on the subgroup differences is positive too, suggesting that remittances increased more strongly among rich households. Note, however, that in both specifications standard errors are large and statistical test under powered and results should only be considered suggestive.

[Table 8 here]

Columns (3) and (4) present the results on home income. The point estimates are zero altogether, indicating no effect on income generation among household members at origin. This is consistent with the result on the number of working household members

[42] Due to the timing of the survey, I do not observe the level of remittances in the direct aftermath of the crisis in 2010. Nevertheless, aggregate remittance statistics for Vietnam during the crisis years 2007–2009 leave no doubt about the strong negative effect of the Great Recession on foreign remittance receipts.

[43] Note that all variables are expressed in logarithmic US$ (PPP) per adult capita, i.e., adjusted by the number of adult nucleus members, excluding any migrants. In unreported regressions, I also find the results to be robust to a specification with total household financial outcomes.

in Panel A of Table 7, which showed no change in response to the shock.

The specifications in columns (5) and (6) capture the change in the household asset position as measured by the stock of savings in cash and kind. The coefficient on the full sample is small and negative, but insignificant, providing suggestive evidence of general decrease in savings. The estimates in column (6) for the poor subgroup is larger in magnitude, negative, but insignificant. If anything, it indicates that the decrease in assets was affecting particularly poor households, since the coefficient on the subgroup difference is positive and of similar magnitude. However, statistical tests are under powered and should only be viewed as suggestive evidence.

Turning to the last specification in columns (7) and (8), the coefficient on the full sample is small and negative, but statistically insignificant according to the EDF p-value. In the subgroup analysis in column (8), however, the coefficients become larger, turn statistically significant, and carry opposite signs. The point estimate for the poor subgroup suggests a decrease in total expenditure of around 12% for the average shock. On the other hand, the point estimate for the subgroup difference is positive and of similar magnitude and the test of joint significance indicates no effect for the rich subgroup.

Taken together, the results on remittances and household financial outcomes provide some evidence that poor households achieved to increase remittances by allocating additional labor migrants abroad. Remittances among rich households, however, appear to have recovered even more strongly while having kept foreign labor migration constant. Potential explanations for this may have been that migrants from the rich subgroup were more resilient to the initial shock or more able to cope with the shock which allowed them to recover more quickly. Home income generation remained generally stable for both subgroups in line with the constant allocation of household members to labor. The results also provide suggestive evidence of a negative effect on the asset position (Δb_t) of the poor subgroup. This is consistent with the fact that foreign migration, especially to high-income countries like the US, tends to be quite expensive for Vietnamese and requires substantial upfront investment on behalf of sending households (Hoang and Yeoh 2015). Apart from the costs for additional migrants, which appear to have had a nega-

tive effect on the household asset position, financial resources might have also been used directly as a coping instrument to compensate for a loss of remittances in the aftermath of the crisis, but I am unable to differentiate that due to data constraints. With respect to the household budget constraint, the deterioration of the asset position among the poor subgroup appears to have outweighed overall gains in remittances, such that this subgroup was still forced to adjust expenditure downwards. The results in column (6) support this interpretation with the corresponding point estimate suggesting a decrease of 12% in expenditures, while they document no effect for the rich subgroup.

6 Robustness Checks

I perform a series of robustness checks that are divided into two groups for the ease of exposition: placebo tests are reported in Appendix Table 2 and modifications of the shock measure and outcome variables in Table 3. Starting with Table 2, panel A presents the results when estimating equation 5 in a placebo shock setup between the years 2003 and 2008 as if the Great Recession had happened five years earlier.[44] Note that this is a direct test for the presence of parallel trends in the pretreatment period, i.e. before the occurrence of the Great Recession. The coefficients are small and statistically insignificant according to the EDF p-values, providing no evidence of any significant correlations between the economic shocks in destination countries and the trends in the outcome variables before the occurrence of the Great Recession. Note that although the coefficient on the subgroup difference in column (6) is weakly significant according to the EDF p-value, the test of joint significance does not reject the null hypothesis for the rich subgroup.

In panel B and C, I rely on the sample of non-migrant households from the same survey which, by definition, had not been exposed to unemployment shocks abroad through any migrants. I assign those households the average shock of neighboring migrant households

[44]In this exercise, I rely on demographic recall data from the baseline survey in order to reconstruct the main outcomes of interest at the household level in 2003. I then replicate my benchmark estimation regressing the pre-crisis household outcomes in 2003 and 2008 on the original shock measure 3, i.e. as if the Great Recession had happened five years earlier.

from the same enumeration area.[45] I then estimated equation 5 on the sample of non-migrant households to analyze the correlation of economic shocks abroad on the outcomes of non-migrant households in Vietnam. Again, the coefficients from this exercise tend to be small and statistically insignificant altogether. Reassuringly, the results suggest that labor market shocks in migrant destination countries during the Great Recession did not have any impact at origin other than through households' foreign migrants at the destination.

Panel A of Appendix Table 3 presents the coefficients from the estimations using the alternative shock measure as calculated by formula 4 (i.e. destination-specific variation only). Comparing the coefficients across the different specifications shows that the results are both quantitatively and qualitatively in line with the ones from the benchmark specification. Note, however, that standard errors in some of these tests are slightly larger and significance levels lower, which stems from the fact that the treatment variation of the shock variable in these specifications is vastly inferior, compared to the benchmark one.

In panel B, the dependent variable is specified to be the net number of the respective outcome, instead of the total numbers. Consequently, these variables capture the change in the outcome variables between period $t-1$ and t for both waves in 2008 and 2013. Again, the results are very similar, both in qualitative and quantitative terms, compared to the ones from my benchmark estimations.

Another potential concern in this empirical setting is related to sample attrition, which can be worrisome if it is correlated with the shock variable. Sample selectivity could then lead to biased estimates. To explore this potential issue, I run regressions

[45]Each enumeration area (EA) is constituted by small sub-village level entities in rural areas or blocks in urban ones, and contains around 100 households, on average. This matching routine appears adequate for two reasons: first, households tend to be quite homogeneous within EAs in Vietnam, which makes them comparable in terms of observable characteristics. Second, migration networks tend to have a strong spatial correlation at the local level and, therefore, foreign migration destinations are highly clustered within EAs. This implies that migrant households from the same neighborhood tend to be highly representative of potential migration options that neighboring non-migrant households are exposed to. On average, there are around 3 households per EA and, in line with the sample stratification strategy, one migrant and one non-migrant household in each of them. In 40 out of 466 EAs where more than one migrant household is present, I randomly chose one of them to be matched to the non-migrant household.

on the cross-section of households at baseline in 2008 with the dependent variable being an attrition indicator for households that could not be tracked in the follow-up survey in 2013 (=1 and 0 otherwise) in order to check that attrition is not correlated with the shock. The coefficient on the shock measure is small and statistically insignificant, providing no evidence that attrition could be a problem in this setting (coefficient: 0.0061, standard error: 0.0049). Additionally, in unreported regressions, I estimate the benchmark specification on the unbalanced household panel. The results are similar to those from the balanced benchmark regressions, both qualitatively and quantitatively.

7 Conclusion

The results presented in this study document that labor market shocks abroad, which translated into income shocks for the household at origin through remittances, led to large and heterogeneous changes in subsequent migration decisions, labor supply, and the demographic composition among families left behind in Vietnam. In reaction to the shock, poor remittance-dependent migrant households substituted domestic migrants with international ones. These effects were driven by labor migration in particular, and new foreign migrants were predominantly female and targeted the US. I find no evidence of a diversification of foreign migrant destinations at the household level which is consistent with the importance of migrant networks for facilitating chain migration. The results suggest no changes in intra-household skill selection, but of aggregate changes with new migrants leaving exclusively from the subgroup with lower overall eduction levels. Previous migrants with intimate partners left behind sorted selectively into returning to the origin, leading to an increase in cohabitation and resulting in a large increase in fertility. These results reveal that different types of migration are interrelated and jointly determine outcomes among families left behind.

These findings have important implications for policy makers both in origin and destination countries concerned with the effects of migration on either side of the corridor. With respect to migration-led development strategies in sending countries, the results in

this study can help informing the debate about interrelated (and potentially unexpected) side effects of migration. With respect to the effects of migration at destination, the findings can help improving our understanding of the determinants of migrant inflows and selection issues that may result from such economic shocks at destination. Lastly, the results also provide important implications for migration research in general and calls for a joint analysis of the two types of migration, especially in research concerned with the effects of migration on the family left behind.

The analysis in this article does not account for potential spillover effects on either end of the migration corridor. While the impact on the destination country is out of the scope of this paper, sustained immigration despite economic crises raises important questions about the impact on the host economy: where do new low-skilled newcomers work, which jobs are they doing, and how do their skills compete with those of the native population? Also, what role do host country immigration policies play in this context and is there a case for a change in these policies? Further research is required to answer these important questions.

Bibliography

Abarcar, P.: 2017, The return motivations of legal permanent migrants: Evidence from exchange rate shocks and immigrants in Australia, *Journal of Economic Behavior and Organization* **144**, 62–77.

Abella, M. I. and Ducanes, G. M.: 2011, The economics prospects of Viet Nam and What it means for migration policy, *Technical report*, International Labour Organization.

Abramitzky, R., Boustan, L. P. and Eriksson, K.: 2012, Europe's tired, poor, huddled masses: Self-selection and economic outcomes in the age of mass migration, *American Economic Review* **102**(5), 1832–1856.

Akee, R.: 2010, Who Leaves? Deciphering Immigrant Self-Selection from a Developing Country, *Economic Development and Cultural Change* **58**(2), 323–344.

Alcaraz, C., Chiquiar, D. and Salcedo, A.: 2012, Remittances, schooling, and child labor in Mexico, *Journal of Development Economics* **97**(1), 156–165.

Amuedo-Dorantes, C. and Pozo, S.: 2006, Migration, Remittances, and Male and Female Employment Patterns, *American Economic Review* **96**(2), 222–226.

Angelucci, M., Hanson, G., Hirano, K., Jayachandran, S. and Meghir, C.: 2015, Note Migration and Financial Constraints: Evidence From Mexico, *The Review of Economics and Statistics* **97**(March), 224–228.

Antman, F.: 2012, The impact of migration on family left behind, *International Handbook on the Economics of Migration*, number 6374, Edward Elgar Publishing, chapter 16, pp. 1–34.

Antman, F. M.: 2006, International Migration and Gender Discrimination among Children Left Behind, *American Economic Review: Papers and Proceedings* **101**(3), 645–649.

Antman, F. M.: 2011, The intergenerational effects of paternal migration on schooling and work: What can we learn from children's time allocations?, *Journal of Development Economics* **96**(2), 200–208.

Ardington, C., Case, A. and Hosegood, V.: 2009, Labor supply responses to large social transfers: Longitudinal evidence from South Africa, *American Economic Journal: Applied Economics* **1**(1), 22–48.

Baez, J., Caruso, G., Mueller, V. and Niu, C.: 2017, Droughts augment youth migration in Northern Latin America and the Caribbean, *Climatic Change* **140**(3-4), 423–435.

Barsbai, T., Steinmayr, A., Yang, D., Tiongson, E. and Licuanan, V.: 2018, Harnessing the Development Benefits of International Migration: A Randomized Evaluation of Enhanced Pre-Departure Orientation Seminars for Migrants from the Philippines, *Randomised control trial*, Ongoing 3ie Funded Studies.

Batista, C., Lacuesta, A. and Vicente, P. C.: 2011, Testing the Brain Gain Hypothesis: Micro-Evidence from Cape Verde, *Journal of Development Economics* **97**(1), 32–45.

Bazzi, S.: 2017, Wealth heterogeneity and the income elasticity of migration, *American Economic Journal: Applied Economics* **9**(2), 219–255.

Beine, M., Docquier, F. F. and Rapoport, H.: 2008, Brain Drain and Human Capital Formation in Developing Countries: Winners and Losers, *Economic Journal* **118**(1), 631–652.

Beine, M., Docquier, F. and Rapoport, H.: 2001, Brain drain and economic growth: Theory and evidence, *Journal of Development Economics* **64**(1), 275–289.

Beine, M., Docquier, F. and Schiff, M.: 2013, International Migration , Transfers of Norms and Home Country Fertility, *Canadian Journal of Economics* **46**(4), 1406–1430.

Bell, M. and Charles-Edwards, E.: 2013, Cross-national comparisons of internal migration: An update on global patterns and trends, *Technical Report 2013/1*.

Bertoli, S. and Bertoli, S.: 2017, The Elasticity of the Migrant Labor Supply: Evidence from Temporary Filipino Migrants, *The Journal of Development Studies* **53**(11), 79–100.

Bertoli, S., Fernández-Huertas Moraga, J. and Ortega, F.: 2013, Crossing the border: Self-selection, earnings and individual migration decisions, *Journal of Development Economics* **101**(1), 75–91.

Bertoli, S. and Marchetta, F.: 2015, Bringing it All Back Home-Return Migration and Fertility Choices, *World Development* **65**(January), 27–40.

Binci, M. and Giannelli, G. C.: 2018, Internal versus International Migration: Impacts of Remittances on Child Labor and Schooling in Vietnam, *International Migration Review* **52**(1), 43–65.

Binzel, C. and Assaad, R.: 2011, Egyptian men working abroad: Labour supply responses by the women left behind, *Labour Economics* **18**(SUPPL. 1), S98 – S114.

Blau, F. D., Kahn, L. M. and Papps, K. L.: 2011, Gender, source country characteristics, and labor market assimilation among immigrants, *Review of Economics and Statistics* **93**(1), 43–58.

Bohra-Mishra, P., Oppenheimer, M. and Hsiang, S. M.: 2014, Nonlinear permanent migration response to climatic variations but minimal response to disasters, *Proceedings of the National Academy of Sciences* **111**(27), 9780–9785.

Borjas, G. J.: 1987, Self-Selection and the Earnings of Immigrants, *The American economic review* **77**(4), 531–553.

Borjas, G. J.: 1991, Immigration and self-selection, *in* J. M. Abowd and R. B. Freeman (eds), *Immigration, Trade and the Labor Market*, pp. 29–76.

Boustan, L. P., Kahn, M., Rhode, P. and Yanguas, M. L.: 2017, The Effect of Natural Disasters on Economic Activity in US Counties: A Century of Data, *NBER Working Paper 23410* .

Brauw, A. D. and Harigaya, T.: 2004, Seasonal Migration and Improving Living Standards in Vietnam Seasonal Migration and Improving Living Standards in Vietnam, *American Journal of Agricultural Economics* **89**(2), 430–447.

Bryan, G., Chowdhury, S. and Mobarak, A. M.: 2014, Underinvestment in a Profitable Technology: The Case of Seasonal Migration in Bangladesh, *Econometrica* **82**(5), 1671–1748.

Cadena, B. C. and Kovak, B. K.: 2013, Immigrants Equilibrate Local Labor Markets: Evidence from the Great Recession, *American Economic Journal: Applied Economics* **8**(3), 1–58.

Cameron, A. C., Gelbach, J. B. and Miller, D. L.: 2008, Bootstrap-Based Improvements for Inference with Clustered Errors, *Review of Economics and Statistics* **90**(3), 414–427.

Cervantes Gonzalez, J. A. and del Pino, A. B.: 2012, Remittance Flows to Mexico and Employment and Total Earnings of Mexican Immigrant Workers in the United States, *in* J. H. Cohen, D. Ratha and I. Sirkeci (eds), *Migration and Remittances during the Global Financial Crisis and Beyond*, The World Bank, chapter 16, pp. 193–212.

Chen, K., Chiang, S. and Leung, S. F.: 2003, Migration, Family, and Risk Diversification, *Journal of Labor Economics* **21**(2), 353–380.

Chernina, E., Castañeda Dower, P. and Markevich, A.: 2014, Property rights, land liquidity, and internal migration, *Journal of Development Economics* **110**, 191–215.

Chiquiar, D. and Hanson, G. H.: 2005, International Migration , Self-Selection, and the Distribution of Wages: Evidence from Mexico and the United States, *Journal of Political Economy* **113**(2), 239–281.

Chiswick, B. R.: 1999, Are immigrants favorably self-selected?, *American Economic Review* **89**(2), 181–185.

Clark, X., Hatton, T. J. and Williamson, J. G.: 2007, Explaining U.S. immigration, 1971–1998, *Review of Economics and Statistics* **89**(May), 359–373.

Clemens, M. A., Montenegro, C. E. and Pritchett, L.: 2008, The Place Premium: Wage Differences for Identical Workers across the U . S . Border, *Working Paper 148*, Center for Global Development.

Coxhead, I., Cuong, N. V. and Vu, L. H.: 2015, Migration in Vietnam: New Evidence from Recent Surveys, *Vietnam Development Economics Discussion Paper 2*, The World Bank.

Dang, N. A., Tran, T. B., Nguyen, N. Q. and Dao, T. S.: 2010, Development on the Move: Country Report Vietnam, *Technical report*, Global Development Network (GDN) and Institute for Public Policy Research (IPPR).

de Brauw, A. and Giles, J.: 2017, Migrant Opportunity and the Educational Attainment of Youth in Rural China, *Journal of Human Resources* **52**(1), 272–311.

De Janvry, A., Emerick, K., Gonzalez-Navarro, M. and Sadoulet, E.: 2015, Delinking land rights from land use: Certification and migration in Mexico, *American Economic Review* **105**(10), 3125–3149.

De La Brière, B., Sadoulet, E., De Janvry, A. and Lambert, S.: 2002, The roles of destination, gender, and household composition in explaining remittances: An analysis for the Dominican Sierra, *Journal of Development Economics* **68**(2), 309–328.

di Gropello, E., Nesmith, K., Yilmaz, Y. and Mai, T. T.: 2008, Vietnam : Higher Education and Skills for Growth, *Technical Report 44428*, World Bank.

Docquier, F. and Rapoport, H.: 2012, Globalization, Brain Drain, and Development, *Journal of Economic Literature* **50**(3), 681–730.

Dolfin, S. and Genicot, G.: 2010, What do networks do? The role of networks on migration and "coyote" use, *Review of Development Economics* **14**(2), 343–359.

Edwards, A. C. and Ureta, M.: 2003, International migration, remittances, and schooling: Evidence from El Salvador, *Journal of Development Economics* **72**(2), 429–461.

Fajardo, G., Gutierrez, E. and Larreguy, H.: 2018, Taking One for the Team: Shocks at Destination and Household's Supply of Migrants.

Fargues, P.: 2007, demographic benefit of international migration: hypothesis and its application to Middle Eastern and North African countries, *in* O. Caglar and M. Schiff (eds), *International Migration, Economic Development and Policy*, The World Bank, Washington, pp. 161–182.

Fargues, P.: 2011, International migration and the demographic transition: A two-way interaction, *International Migration Review* **45**(3), 588–614.

Feliciano, C.: 2005, Educational Selectivity in U.S. Immigration: How Do Immigrants Compare to Those Left behind?, *Demography* **42**(1), 131–152.

Fernández-Huertas Moraga, J.: 2013, Understanding different migrant selection patterns in rural and, *Journal of Development Economics* **103**, 182–201.

Gibson, J.: 2015, The Long-Term Impacts of International Migration Evidence from a Lottery, *World Bank Economic Review* **32**(November), 127–147.

Gibson, J., McKenzie, D. and Stillman, S.: 2011, The impacts of international migration on remaining household members: Omnibus results from a migration lottery program, *Review of Economics and Statistics* **93**(4), 1297–1318.

Greenwood, M. J.: 1985, Human migration: theory, models, and empirical studies, *Journal of Regional Science* **25**(4), 521–544.

Gröger, A. and Zylberberg, Y.: 2016, Internal labor migration as a shock coping strategy: Evidence from a typhoon, *American Economic Journal: Applied Economics* **8**(2), 123–153.

Grogger, J. and Hanson, G. H.: 2011, Income maximization and the selection and sorting of international migrants, *Journal of Development Economics* **95**(1), 42–57.

Guillaume, D., Raphaël, F. and Rapoport, H.: 2018, Can Internal Migration Foster the Convergence in Regional Fertility Rates? Evidence from 19th Century France, *Economic Journal* (forthcoming).

Halliday, T.: 2006, Migration, Risk, and Liquidity Constraints in El Salvador, *Economic Development and Cultural Change* **54**(4), 893–925.

Hanson, G. H. and McIntosh, C.: 2012, Birth Rates and Border Crossings: Latin American Migration to the US, Canada, Spain and the UK, *Economic Journal* **122**(561), 707–726.

Hanson, G. H. and Spilimbergo, A.: 1999, Illegal immigration, border enforcement, and relative wages: Evidence from apprehensions at the U.S.-Mexico border, *American Economic Review* **89**(5), 1337–1357.

Hanson, G. and McIntosh, C.: 2016, Is the Mediterranean the New Rio Grande? US and EU Immigration Pressures in the Long Run, *Journal of Economic Perspectives* **30**(4), 57–82.

Hardy, A.: 2001, Rules and Resources : Negotiating the Household Registration System in Vietnam, *Journal of Social Issues in Southeast Asia* **16**(2), 187–212.

Hatton, T. J. and Williamson, J. G.: 1993, After the Famine: Emigration from Ireland, 1850–1913, *The Journal of Economic History* **53**(3), 575–600.

Hervitz, H. M.: 1985, Selectivity, Adaptation, or Disruption? A Comparison of Alternative Hypotheses on the Effects of Migration on Fertility: the Case of Brazil., *The International migration review* **19**(2), 293–317.

Hiday, V. A.: 1978, Migration, Urbanization, and Fertility in the Philippines, *International Migration Review* **12**(3), 370–85.

Hildebrandt, N. and McKenzie, D. J.: 2005, The Effects of Migration on Child Health in Mexico, *Economía* **6**(1), 257–289.

Hoang, L. A. and Yeoh, B. S. A.: 2015, *Transnational Labour Migration, Debts and Family Economics in Vietnam*, Palgrave Macmillan UK, London, pp. 283–310.

Hongbo, W.: 2015, World Population Prospects: The 2015 Revision, *Technical report*, United Nations Department of Economic and Social Affairs, Population Division.

Hornbeck, R.: 2012, The enduring impact of the American Dust Bowl: Short- and long-run adjustments to environmental catastrophe, *American Economic Review* **102**(4), 1477–1507.

Ibarraran, P. and Lubotsky, D. H.: 2005, Mexican Immigration and Self-Selection: New Evidence from the 2000 Mexican Census, *Mexican Immigration to the United States*, NBER Chapters, National Bureau of Economic Research, Inc, pp. 159–192.

Imbert, C. and Papp, J.: 2018, Costs and Benefits of Seasonal Migration: Evidence from India, *The Warwick Economics Research Paper Series No. 1161* .

IOM/Gallup: 2011, GallupWorld Poll: The Many Faces of Global Migration.

Jayachandran, S.: 2006, Selling Labor Low: Wage Responses to Productivity Shocks in Developing Countries, *Journal of Political Economy* **114**(3), 538–575.

Kleemans, M. and Magruder, J.: 2018, Labor markets changes in response to immigration: evidence from internal migration driven by weather shocks, *Economic Journal* (forthcoming).

Lindstrom, D. P. and Saucedo, S. G.: 2007, The interrelationship between fertility, family maintenance, and Mexico-U.S. migration, *Demographic Research* **17**, 821–858.

Lokshin, M. and Glinskayai, E.: 2008, The effect of male migration for work on employment patterns of females in Nepal, *World Bank Policy Research Working Paper Series, Vol* **23**(3), 481–507.

Lundberg, S.: 1985, The Added Worker Effect, *Journal of Labor Economics* **3**(1, Part 1), 11–37.

MacKinnon, J. G. and Webb, M. D.: 2016, The Subcluster Wild Bootstrap for Few (Treated) Clusters, *Queen's Economics Department Working Paper No. 1364* .

Macours, K. and Vakis, R.: 2007, Seasonal Migration and Early Childhood Development Summary Findings, *World Development* **38**(6), 857–869.

Mahajan, P. and Yang, D.: 2017, Taken by Storm: Hurricanes, Migrant Networks, and U.S. Immigration, *Working Paper 23756*, National Bureau of Economic Research.

Marchiori, L., Maystadt, J. F. and Schumacher, I.: 2012, The impact of weather anomalies on migration in sub-Saharan Africa, *Journal of Environmental Economics and Management* **63**(3), 355–374.

Marx, V. and Fleischer, K.: 2010, Internal migration Opportunitites and challenges for socio-economic development in Viet Nam, *Technical report*, United Nations.

McKenzie, D. and Rapoport, H.: 2006, Self-selection patterns in Mexico-U.S. migration: The role of migration networks, *The Review of Economics and Statistics* **92**(4), 811–821.

McKenzie, D. and Rapoport, H.: 2011, Can Migration Reduce Educational Attainments? Depressing Evidence from Mexico Depressing Evidence from Mexico, *Journal of Population Economics* **24**(01), 1–42.

McKenzie, D., Stillman, S. and Gibson, J.: 2010, How Important is Selection? Experimental VS. Non-Experimental Measures of the Income Gains from Migration, *Journal of the European Economic Association* **8**(4), 913–945.

McKenzie, D., Theoharides, C. and Yang, D.: 2014, Distortions in the international migrant labor market: Evidence from filipino migration and wage responses to destination country economic shocks, *American Economic Journal: Applied Economics* **6**(2), 49–75.

McKenzie, D. and Yang, D.: 2012, Experimental Approaches in Migration Studies, *in*

C. Vargas-Silva (ed.), *Handbook of Research Methods in Migration*, Edward Elgar Publishing, chapter 12, pp. 249–272.

Mendola, M. and Carletto, G.: 2012, International migration and gender differentials in the home labor market: Evidence from Albania, *Labour Economics* **19**(April), 870–880.

Minale, L.: 2018, Agricultural Productivity Shocks, Labor Reallocation, and Rural- Urban Migration in China, *Journal of Economic Geography* **18**(4), 795–821.

Ministry of Foreign affairs of Vietnam: 2012, Review of Vietnamese Migration Abroad, *Technical report*, Consular Department.

Missirian, A. and Schlenker, W.: 2017, Asylum applications and migration flows, *American Economic Review, Papers & Proceedings* **107**(5), 436–440.

Mu, R. and de Walle, D. V.: 2011, Left Behind to Farm? Women's Labor Re-Allocation in Rural China, *Labour Economics* **18**, S83–S97.

Munshi, K.: 2003, Networks in the modern economy: Mexican migrants in the U. S. Labor market, *Quarterly Journal of Economics* **118**(2), 549–599.

Nguyen, C. H.: 2014, Development and brain drain: a review of Vietnamese labour export and skilled migration, *Migration and Development* **3**(2), 181–202.

Nguyen, C. V., Van den Berg, M. and Lensink, R.: 2011, The impact of work and non-work migration on household welfare, poverty and inequality, *Economics of Transition* **19**(4), 771–799.

Nguyen, V. C. and Mont, D.: 2012, Economic impacts of international migration and remittances on household welfare in Vietnam, *International Journal of Development Issues* **11**(2), 144–163.

Ortega, F. and Peri, G.: 2013, The effect of income and immigration policies on international migration, *Migration Studies* **1**(1), 47–74.

Patrinos, H. A. and Montenegro, C. E.: 2014, Comparable estimates of returns to schooling around the world, *Policy Research Working Paper Series 7020*, The World Bank.

Phan, D. and Coxhead, I.: 2010, Inter-provincial migration and inequality during Vietnam's transition, *Journal of Development Economics* **91**(1), 100–112.

Pisati, M.: 2008, SPMAP: Stata Module to Visualize Spatial Data, Statistical Software Components, Boston College Department of Economics.

Roodman, D.: 2015, BOOTTEST: Stata module to provide fast execution of the wild bootstrap with null imposed, Statistical Software Components, Boston College Department of Economics.

Rosenzweig, M. and Stark, O.: 1989, Consumption Smoothing,Migration, and Marriage: Evidence from Rural India, *Journal of Political Economy* **97**(4), 905–926.

Roy, A. D.: 1951, Some Thoughts on the Distribution of Earnings, *Oxford Economic Papers* **3**(2), 135–146.

Sato, Y.: 2007, Economic geography, fertility and migration, *Journal of Urban Economics* **61**(2), 372–387.

Sato, Y. and Yamamoto, K.: 2005, Population concentration, urbanization, and demographic transition, *Journal of Urban Economics* **58**(1), 45–61.

Seshan, G. and Yang, D.: 2014, Motivating migrants: A field experiment on financial decision-making in transnational households, *Journal of Development Economics* **108**(C), 119–127.

Sjaastad, L. A.: 1962, The Costs and Returns of Human Migration, *Journal of Political Economy* **70**(5), 80–93.

Solon, G., Haider, S. and Wooldridge, J.: 2015, What Are We Weighting For?, *Journal of Human Resources* **50**(2), 301–316.

Stark, O. and Bloom, D. E.: 1985, The New Economics of Labor Migration, *American Economic Review* **75**(2), 173–178.

Stephen, E. H. and Bean, F. D.: 1992, Assimilation, Disruption and the Fertility of Mexican-Origin Women in the United States, *International Migration Review* **26**(1), 67–88.

Stephens, Jr., M.: 2002, Worker Displacement and the Added Worker Effect, *Journal of Labor Economics* **20**(3), 504–537.

Stillman, S., Gibson, J. and McKenzie, D.: 2012, The impact of immigration on child health: Experimental evidence from a migration lottery program, *Economic Inquiry* **50**(1), 62–81.

Taylor, J. E.: 1987, Undocumented Mexico-U.S. Migration and the Returns to Households in Rural Mexico, *American Journal of Agricultural Economics* **69**(3), 626.

Tchaidze, R. and Torosyan, K.: 2010, Development on the Move: Measuring and Optimising Migration's Economic and Social Impacts in Georgia, *Technical report*, Global Development Network (GDN) and Institute for Public Policy Research (IPPR).

The World Bank: 2009, Reshaping Economic Geography (World Development Report), *Technical Report 43738*.

United Nations: 2013, International Migration Report 2013, *Technical report*, United Nations.

World Bank: 2018, World Development Indicators, *Technical report*.

WorldBank: 2017, Migration and Remittances: Recent Developments and Outlook. Special Topic: Return Migration, *Technical report*.

Wozniak, A.: 2010, Are College Graduates More Responsive to Distant Labor Market Opportunities?, *Journal of Human Resources* **45**(4), 944–970.

Yang, D.: 2006, Why Do Migrants Return To Poor Countries ? Evidence from Philippine Migrants' Responses to Exchange Rate Shock, *Review of Economics and Statistics* **88**(4), 715–735.

Yang, D.: 2008, International migration, remittances and household investment: Evidence from Philippine migrants' exchange rate shocks, *Economic Journal* **118**(528), 591–630.

Yang, D. and Choi, H. J.: 2007, Are remittances insurance? Evidence from rainfall shocks in the Philippines, *World Bank Economic Review* **21**(2), 219–248.

Young, A.: 2016, Improved, Nearly Exact, Statistical Inference with Robust and Clustered Covariance Matrices using Effective Degrees of Freedom Corrections.

Tables

Table 1: Top 10 Foreign Migrant Destinations in 2008 and Labor Market Shocks

Panel A: Migrant Destinations			**Panel B**: Shock Measures by education level: $\Delta UR_{d,s}$			
Country	**Count**	**Percent**	ΔUR_d	*Primary*	*Secondary*	*Tertiary*
United States	185	27.7	4.67	7.3 [50]	6.0 [102]	2.8 [31]
Taiwan	99	14.9	1.94	1.5 [45]	2.3 [52]	1.6 [2]
Malaysia	61	9.2	0.45	0.6 [12]	0.5 [43]	-0.1 [4]
Republic of Korea	58	8.7	0.40	0.2 [10]	0.3 [43]	-0.6 [4]
Germany	44	6.6	-0.91	-1.3 [5]	-0.9 [30]	-0.4 [8]
Russia	42	6.3	2.20	6.9 [1]	3.5 [41]	-
Australia	28	4.2	1.20	5.9 [1]	1.9 [19]	0.7 [8]
Japan	26	3.9	1.23	1.6 [1]	1.4 [16]	0.8 [8]
Czech Republic	25	3.8	1.34	3.4 [5]	2.3 [17]	0.6 [3]
Canada	14	2.1	2.33	3.8 [3]	3.2 [7]	0.9 [4]
Other†	83	12.5				
Total	**665**	**100.0**	**2.01**	**3.5 [139]**	**2.5 [412]**	**1.2 [87]**

Panel A *Source*: DOTM data 2008. *Note*: Distribution of international migrants across destination countries reported for the balanced dataset in 2008, including 665 migrants in 30 destinations. Panel B *Source*: DOTM data 2008, IMF World Economic Outlook database, ILO statistical database, World Development Indicators, and national statistical offices. *Note*: The shock measure is the absolute change in the unemployment rate (percent of total labor force) between 2007 and 2009 by destination (column 1) and migrants' educational attainment prior to migration (column 2–4). Measure in column 1 rounded to two digits, columns 2-4 to one. Cell sample size by educational attainment in brackets. Marginal differences in sample sizes between panel A and B due to missing country level or educational attainment data. †: "Other" include Angola, Belgium, China, Finland, France, Hungary, Italy, Laos, Libya, Mexico, Netherlands, Norway, Poland, Qatar, Saudi Arabia, Singapore, Switzerland, Thailand, Ukraine, and United Kingdom.

Table 2: Foreign Migrant Individual Characteristics 2008

Number of observations: 665	*Mean*
Age	31.3
Year of departure	2004
Gender (=female) *(indicator)*	0.56
Marital status is married *(indicator)*	0.62
Highest educational attainment before departure *(indicator)*	
$\leq$*primary*	0.44
secondary	0.43
$>$*secondary*	0.13
Reasons for departure *(indicator)**	
economic	0.55
family	0.43
education	0.17
Frequency of communication with origin *(indicator)*	
$\leq$*weekly*	0.40
weekly$<$*monthly*	0.42
$\geq$*monthly*	0.18

Source: DOTM data 2008. *Note*: Descriptive statistics reported for the balanced panel, including 665 migrants in 30 destinations. * Three most frequently reported motives for migrant departure: Multiple answers allowed, reasons not mutually exclusive. *Economic* includes "easier to get a steady job", "earn more money", and "send money back". *Family* includes "mutual family decision", "left to get married", and "joined family abroad". *Education* includes "study and get additional qualifications" and "learn to speak another language".

Table 3: Household Descriptive Statistics 2008/2013

Median consumption	**2008**				**2013**			
	Low		**High**		**Low**		**High**	
	Mean	*SD*	Mean	*SD*	Mean	*SD*	Mean	*SD*
				Demography*				
Total household size	4.61	*1.90*	3.85	*1.83*	4.59	*2.20*	3.94	*1.85*
thereof: adults	3.83	*1.56*	2.99	*1.47*	3.66	*1.61*	3.19	*1.44*
thereof: working	2.29	*1.28*	1.78	*1.18*	1.95	*1.19*	1.72	*1.21*
				Finance⋆				
Domestic income	1,694	*1,320*	4,097	*6,518*	2,284	*2,718*	4,301	*6,668*
Foreign remittances	880	*1,335*	857	*1,421*	510	*1,044*	423	*974*
Total expenditure	1,645	*515*	4,838	*2,644*	2,681	*2,283*	4,895	*4,186*
Remittances/expenditure (%)	53.5		17.7		19.0		8.6	
Foreign				**Migration†**				
Probability(migrant)	1		1		0.66		0.71	
Total no. migrants	1.2	*0.53*	1.36	*0.81*	0.95	*0.97*	1.13	*1.12*
thereof: Labor	0.87	*0.65*	0.93	*0.77*	0.72	*0.73*	0.86	*0.88*
conditional on migrant	1.2	*0.53*	1.36	*0.81*	1.44	*0.85*	1.59	*1.02*
No. migrants *(indicator)*								
0	0		0		0.34		0.29	
1	0.84		0.78		0.48		0.48	
2+	0.16		0.22		0.18		0.33	
No. destinations *(indicator)*								
0	0		0		0.34		0.29	
1	0.96		0.96		0.63		0.67	
2+	0.04		0.04		0.03		0.04	
Migrant education *(indicator)*								
pre-primary	0.01		0.02		0.00		0.00	
primary	0.27		0.13		0.35		0.16	
lower secondary	0.29		0.17		0.26		0.18	
upper secondary	0.26		0.39		0.23		0.39	
post-secondary	0.08		0.09		0.05		0.05	
tertiary first stage	0.09		0.18		0.11		0.19	
tertiary second stage	0.00		0.02		0.00		0.03	
Domestic								
Probability(migrant)	0.17		0.22		0.37		0.28	
Total no. migrants	0.22	*0.56*	0.41	*0.97*	0.76	*1.24*	0.50	*1.03*
thereof: Labor	-	-	-	-	0.41	*0.80*	0.29	*0.62*

Source: DOTM panel data 2008–2013. *Note*: Number of observations: 507. Descriptive statistics by subsamples of households level relative to the expenditure per adult capita median in 2008. * Working: Members reported employed or self-employed. ⋆ All monetary variables are expressed in real USD per adult capita. † Foreign labor migration includes former household members being reported to having left the country to work abroad or for one of the following motives: "easier to get a steady job", "earn more money", and "send money back". Migrant educational attainment prior to departure according to International Standard Classification of Education 1997 levels. Domestic labor migration includes former household members being reported to having migrated domestically and were either employed or self-employed during the reference period. ‡ Conditional on the household head being employed or self-employed.

Table 4: Foreign Migration: Gender and Work

Panel A	Number of foreign migrants					
	Total		Female		Male	
	(1)	(2)	(3)	(4)	(5)	(6)
Shock×Post (β_1)	0.0672***	0.0744***	0.0324**	0.0438**	0.0355**	0.0336
	(0.0181)	(0.0209)	(0.0118)	(0.0159)	(0.0158)	(0.0199)
EDF (p-value)	0.030	0.024	0.049	0.039	0.159	0.351
WR (p-value)	0.027	0.102	0.185	0.236	0.053	0.208
Shock×Post×Rich (β_2)		-0.0232		-0.0259*		-0.0015
		(0.0172)		(0.0140)		(0.0178)
EDF (p-value)		0.186		0.072		0.479
WR (p-value)		0.501		0.307		0.930
$\beta_1 + \beta_2 = 0$ (p-value)		0.080		0.354		0.129
Household FE	√	√	√	√	√	√
Province-Year FE	√	√	√	√	√	√
Baseline controls	√	√	√	√	√	√
Observations	1,014	1,014	1,014	1,014	1,014	1,014
Households	507	507	507	507	507	507
Cluster	26	26	26	26	26	26
R^2	0.246	0.253	0.125	0.130	0.225	0.227
Mean Dep. Var.	1.28	1.28	0.72	0.72	0.56	0.56
Panel B	Labor		Female labor		Male labor	
	(1)	(2)	(3)	(4)	(5)	(6)
Shock×Post (β_1)	0.0374	0.0790***	0.0139	0.0482**	0.0235	0.0307
	(0.0255)	(0.0254)	(0.0139)	(0.0174)	(0.0188)	(0.0206)
EDF (p-value)	0.341	0.037	0.542	0.031	0.387	0.377
WR (p-value)	0.245	0.088	0.398	0.157	0.305	0.196
Shock×Post×Rich (β_2)		-0.0818***		-0.0652***		-0.0166
		(0.0177)		(0.0172)		(0.0185)
EDF (p-value)		0.018		0.013		0.823
WR (p-value)		0.059		0.115		0.389
$\beta_1 + \beta_2 = 0$ (p-value)		0.945		0.432		0.553
Household FE	√	√	√	√	√	√
Province-Year FE	√	√	√	√	√	√
Baseline controls	√	√	√	√	√	√
Observations	1,014	1,014	1,014	1,014	1,014	1,014
Households	507	507	507	507	507	507
Cluster	26	26	26	26	26	26
R^2	0.269	0.281	0.201	0.213	0.214	0.216
Mean Dep. Var.	0.90	0.90	0.45	0.45	0.45	0.45

Source: Author's calculations based on DOTM panel data 2008–2013. *Note*: † Subsample of households with male foreign migrant at baseline. Each column displays the result of a separate regression based on equation 5 and 6 respectively. I only report the shock coefficient interacted with the *Post* dummy for the follow-up wave 2013 (β_1 in equation 5 and 6) and the triple interaction term with the subgroup dummy (β_2 in equation 6). Cluster robust standard errors in parenthesis. Bias corrected p-values based on the effective degrees of freedom (EDF) calculated using the "edfreg" Stata module (Young 2016). Wild bootstrap restricted (WR) p-values (with null imposed) based on 9,999 replications calculated using the "boottest" Stata module (Roodman 2015). The test of joint significance for the null hypothesis of the net effect for rich households being zero is based on WR standard errors ($\beta_1 + \beta_2 = 0$). *** p<0.01, ** p<0.05, * p<0.1.

Table 5: Foreign Migration: Destination and Skill Selection

Panel A	Number of foreign migrants					
	Total Non US		Labor Non US		Labor US	
	(1)	(2)	(3)	(4)	(5)	(6)
Shock×Post (β_1)	0.0473**	0.0416*	0.0130	0.0236	0.0244***	0.0554***
	(0.0191)	(0.0205)	(0.0250)	(0.0248)	(0.0050)	(0.0139)
EDF (p-value)	0.075	0.108	0.698	0.317	0.039	0.033
WR (p-value)	0.072	0.155	0.689	0.482	0.006	0.171
Shock×Post×Rich (β_2)		0.0026		-0.0293**		-0.0525***
		(0.0147)		(0.0133)		(0.0162)
EDF (p-value)		0.960		0.216		0.095
WR (p-value)		0.851		0.076		0.467
$\beta_1 + \beta_2 = 0$ (p-value)		0.127		0.867		0.614
Household FE	√	√	√	√	√	√
Province-Year FE	√	√	√	√	√	√
Baseline controls	√	√	√	√	√	√
Observations	1,014	1,014	1,014	1,014	1,014	1,014
Households	507	507	507	507	507	507
Cluster	26	26	26	26	26	26
R^2	0.296	0.305	0.239	0.244	0.335	0.370
Mean Dep. Var.	0.92	0.92	0.69	0.69	0.22	0.22
Panel B	Average skill level		Number destinations		Destination change	
	(1)	(2)	(3)	(4)	(5)	(6)
Shock×Post (β_1)	0.0157	0.0416	0.0271	0.0233	0.0364**	0.0734***
	(0.0381)	(0.0601)	(0.0161)	(0.0208)	(0.0173)	(0.0175)
EDF (p-value)	0.619	0.430	0.225	0.271	0.322	0.861
WR (p-value)	0.690	0.534	0.203	0.422	0.392	0.582
Shock×Post×Rich (β_2)		-0.0443		0.00336		-0.0674***
		(0.0656)		(0.0187)		(0.0215)
EDF (p-value)		0.447		0.823		0.190
WR (p-value)		0.527		0.883		0.240
$\beta_1 + \beta_2 = 0$ (p-value)		0.941		0.204		0.218
Household FE	√	√	√	√	–	–
Province-Year FE	√	√	√	√	√	√
Baseline controls	√	√	√	√	√	√
Observations	1,014	1,014	1,014	1,014	507	507
Households	507	507	507	507	507	507
Cluster	26	26	26	26	26	26
R^2	0.382	0.386	0.366	0.371	0.073	0.087
Mean Dep. Var.	2.67	2.67	1.04	1.04	–	–

Source: Author's calculations based on DOTM panel data 2008–2013. *Note*: † Subsample of households with male foreign migrant at baseline. Each column displays the result of a separate regression based on equation 5 and 6 respectively. I only report the shock coefficient interacted with the *Post* dummy for the follow-up wave 2013 (β_1 in equation 5 and 6) and the triple interaction term with the subgroup dummy (β_2 in equation 6). Cluster robust standard errors in parenthesis. Bias corrected p-values based on the effective degrees of freedom (EDF) calculated using the "edfreg" Stata module (Young 2016). Wild bootstrap restricted (WR) p-values (with null imposed) based on 9,999 replications calculated using the "boottest" Stata module (Roodman 2015). The F-test p-value is for the null hypothesis of the net effect for rich households being zero ($\beta_1 + \beta_2 = 0$). *** p<0.01, ** p<0.05, * p<0.1.

Table 6: Domestic Migration

	Number of domestic migrants					
	Total		Labor		Labor long-distance	
	(1)	(2)	(3)	(4)	(5)	(6)
Shock×Post (β_1)	-0.0441**	-0.0749***	-0.0288*	-0.0607***	-0.0289*	-0.0589***
	(0.0209)	(0.0239)	(0.0149)	(0.0163)	(0.0152)	(0.0172)
EDF (p-value)	0.148	0.018	0.250	0.019	0.213	0.018
WR (p-value)	0.180	0.190	0.268	0.102	0.245	0.137
Shock×Post×Rich (β_2)		0.0639*		0.0677***		0.0642***
		(0.0369)		(0.0122)		(0.0140)
EDF (p-value)		0.036		0.003		0.004
WR (p-value)		0.576		0.030		0.070
$\beta_1 + \beta_2 = 0$ (p-value)		0.819		0.705		0.809
Household FE	√	√	-	-	-	-
Province-Year FE	√	√	√	√	√	√
Baseline controls	√	√	√	√	√	√
Observations	1,014	1,014	507	507	507	507
Households	507	507	507	507	507	507
Cluster	26	26	26	26	26	26
R^2	0.068	0.081	0.191	0.198	0.191	0.200
Mean Dep. Var.	0.32	0.32	-	-	-	-

Source: Author's calculations based on DOTM panel data 2008–2013 in columns (1) and (2) and DOTM cross-section data 2013 in columns (3) to (6). *Note*: There are two the different specifications of domestic migration in this table. Coefficients in columns (1) and (2) are estimated according to equation 5 and 6 respectively and can be considered causal effect estimates. Due to a lack of information on domestic migrants' occupation in the baseline survey, the dependent variable in estimations in columns (3) to (6) is only cross-sectional. These coefficients are estimated as $Y_h = \beta_0 + \beta_1(Shock_h) + \beta_3(Shock_h \times Rich_h) + \varepsilon_h$. For this reason, the estimates should only be interpreted as suggestive evidence, reflecting correlations instead of causal effects. For columns (1) and (2), I report the shock coefficient interacted with the *Post* dummy for the follow-up wave 2013 (β_1 in equation 5 and 6) and the triple interaction term with the subgroup dummy (β_2 in equation 6). Cluster robust standard errors in parenthesis. Bias corrected p-values based on the effective degrees of freedom (EDF) calculated using the "edfreg" Stata module (Young 2016). Wild bootstrap restricted (WR) p-values (with null imposed) based on 9,999 replications calculated using the "boottest" Stata module (Roodman 2015). The F-test p-value is for the null hypothesis of the net effect for high-skilled households being zero ($\beta_1 + \beta_2 = 0$). *** p<0.01, ** p<0.05, * p<0.1.

Table 7: Origin Household

Panel A	Number of household nucleus members					
	Total		Labor		Male	
	(1)	(2)	(3)	(4)	(5)	(6)
Shock×Post (β_1)	0.0086	0.0807	0.0183	-0.0020	0.0024	0.0302
	(0.0432)	(0.0547)	(0.0333)	(0.0518)	(0.0259)	(0.0296)
EDF (p-value)	0.906	0.224	0.341	0.851	0.846	0.274
WR (p-value)	0.890	0.312	0.644	0.973	0.937	0.439
Shock×Post×Rich (β_2)		-0.142***		0.0347		-0.0594***
		(0.0337)		(0.0634)		(0.0192)
EDF (p-value)		0.013		0.707		0.010
WR (p-value)		0.017		0.877		0.064
$\beta_1 + \beta_2 = 0$ (p-value)		0.183		0.648		0.292
Household FE	√	√	√	√	√	√
Province-Year FE	√	√	√	√	√	√
Baseline controls	√	√	√	√	√	√
Observations	1,014	1,014	1,014	1,014	1,014	1,014
Households	507	507	507	507	507	507
Cluster	26	26	26	26	26	26
R^2	0.077	0.082	0.180	0.182	0.101	0.103
Mean Dep. Var.	4.20	4.20	2.02	2.02	1.96	1.96
Panel B	Female		Female fertile age cohabiting		Children (0-5y)	
	(1)	(2)	(3)	(4)	(5)	(6)
Shock×Post (β_1)	0.0079	0.0524	0.0146	0.0438*	0.0186	0.0512***
	(0.0231)	(0.0314)	(0.0157)	(0.0224)	(0.0110)	(0.0142)
EDF (p-value)	0.954	0.276	0.454	0.084	0.487	0.041
WR (p-value)	0.752	0.164	0.466	0.196	0.245	0.060
Shock×Post×Rich (β_2)		-0.0833***		-0.0567***		-0.0590***
		(0.0208)		(0.0189)		(0.0178)
EDF (p-value)		0.046		0.019		0.036
WR (p-value)		0.016		0.086		0.070
$\beta_1 + \beta_2 = 0$ (p-value)		0.146		0.241		0.614
Household FE	√	√	√	√	√	√
Province-Year FE	√	√	√	√	√	√
Baseline controls	√	√	√	√	√	√
Observations	1,014	1,014	1,014	1,014	1,014	1,014
Households	507	507	507	507	507	507
Cluster	26	26	26	26	26	26
R^2	0.068	0.073	0.128	0.137	0.071	0.083
Mean Dep. Var.	2.24	2.24	0.52	0.52	0.24	0.24

Source: Author's calculations based on DOTM panel data 2008–2013. *Note*: Each column displays the result of a separate regression based on equation 5 and 6 respectively. I only report the shock coefficient interacted with the *Post* dummy for the follow-up wave 2013 (β_1 in equation 5 and 6) and the triple interaction term with the subgroup dummy (β_2 in equation 6). Cluster robust standard errors in parenthesis. Bias corrected p-values based on the effective degrees of freedom (EDF) calculated using the "edfreg" Stata module (Young 2016). Wild bootstrap restricted (WR) p-values (with null imposed) based on 9,999 replications calculated using the "boottest" Stata module (Roodman 2015). The F-test p-value is for the null hypothesis of the net effect for rich households being zero ($\beta_1 + \beta_2 = 0$). *** p<0.01, ** p<0.05, * p<0.1.

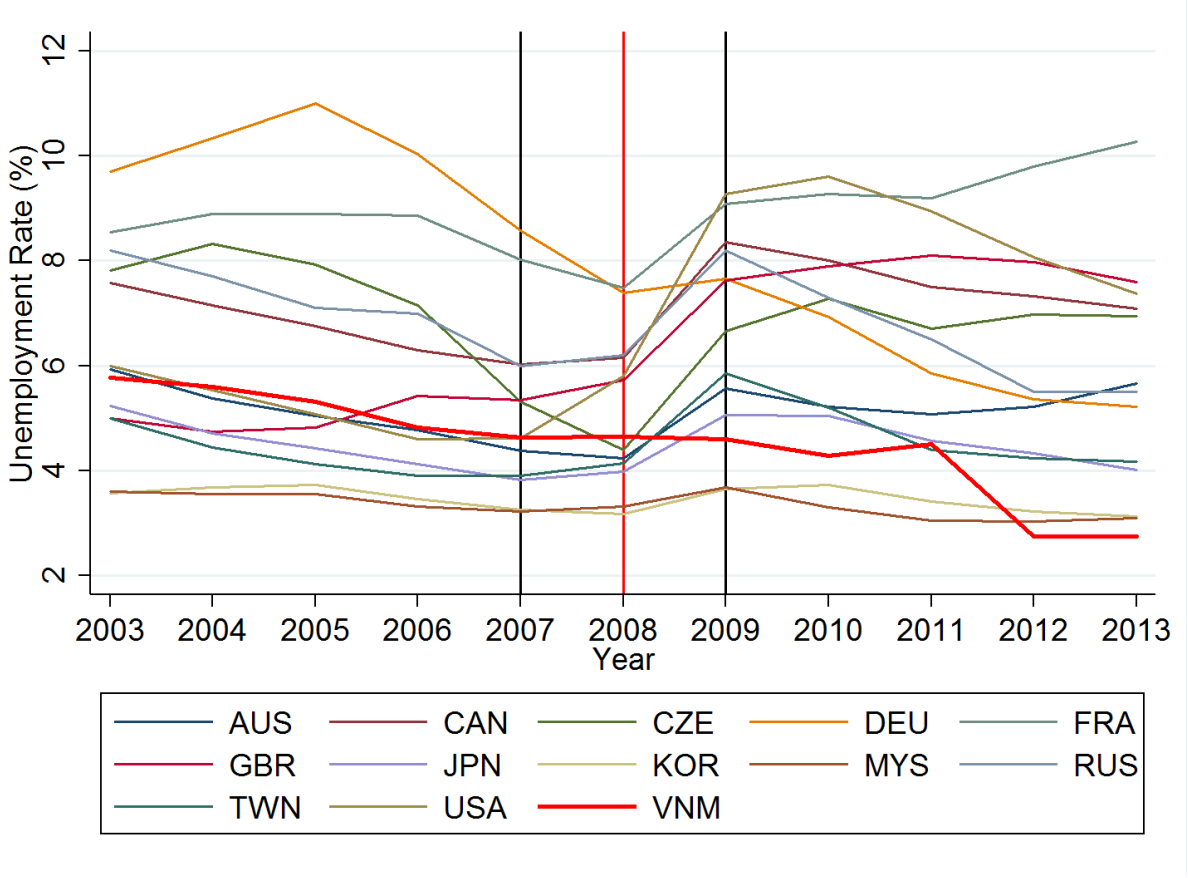
Table 8: Remittances and Household Financial Outcomes

LOG US$ PC	Total remittances		Home income		ΔAssets		Expenditure	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Shock×Post (β_1)	0.211**	0.137	-0.0002	0.0013	-0.0785	-0.136	-0.0342***	-0.0516***
	(0.0791)	(0.100)	(0.0658)	(0.0583)	(0.0867)	(0.121)	(0.0088)	(0.0144)
EDF (p-value)	0.165	0.314	0.477	0.973	0.191	0.208	0.203	0.073
WR (p-value)	0.087	0.233	0.997	0.979	0.423	0.259	0.008	0.006
Shock×Post×Rich (β_2)		0.104		0.0117		0.136		0.0463**
		(0.111)		(0.0850)		(0.134)		(0.0172)
EDF (p-value)		0.978		0.423		0.583		0.017
WR (p-value)		0.407		0.907		0.362		0.040
$\beta_1 + \beta_2 = 0$ (p-value)		0.139		0.913		0.996		0.716
Household FE	√	√	√	√	√	√	√	√
Province-Year FE	√	√	√	√	√	√	√	√
Baseline controls	√	√	√	√	√	√	√	√
Observations	1,014	1,014	1,014	1,014	1,014	1,014	1,014	1,014
Households	507	507	507	507	507	507	507	507
Cluster	26	26	26	26	26	26	26	26
R^2	0.351	0.360	0.163	0.166	0.134	0.138	0.092	0.163

Source: Author's calculations based on DOTM panel data 2008–2013. *Note*: All variables are expressed in logarithmic US$ (PPP) per capita, i.e., adjusted by the number of permanent adult household members excluding any migrants. Income is from labor activities within the household of origin only and net of informal transfers, such as remittances. Remittance receipts from foreign migrants by country of destination. Assets are the stock of savings in cash and kind. Each column displays the result of a separate regression based on equation 5 and 6 respectively. I only report the shock coefficient interacted with the *Post* dummy for the follow-up wave 2013 (β_1 in equation 5 and 6) and the triple interaction term with the subgroup dummy (β_2 in equation 6). Cluster robust standard errors in parenthesis. Bias corrected p-values based on the effective degrees of freedom (EDF) calculated using the "edfreg" Stata module (Young 2016). Wild bootstrap restricted (WR) p-values (with null imposed) based on 9,999 replications calculated using the "boottest" Stata module (Roodman 2015). The F-test p-value is for the null hypothesis of the net effect for rich households being zero ($\beta_1 + \beta_2 = 0$). *** p<0.01, ** p<0.05, * p<0.1.

Figures

Figure 1: Unemployment rates in top 12 destination countries and Vietnam

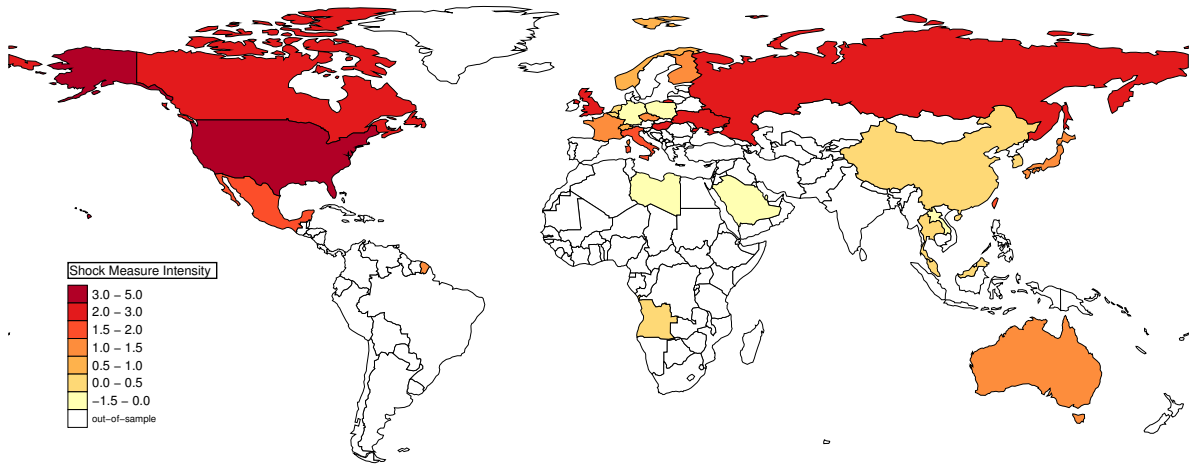


Source: IMF World Economic Outlook database. *Note*: Yearly unemployment rates (percent of total labor force) between 2003 and 2013 in the top 12 destination countries and Vietnam.

Appendix (For online publication)

A.1 Figures

Figure 2: Change in unemployment rate in migrant destination countries 2007-2009



Source: IMF World Economic Outlook database. *Note*: Graphical visualization of percentage point changes in unemployment rate (percent of total labor force) between 2007 and 2009 in migrant destination countries ($\Delta UR_{d,2007-2009}$). Visualization using Pisati (2008).

A.2 Robustness Checks

Table 1: Balance test - Household and Migrant Observables

	Coefficient	Cluster robust SE	WR (p-value)	EDF (p-value)	Observations
		Household head			
Gender	0.121	0.146	0.40	**0.02**	507
Age	-0.0164	0.0076	0.21	0.47	507
Marital status married (indicator)	0.119	0.235	0.63	0.57	507
Highest educational attainment (indicators)					
Less than primary	-0.291	0.195	0.15	0.61	507
Primary	-0.064	0.226	0.77	0.87	507
Secondary	0.116	0.175	0.52	0.73	507
Post-secondary	0.336	0.423	0.46	0.27	507
Employment status (indicators)					
Employed	0.075	0.162	0.65	0.47	502
Self-employed	0.085	0.187	0.65	0.49	502
Unemployed	0.095	0.367	0.81	0.20	507
Retired	-0.629	0.286	0.16	0.39	502
Other	0.236	0.251	0.43	**0.08**	507
Occupation (indicators)					
Professional	0.085	0.282	0.77	0.47	507
White-collar	-0.370	0.828	0.78	0.86	507
Services	0.262	0.298	0.47	0.16	507
Blue-collar	-0.380	0.322	0.38	0.19	507
Agriculture	0.655	0.275	0.11	**0.09**	507
		Household composition			
No. of members (excl. migrants)	0.035	0.039	0.48	0.15	507
No. of working adults	-0.095	0.078	0.25	0.51	507
No. of infants (<5 years)	-0.134	0.236	0.571	507	
No. of domestic migrants	-0.124	0.067	0.11	**0.09**	507
No. of foreign migrants	0.748	0.111	**0.001**	**0.002**	507
		Household finance			
Income	-0.029	0.047	0.59	0.95	507
Savings	0.015	0.031	0.65	0.50	507
Remittances	0.037	0.027	0.20	0.41	507
		Foreign migrant characteristics			
Gender	-0.278	0.350	0.42	0.94	507
Age	0.432	0.0.152	0.18	**0.04**	507
Partner left behind (indicator)	0.540	0.628	0.39	0.75	507
Highest educational attainment (indicators)					
Less than primary	0.607	0.677	0.50	0.59	507
Primary	-0.571	0.260	0.12	0.14	507
Secondary	0.870	0.399	**0.04**	**0.09**	507
Post-secondary	-1.516	0.723	**0.06**	0.12	507
Employment sector (indicators)					
Agriculture	-0.350	0.445	0.47	0.34	507
Manufacturing	-0.718	0.0.338	0.11	0.12	507
Services	0.822	0.408	0.11	0.11	507
Time since departure (indicators)					
less than 1 year	-0.086	0.424	0.86	0.74	507
1-2 years	-0.111	0.254	0.68	0.33	507
2-3 years	-0.321	0.356	0.46	0.66	507
3-4 years	-0.119	0.267	0.71	0.60	507
more than 4 years	0.349	0.380	0.44	0.38	507

Source: Author's calculations based on DOTM cross-section data 2008. *Note*: Each line displays the result of a separate regression based on equation: $Shock_h = \beta_0 + \beta_1 X_h + \gamma_{p(h)} + \varepsilon_h$ in the cross-sectional baseline dataset of 2008. Cluster robust standard errors in column (2). Bias corrected p-values based on the effective degrees of freedom (EDF) calculated using the "edfreg" Stata module (Young 2016) in column (3). Wild bootstrap restricted (WR) p-values (with null imposed) based on 9,999 replications calculated using the "boottest" Stata module (Roodman 2015) in column (4). Income, expenditures, and transfers are expressed in USD (PPP) per capita, i.e. adjusted by the number of permanent household members excluding migrants. *** p<0.01, ** p<0.05, * p<0.1.

Table 2: Placebo Tests

Panel A	Number of household					
Pretreatment trends	Members		Domestic migrants		Foreign migrants	
	(1)	(2)	(3)	(4)	(5)	(6)
Shock×Post (β_1)	-0.0328	-0.0037	-0.0095	0.0027	0.0327	-0.0040
	(0.0255)	(0.0226)	(0.0077)	(0.0137)	(0.0243)	(0.0199)
EDF (p-value)	0.319	0.901	0.341	0.880	0.153	0.879
WR (p-value)	0.217	0.861	0.482	0.874	0.124	0.856
Shock×Post×Rich (β_2)		-0.0381		-0.0249		0.0621**
		(0.0359)		(0.0241)		(0.0289)
EDF (p-value)		0.456		0.467		0.060
WR (p-value)		0.300		0.405		0.239
Household FE	√	√	√	√	√	√
Province-Year FE	√	√	√	√	√	√
Observations	1,014	1,014	1,014	1,014	1,014	1,014
Households	507	507	507	507	507	507
Cluster	26	26	26	26	26	26
R^2	0.364	0.376	0.083	0.090	0.516	0.523
Panel B	Number of household					
Non-migrant sample	Members		Domestic migrants		Foreign migrants	
	(1)	(2)	(3)	(4)	(5)	(6)
Shock×Post (β_1)	0.0110	-0.0238	-0.0129	0.0269	0.0011	-0.0025
	(0.0303)	(0.0427)	(0.0301)	(0.0527)	(0.0038)	(0.0068)
EDF (p-value)	0.562	0.665	0.711	0.671	0.984	0.664
WR (p-value)	0.724	0.712	0.747	0.868	0.796	0.733
Shock×Post×Rich (β_2)		0.0557		-0.0617*		0.0067
		(0.0415)		(0.0366)		(0.0059)
EDF (p-value)		0.312		0.300		0.396
WR (p-value)		0.329		0.574		0.275
Household FE	√	√	√	√	√	√
Province-Year FE	√	√	√	√	√	√
Baseline controls	√	√	√	√	√	√
Observations	652	652	652	652	652	652
Households	326	326	326	326	326	326
Cluster	68	68	68	68	68	68
R^2	0.074	0.080	0.363	0.379	0.133	0.135
Panel C	Total household					
Non-migrant sample	Home income		Net remittances		Expenditure	
LOG US$ PC	(1)	(2)	(3)	(4)	(5)	(6)
Shock×Post (β_1)	0.0483	0.0067	-0.0209	-0.0636	0.0033	0.0132
	(0.0544)	(0.0742)	(0.0366)	(0.0677)	(0.0157)	(0.0170)
EDF (p-value)	0.443	0.923	0.409	0.320	0.648	0.511
WR (p-value)	0.385	0.937	0.603	0.377	0.849	0.468
Shock×Post×Rich (β_2)		0.0671		0.0758		-0.0043
		(0.0673)		(0.0598)		(0.0164)
EDF (p-value)		0.269		0.292		0.851
WR (p-value)		0.483		0.259		0.811
Household FE	√	√	√	√	√	√
Province-Year FE	√	√	√	√	√	√
Baseline controls	√	√	√	√	√	√
Observations	652	652	652	652	652	652
Households	326	326	326	326	326	326
Cluster	68	68	68	68	68	68
R^2	0.101	0.103	0.141	0.143	0.138	0.265

Source: Panel A: Author's calculations based on DOTM panel data 2003–2008. Panel B and C: DOTM panel data 2008–2013 *Note*: Each column displays the result of a separate regression based on equation 5 and 6 respectively. I only report the shock coefficient interacted with the *Post* dummy for the baseline wave 2008 in panel A and follow-up wave 2013 in panel B and C (β_1 in equation 5 and 6) and the triple interaction term with the subgroup dummy respectively (β_2 in equation 6). Cluster robust standard errors in parenthesis. Bias corrected p-values based on the effective degrees of freedom (EDF) calculated using the "edfreg" Stata module (Young 2016). Wild bootstrap restricted (WR) p-values (with null imposed) based on 9,999 replications calculated using the "boottest" Stata module (Roodman 2015). *** p<0.01, ** p<0.05, * p<0.1.

Table 3: Shock Measure and Outcome Variable Modifications

Panel A	Number of household					
Shock measure 2	Members		Domestic migrants		Foreign migrants	
	All	Labor	All	Labor	All	Labor
	(1)	(2)	(3)	(4)	(5)	(6)
Shock×Post (β_1)	0.135*	0.0117	-0.100**	-0.0935***	0.110***	0.117***
	(0.0748)	(0.0648)	(0.0388)	(0.0199)	(0.0387)	(0.0382)
EDF (p-value)	0.209	0.714	0.098	0.066	0.040	0.119
WR (p-value)	0.252	0.878	0.267	0.090	0.199	0.097
Shock×Post×Rich (β_2)	-0.152**	0.0344	0.0859	0.102***	-0.0306	-0.116***
	(0.0572)	(0.0718)	(0.0532)	(0.0137)	(0.0363)	(0.0343)
EDF (p-value)	0.030	0.877	0.107	0.013	0.232	0.147
WR (p-value)	0.069	0.837	0.648	0.005	0.757	0.285
Household FE	√	√	√	-	√	√
Province-Year FE	√	√	√	√	√	√
Baseline controls	√	√	√	√	√	√
Observations	1,044	1,044	1,044	522	1,044	1,044
Households	522	522	522	522	522	522
Cluster	26	26	26	26	26	26
R^2	0.081	0.182	0.353	0.263	0.254	0.280
Panel B	Number of household					
Net number	Members		Domestic migrants		Foreign migrants	
	All	Labor	All	Labor	All	Labor
	(1)	(2)	(3)	(4)	(5)	(6)
Shock×Post (β_1)	0.0925	-0.00750	-0.0715**	-0.0601***	0.0733*	0.0977**
	(0.0614)	(0.0648)	(0.0273)	(0.0163)	(0.0413)	(0.0442)
EDF (p-value)	0.259	0.885	0.026	0.023	0.099	0.091
WR (p-value)	0.266	0.931	0.263	0.101	0.309	0.204
Shock×Post×Rich (β_2)	-0.119***	0.0479	0.0406	0.0710***	-0.0470	-0.119***
	(0.0403)	(0.0603)	(0.0547)	(0.0137)	(0.0310)	(0.0287)
EDF (p-value)	0.054	0.547	0.283	0.006	0.344	0.041
WR (p-value)	0.090	0.794	0.686	0.028	0.502	0.109
Household FE	√	√	√	-	√	√
Province-Year FE	√	√	√	√	√	√
Baseline controls	√	√	√	√	√	√
Observations	1,014	1,014	1,014	507	1,014	1,014
Households	507	507	507	507	507	507
Cluster	26	26	26	26	26	26
R^2	0.320	0.245	0.569	0.272	0.609	0.479

Source: Author's calculations based on DOTM panel data 2008–2013. *Note*: Each column displays the result of a separate regression based on equation 5 and 6 respectively. I only report the shock coefficient interacted with the time dummy for the follow-up wave 2013 (β_1 in equation 5 and 6) and the triple interaction term with the subgroup dummy (β_2 in equation 6). Cluster robust standard errors in parenthesis. Bias corrected p-values based on the effective degrees of freedom (EDF) calculated using the "edfreg" Stata module (Young 2016). Wild bootstrap restricted (WR) p-values (with null imposed) based on 9,999 replications calculated using the "boottest" Stata module (Roodman 2015). *** p<0.01, ** p<0.05, * p<0.1.

A.3 Theoretical Framework: Mathematical Derivation

1. **Elasticity of <u>domestic</u> migration w.r.t. foreign wages**

   - Solve the household size constraint for m_h,

   $$m_h = n - m_d - m_f$$

   - the budget constraint for m_f,

   $$m_f = \frac{\underline{c} - w_d m_d}{w_f}$$

   - and replace m_h and m_f in the maximization problem:

   $$\underset{m_d}{\text{Max}} \quad \left\{ u(n - m_d - (\frac{\underline{c} - w_d m_d}{w_f})) - \alpha m_d - \beta(\frac{\underline{c} - w_d m_d}{w_f}) \right\}$$

   - Differentiation w.r.t. m_d, yields the first-order condition:

   $$\frac{\mathrm{dU}}{\mathrm{d}m_d^*} = \frac{w_d - w_f}{w_f} u'(m_h) - \alpha + \beta \frac{w_d}{w_f} = 0.$$

   - Total differentiation yields:

   $$\frac{\mathrm{dm_d^*}}{\mathrm{dw_f}} = -\frac{\frac{\mathrm{d}}{\mathrm{dw_f}}}{\frac{\mathrm{d}}{\mathrm{dm_d^*}}} = -\frac{-\frac{w_d}{w_f^2} u'(m_h^*) + \frac{(w_d - w_f) m_d^*}{w_f^2} u''(m_h^*) - \beta \frac{w_d}{w_f^2}}{\left. \frac{\mathrm{dU^2}}{\mathrm{d}d^2} \right|_{d=d^*}}.$$

   - Since, by assumption: $\frac{\mathrm{dU^2}}{\mathrm{d}m_d^2} < 0$, the sign of the elasticity of domestic migration w.r.t. foreign wages is determined by the sign of the numerator ($\frac{\mathrm{d}}{\mathrm{dw_f}}$):

   $$sgn(\frac{\mathrm{d}}{\mathrm{dw_f}}) = sgn(-\frac{w_d}{w_f^2} u'(m_h^*) + \frac{(w_d - w_f) m_d^*}{w_f^2} u''(m_h^*) - \beta \frac{w_d}{w_f^2}).$$

2. **Elasticity of foreign labor migration w.r.t. foreign wages**

- Solve the household size constraint for m_h,

$$m_h = n - m_d - m_f$$

- the budget constraint for m_d,

$$m_d = \frac{\underline{c} - w_f m_f}{w_d}$$

- and replace m_h and m_d in the maximization problem:

$$\underset{m_f}{\text{Max}} \quad \left\{ u(n - (\frac{\underline{c} - w_f m_f}{w_d}) - m_f) - \alpha(\frac{\underline{c} - w_f m_f}{w_d}) - \beta m_f) \right\}$$

- Differentiation w.r.t. m_f, yields the first-order condition:

$$\frac{\mathrm{dU}}{\mathrm{d}m_f^*} = \frac{w_f - w_d}{w_d} u'(m_h) + \alpha \frac{w_f}{w_d} - \beta = 0.$$

- Total differentiation yields:

$$\frac{\mathrm{dm_f^*}}{\mathrm{dw_f}} = -\frac{\frac{\mathrm{d}}{\mathrm{dw_f}}}{\frac{\mathrm{d}}{\mathrm{dm_f^*}}} = -\frac{\frac{1}{w_d} u'(m_h^*) + \frac{(w_f - w_d) m_f^*}{w_d^2} u''(m_h^*) + \alpha \frac{1}{w_d}}{\left. \frac{\mathrm{dU^2}}{\mathrm{d}m_f^2} \right|_{m_f = m_f^*}}.$$

- Since, by assumption: $\frac{\mathrm{dU^2}}{\mathrm{d}m_f^2} < 0$, the sign of the elasticity of foreign migration w.r.t. foreign wages is determined by the sign of the numerator ($\frac{\mathrm{d}}{\mathrm{dw_f}}$):

$$sgn(\frac{\mathrm{d}}{\mathrm{dw_f}}) = sgn(\frac{1}{w_d} u'(m_h^*) + \frac{(w_f - w_d) m_f^*}{w_d^2} u''(m_h^*) + \alpha \frac{1}{w_d}).$$

A.4 Theoretical Framework: Calibration Exercise

In order to illustrate the heterogeneous predictions of this model for the discrete case of my sample households, I conduct a simple parametrization exercise. Table 4 summarizes the parameters used in this exercise for a hypothetical low and high-skilled household, comparing two periods, before (t_0) and after (t_1) the occurrence of an economic shock abroad. I assume that the household optimally distributes $n = 5$ members across *home*, *domestic*, and $foreign$ locations, which corresponds approximately to the mean household size in my sample, including migrants. Discrete optimization is important in this context because households' migration decisions are binary and the set of potential migration candidates is strictly finite.

Table 4: Parametrization of Household Migration Model

	Period 0 (*before*)		**Period 1** (*after*)	
Parameters — Wealth	**Low**	**High**	**Low**	**High**
Domestic wage (w_d)	2	4	2	4
Foreign wage (w_f)	8	9	6	7
Foreign wage shock (Δw_F)			-2	-2
Domestic cost parameter (α)	0.1	0.1	0.1	0.1
Foreign cost parameter (β)	0.3	0.3	0.3	0.3
			Results	
Members at home (m_h^*)	3	3	3	3
Domestic migrants (m_d^*)	1	1	0	1
Foreign migrants (m_f^*)	1	1	2	1
Consumption ($\underline{c}^*$)	10	13	12	11

Note: Minimum consumption, $\underline{c} = 10$ units, utility function: $u(m_h) = ln(m_h) - \alpha m_d - \beta m_f$.

Households' skill distribution is normalized and ranges between 0 and 1, with low-skilled households earning the minimum wage for unskilled labor ($s = 0$) and high-skilled ones ($s = 1$) receive the maximum returns to schooling additionally. Domestic wages are determined by: $w_f = 2 + 2s$, which implies returns to skills of 100% for the high-skilled. Comparing the case of an unskilled worker with the one of a college graduate with 15 years of education, this translates into yearly returns to schooling of approximately 6.67%. This figure corresponds quantitatively to the estimated returns to schooling for Vietnam by di Gropello et al. (2008) (5.5.%) and Patrinos and Montenegro (2014) for South Asia (7.7%). Foreign migrants, on the other hand, earn $w_f = 8 + 1s$, which implies that the foreign minimum wage is fourfold compared to the domestic one. On average, this is consistent with the estimated wage ratios for observably identical workers between Vietnam and the US (3.92) by Clemens et al. (2008). In respect to the returns to schooling, this implies a 12.5% mark-up for the high-skilled in foreign destinations, which is considerably lower compared to the domestic one, as hypothesized in the general framework. Furthermore, I assume that foreign migration causes three times more disutility than the

domestic one ($\alpha = 0.1$ and $\beta = 0.3$).

In period 1, a negative economic shock occurs, which leads to a uniform reduction in the foreign wage by 2 units ($\Delta w_f = -2$), such that the foreign wage equation turns into $w_f = 6 + 1s$. This absolute wage shock translates into a 25% decrease in the foreign wage of low-skilled and 22% for the high-skilled workers, respectively. The relative magnitude of this shock parameter is in line with the estimates by Cervantes Gonzalez and del Pino (2012) for the accumulated change in remittances from the USA to Mexico between 2007 and 2009 (-19%). It also corresponds to their lower bound estimate for the change in earnings by non-citizen Mexican immigrant workers in the US with post-secondary, non-tertiary education level (-21.7%) during the same period. This subgroup is most comparable to the migrants in my sample, who usually don't have citizenship in their host country and who predominantly posses a secondary educational degree. Since we are interested in the reaction of migrant households, i.e. the ones with $d, f > 0$, the minimum consumption level is assumed to be greater or equal to the earnings of a low-skilled household with one domestic and foreign migrant each ($\underline{c} \geq 10$).

Under these assumptions, comparative statics of this simple model generate the following predictions. Given the ex-ante migration decisions in period t_0, low-skilled households realize exactly the consumption minimum, while high-skilled ones earn somewhat more than $\underline{c}$, due to the household's choice set being discrete. When the shock strikes in t_1 and foreign wages decrease, low-skilled households fall below the minimum consumption level, while high-skilled households remain unaffected: they can compensate the shock from their excess earnings, such that their initial portfolio remains optimal.[46] Low-skilled households, on the other hand, are forced to re-optimize their migration decisions and do so by increasing the allocation of labor to foreign markets by one member as the marginal wage abroad is still superior compared to the domestic one they face. As additional foreign migration occurs and the household's budget constraint is satisfied once again, the income from the remaining domestic migrant does not provide any more utility. Due to the household's home bias of locational preferences, they derive positive utility from calling the domestic migrant back home, such that the allocation of members to domestic destinations decreases to zero.

In summary, this simple discrete optimization exercise demonstrates that, for low-skilled households with the given parameters, the model predicts that the elasticity of domestic migration with respect to foreign wages is positive and the one of foreign migration is negative. In other words, for low-skilled households, the income effect dominates the substitution effect. The optimal shock coping strategy for low-skilled households in this example is to trade-off domestic migrants with foreign ones. High-skilled households'

[46] Note that the probability of the budget constraint becoming binding as a result of any income shock for any given consumption minimum is generally larger for low- compared to high-skilled households in the discrete case due to their lower wage levels.

migration decisions, on the other hand, remain unaffected by the shock.

Under this scenario, the model also predicts that the aggregate flows of foreign migrants become more negatively selected on skills in relative terms because of low-skilled households sending more members abroad, while high-skilled ones do not. This corresponds qualitatively to a situation in which the migrant skill composition in the foreign destination deteriorates in relative terms (compared to the non-crisis counterfactual). On the other hand, the model does not capture intra household skill selection into migration, since all members are assumed to be equal within the household. In practice, however, domestic and foreign migrant individuals often share certain characteristics, such that domestic migrants may be more likely to becoming foreign migrants compared to the average family member.