

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

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**Job Market Paper**

*this version:* November 21, 2016. *Latest version:* available [here](#)

## Abstract

This paper studies the impact of economic shocks to migrant incomes abroad on their remittance-dependent families left behind in Vietnam. Relying on destination- and skill-specific variation in the shock intensities generated by the Great Recession abroad, I adopt a natural experiment approach using a panel dataset of migrant households at the origin in Vietnam. The results show that the shock leads to heterogeneous household responses at the origin. Low-skilled households are negatively affected and cope by increasing labor supply at home and sending more migrants to foreign destinations, while reducing the number of domestic migrants. High-skilled ones remain largely unaffected. I provide a theoretical framework, which rationalizes this heterogeneity in household responses by the relative magnitudes of the income and substitution effects caused by the shock. The findings contribute to different literature in development and migration by providing evidence of a trade-off between domestic and foreign migration strategies in developing countries, highlighting migrant households' shock coping mechanisms, and documenting the risks attached to remittance dependence at origin.

*JEL classification:* D10, F22, J61, O15, P36, R23

*Keywords:* International Migration, Domestic Migration, Labor Supply, Shock Coping, Family Left Behind, Great Recession, Unemployment, Vietnam

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# 1 Introduction

The magnitude of migration is large and has been growing rapidly over the past decades, both within and across countries ([World Bank 2009](#)).<sup>1</sup> International migration typically yields high income gains to migrant workers from developing countries ([McKenzie et al. 2010](#)). Countries such as the Philippines and Vietnam have started to promote temporary labor export schemes with the goal of fostering remittance receipts, which have become a major source of income for families left behind ([World Bank 2016a](#)). In this environment of increasing migration and remittances, migrant households at the origin become dependent on overseas incomes and exposed to economic shocks through their migrants abroad. Despite the increasing scale of this phenomenon, there is little evidence about how those households cope with negative shocks to migrant incomes, and about the implications for their domestic and foreign migration decisions.

This paper studies the impact of economic shocks to migrant incomes during the Great Recession on their remittance-dependent families left behind in Vietnam. I address three sets of questions: First, with negative income shocks that hit migrant members in the destination country, how do families left behind in the country of origin cope? Second, do they react heterogeneously to the shock and, if yes, for what reason? Third, conditional on their coping strategies, what are the financial consequences for affected households and its implications for a migration-driven development policy?

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 ([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), up from 4.5 million in 1999 ([Marx and Fleischer 2010](#)). At the same time, approximately 1 million Vietnamese (1.2% of the total population) were living abroad in a diverse set of destination countries ([Dang et al. 2010](#)) and Vietnam ranked among the top 10 net emigration countries ([United Nations 2013b](#)). Remittance receipts amounted to approximately 8.3 billion USD in 2010, constituting 7% of GDP ([World Bank 2016b](#)). 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.

Estimating the effects of migration on the family left behind is typically complicated as selection into migration tends to be correlated with unobserved household characteristics. Furthermore, economic shocks abroad might also affect migrant origin areas, thereby preventing the identification of household responses. In addition, microeconomic data on

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<sup>1</sup>The total stock of domestic migrants was estimated to be 763 million in 2005 ([United Nations 2013a](#)) and 191 million for international migrants, with the latter having increased to 243 million in 2015 ([United Nations 2015](#)).

migrants and their households at the origin tends to be scarce. This study overcomes these issues by adopting a natural experiment approach (McKenzie and Yang 2012). My empirical analysis relies on survey data from a panel of around 550 foreign migrant households, including individual information from 665 foreign migrant individuals and 2,170 household members and domestic migrants, which was collected in two waves in 2008 and 2013, with the latter implemented by the author. I exploit the fact that families left behind were exposed to differential shocks conditional on the destination and skill-levels of their migrants abroad in order to construct a continuous and household-specific measure of economic shocks during the Great Recession. Conducting a difference-in-difference analysis, my empirical approach compares origin households with differential shock exposure, before and after the crisis occurred. In my estimation specification, I control for time-invariant household and destination characteristics as well as for changes in the province of origin over time. Under the assumption of parallel trends, this setting allows identifying the causal effects of economic shocks abroad on the outcomes of families left behind at the origin.

My analysis provides the following findings. First, affected families left behind coped with the shock by readjusting their labor supply along the extensive margin across different locations in a complementary way: they increased labor supply at home by 15% through an increase in the number of working members in response to the average economic shock. This effect was partly driven by formerly unemployed members entering into new employment opportunities ex-post. Further, domestic migration decreased by around 50%, partly because domestic migrants returned to the household of origin. Simultaneously, households sent around 20% *more* foreign migrants in reaction to the average shock. The key contribution of this paper is to provide the first empirical evidence of a trade-off between domestic and foreign migration strategies among migrant households in developing countries. Interestingly, despite the shock abroad, additional foreign migrants targeted the *same* destination countries as previous household migrants, which is consistent with an explanation of migration destination decisions being affected by social networks.

Second, I find that household responses were heterogeneous along the initial distribution of skills and that the aggregate effects identified were driven exclusively by the low-skilled subgroup. High-skilled households, on the other hand, remained largely unaffected by the shock. In order to rationalize these heterogeneous effects, I develop a simple theoretical framework in which households at the origin are considered as the decision-making units (Stark and Bloom 1985) and choose to distribute their labor optimally across home, domestic, and foreign locations in order to maximize their utility. The main intuition behind this framework is that changes in the foreign wage cause income and substitution effects and that the relative strength of these two effects determines the elasticity of domestic and foreign labor supply with respect to foreign wages. For

low-skilled households who face relatively low levels of wages in domestic locations compared to what they could earn abroad, the elasticity of domestic migration with respect to foreign wages is positive and that of foreign migration is negative. For high-skilled households, these elasticities are either zero or tend to have opposite signs.

Third, I find that the allocation of additional labor to foreign destinations led to an increase of remittances receipts for the family left behind in the aftermath of the crisis. However, despite higher remittances, low-skilled households still experienced a significant decrease in consumption of around 15% for the average shock, even three years after the official end of the Great Recession. This can be explained by a deterioration of their asset position (-70%), consistent with foreign migration costs being high in Vietnam such that additional emigration requires significant household investment upfront. This situation may lead to a migration poverty trap among the most remittance-dependent families at origin if domestic income opportunities are insufficient and additional foreign migration cannot be financed. These findings suggest that foreign migration can be understood as a high-risk, high-return livelihood strategy for low-skill households in developing countries.

I address a number of concerns regarding the robustness of my empirical results. Relying on historic migration data for my household sample, I demonstrate the presence of pretreatment parallel trends for my key outcome variables. Due to the number of foreign destination clusters being relatively small and unbalanced in this empirical setting, all estimations are implemented using a wild bootstrap procedure to calculate cluster-robust standard errors (Cameron and Miller 2015). Taking advantage of the availability of a large non-migrant household sample from the same survey, I also conduct a test verifying that my shock measures are exogenous to economic development at the origin. Furthermore, I show that the results are robust to sample attrition as well as a range of modifications of the shock measure, outcome variables, and estimation specification.

This study contributes to at least four different strands of the migration and development literature: 1) the determinants of migration; 2) household risk management in developing countries; 3) selection into migration; and 4) consequences of migration for the family left behind. In line with classic theories of domestic (Harris and Todaro 1970, Cole and Sanders 1985) and international migration (Borjas 1999, Clark et al. 2007), the empirical literature on the determinants of migration has identified differences in income opportunities between origin and destination to be the main driver for emigration, both in the domestic (Todaro 1980) and international context (Mayda 2010, Ortega and Peri 2013). While there is a general consensus about this effect, my results document a contradicting phenomenon in which negative economic shocks in a destination country, i.e. a *decrease* of differences in income opportunities, *increase* emigration to that country. Furthermore, the results also provide evidence of a trade-off between domestic and foreign migration strategies, whereby the decrease in foreign incomes causes *more* foreign migration and *less* domestic migration ex-post.

There is a large literature on household risk management in developing countries which has identified a range of measures that households rely on in order to cope with negative income shocks. Migration related strategies have been identified to fulfill important insurance functions via remittances when households at the origin are hit by negative shocks, both in the context of domestic (Rosenzweig and Stark 1989) and international migration (de la Brière et al. 2002, Yang and Choi 2007).<sup>2</sup> Gröger and Zylberberg (2016) show that rural households affected by a natural disaster in Vietnam cope predominantly through domestic labor migration to urban areas: those with settled migrants ex-ante receive more remittances while non-migrant households react by sending new members away ex-post. This study adds to that literature by showing that foreign migration is a high-risk, high-return livelihood option for low-skilled households in developing countries and can lead to a reinforcement of emigration as an ex-post shock coping strategy.

The central question of the literature on migration skill selection is typically the one about *brain drain*. Applied work has identified *positive* skill selection into migration, i.e. migrants having above average skills compared to their population of origin, to be a key characteristic of migration.<sup>3</sup> My findings show that this general trend can reverse in times of crises abroad, when international migrants become more *negatively* selected. A related question in this literature is about the optimal duration of migration (Dustmann 2003).<sup>4</sup> The results in this paper suggest that low-skilled households' migration decisions are consistent with those of the target-earner type.

There is a small but growing literature on the effects of migration on the families left behind.<sup>5</sup> In a closely related study, Yang (2006, 2008) explore how Philippine migrant households responded to positive income shocks during the Asian Financial Crisis and find no effect on households' labor supply at the origin, but a decrease in the probability of migrant return. Using administrative data on contract workers from the Philippines, McKenzie et al. (2014) investigate how emigration flows were affected by the Great Recession. They find a negative effect on emigration flows driven by a decrease in the demand for migrant labor, but no significant response of overseas earnings because of minimum wage restrictions abroad. The paper closest to this one is by Fajardo et al. (2015) who investigate Mexican-US migration flows during the Great Recession. They

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<sup>2</sup>For an overview of the literature on the economics of remittances, see Rapoport and Docquier (2006) for theoretical considerations, and Yang (2011) for a review of evidence.

<sup>3</sup>For an overview of this literature, see Docquier and Rapoport (2012). See, for example, Fernández-Huertas Moraga (2013) for evidence in the domestic and Grogger and Hanson (2011) in the international migration context.

<sup>4</sup>There are two competing stylized behavioral patterns determining the optimal migration duration. If return migration is governed by *life-cycle* concerns, the length of overseas stays depends on the maximization of net marginal income abroad. On the other hand, from a *target-earner* perspective, households choose the optimal duration according to the time needed to accumulate a certain level of overseas earnings. This implies that economic crisis abroad leads to a decrease in the optimal migration duration for the former type of migrant and an increase for the latter.

<sup>5</sup>See Antman (2013) for an overview of this literature.

find that high-skilled households in Mexico react to economic shocks in the US by bringing their members back to Mexico, while low-skilled ones send more workers to the US. My results confirm the effect for low-skilled households in the more general context of a poor developing country with migrants to a large number of different destinations worldwide. In contrast, I find that high-skilled households remained unaffected. Observing both domestic and foreign migration in my data, however, allows me to go beyond the scope of that paper by showing a trade-off between the two margins. Furthermore, being able to identify precise household-specific shocks and measure detailed financial outcomes enables me to analyze household responses and consequences directly, thereby providing a complete picture of coping mechanisms and impacts at origin.

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 for my study, namely the patterns of migration in Vietnam, descriptive statistics, and the construction of the shock measure. Section 4 outlines the identification and estimation strategy. Section 5 presents the main results and section 6 summarizes the findings from a series of robustness checks. I briefly conclude in Section 7.

## 2 Theoretical Framework

I develop a simple theoretical framework in which migration decisions are determined at the household level (Stark and Bloom 1985) 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 migrant families left behind who are dependent on remittances 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  $i$  ( $i \in \{h, d, f\}$ ),  $\mu_i$  is the minimum wage for unskilled labor,  $s$  is the individual level of schooling, and  $\delta_i$  is the return to schooling. Because minimum wages tend to be higher in developed compared to developing countries such as Vietnam, I assume  $\mu_f > \mu_d$ . In contrast, the returns to schooling are typically lower in developed compared to developing countries:  $\delta_f < \delta_d$ .<sup>6</sup>

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<sup>6</sup>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 Table 1, which mainly belong



Consequently, for two potential households with low and high skills, the relative wage premium of foreign to domestic migration ( $\frac{w_f}{w_d}$ ) is higher for the former compared to the latter. For simplicity, I normalize the wage at home to 0. The economic shock is assumed to depress foreign wages uniformly, 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 households, both in absolute and relative terms.

Income from the family's labor supply is pooled at the household level<sup>7</sup> and all members have the same skill level. Household utility is determined by a concave function, 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).<sup>8</sup> Migration incurs constant psychic costs to the household which arise when sending their members away and materialize in the form of disutility (Sjaastad 1962). The disutility is assumed to be constant over time and smaller for domestic ( $\alpha$ ) than for foreign migration ( $\beta$ ) due to distance and higher ease of return, so that:  $\alpha < \beta$ . 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:

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

This setup highlights how the migrant household's choice 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.<sup>9</sup> The main goal of this simple framework is to illustrate how migrant households with different skills and resulting wage levels respond to income shocks abroad in terms of domestic and foreign migration decisions. Note

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to the group of developed countries. For empirical evidence supporting these assumptions, see Chiquiar and Hanson (2005) and Montenegro and Patrinos (2014).

<sup>7</sup>This is not restrictive since it suffices for results to hold that only a share of the household income comes from remittances.

<sup>8</sup>The incentive of keeping 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).

<sup>9</sup>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.

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. A modification of this assumption that allows positive decreasing marginal returns to additional consumption does, however, qualitatively yield similar predictions. 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 (see Appendix Section B.1 for a step-by-step solution):

$$\text{sgn}\left(\frac{d}{dw_f}\right) = \text{sgn}\left(-\frac{w_d}{w_f^2}u'(m_h^*) + \frac{(w_d - w_f)m_d^*}{w_f^2}u''(m_h^*) - \beta\frac{w_d}{w_f^2}\right), \quad (1)$$

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

Intuitively, changes in the foreign wage cause income and substitution effects, which can vary to the extent that the signs of expressions 1 and 2 become positive or negative. The difference between these two effects ultimately determines the elasticity of domestic and foreign labor supply with respect to foreign wages. Note that the effects in this general and continuous case are ambiguous, depending on the precise shape of the utility function, the relative magnitudes of domestic to foreign wages, and the cost parameters.

Nevertheless, in order to illustrate the heterogeneous predictions of this model for the discrete case of my sample households, I now proceed to a simple parametrization exercise. Table 1 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.

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 [World Bank \(2008\)](#) (5.5.%) and [Montenegro and Patrinos \(2014\)](#) 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 [González 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 possess 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.<sup>10</sup> 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

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<sup>10</sup>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.

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' 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.

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 ([McKenzie et al. 2014](#), [Cadena and Kovak 2016](#)). 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 consequences 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 are predominantly seeking employment opportunities. The industrial sector is the main provider for off-farm employment in Vietnam and its activity is highly concentrated in a small number of urban centers, mainly Ho-Chi-Minh-City (*Saigon*) and surrounding provinces in the South, as well as Hanoi in the North.

Conditional on the sector of employment, 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 (de Brauw and Harigaya 2007). 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 to domestic migration, there is a general lack of data and empirical evidence on foreign migration in Vietnam. Nevertheless, 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 2013b). For 2008, Dang et al. (2010) estimate that 1 million Vietnamese were living abroad, corresponding to 1.2% of the total population.<sup>11</sup> Simultaneously, remittance receipts from international migrants grew rapidly and reached approximately 8.3 billion USD in 2010, constituting 7% of GDP (World Bank 2016b).

Between 2000 and 2010, the single most important channel of international migration was the country's temporary labor export scheme, sending around 70 thousand contract workers per year to a diverse set of countries worldwide (Ministry of Foreign Affairs of Viet Nam 2012).<sup>12</sup> This figure has increased to around 100 thousand departures per

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<sup>11</sup>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.

<sup>12</sup>See Nguyen (2014) for an institutional description of Vietnam's labor export program. Alternative channels of international migration in Vietnam are non-temporary workers migrating through family reunification policies or other permanent migration channels, irregular labor migration, as well as edu-

year since 2010. Within this program, contract workers from Vietnam migrate on a temporary basis, through employment quotas to certain destination countries, which are usually negotiated in bilateral agreements. Job matching in Vietnam is performed through private recruitment agencies that charge relatively high fees, officially amounting to several months of overseas gross earnings (Abella 2004). However, there is anecdotal evidence of excessive overcharging practices among agencies, such that effective fees tend to be even higher (Wang and Bélanger 2011). In addition to that, foreign migration costs are often debt-financed at high interest rates in Vietnam (Hoang and Yeoh 2015).

A previous study based on the baseline data used in this paper finds that foreign migrants in Vietnam share certain characteristics with domestic ones (Dang et al. 2010): they are relatively young and better educated than the average Vietnamese. 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. There is a wide variation across destinations in wage earning potentials for overseas workers with OECD countries such as Japan offering the highest salaries and the United Arab Emirates or Malaysia the lowest (McKenzie et al. 2014). Apart from descriptive statistics, empirical evidence is thus far very limited.<sup>13</sup> To the best of my knowledge, the analysis in this study is the first one to rely on a comprehensive panel of foreign and domestic migrants and their households in Vietnam.

## 3.2 Household and Migrant Data

The analysis in this paper focuses on households with international migrants having left prior to the onset of the Great Recession and who were, therefore, exposed to the deterioration of economic conditions abroad through their migrants. Data on households and their migrants in domestic and international destinations was collected in two rounds in 2008 and 2013 among a stratified random sample in Vietnam (see Figure 1). 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*.<sup>14</sup> The follow-up round in 2013 was organized by the author in collaboration with the Mekong Development Research Institute and the Vietnamese-German University.

Households were included in the sample if they had at least one migrant abroad

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cational and marriage migration to a minor scale.

<sup>13</sup>This is due to sample sizes of international migrants in random household surveys being (still) 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 (2016) find that remittances increase schooling and reduce child labor.

<sup>14</sup>See Chappell et al. (2010) for a technical report on the international project and Dang et al. (2010) for details on the survey in Vietnam, including the sampling procedure.

during the baseline in 2008 who left the household within ten years prior to the baseline survey and had not returned yet. Apart from this migrant household sample, the survey also included a strata of non-migrant and returned migrant households. I exclude these samples from the main analysis as, by definition, they did not experience the shock of interest. Nevertheless, in robustness checks, I rely on the non-migrant household sample in order to demonstrate the exogeneity of the Great Recession economic shocks to household outcomes in Vietnam. All migrants who left from the sample households domestically or internationally within the reference period were recorded and detailed information on those individuals was collected through proxy respondents, usually the head of the household. Out of the initial sample of 618 migrant households interviewed in the baseline survey, 546 of them could be successfully tracked in the follow-up survey. This translates into an attrition rate of 11.7% over 5 years or 2.3% per year, which is remarkably low compared to similar datasets, particularly those including migrant households in a developing country (Yang 2008). Accounting for missing observations, in the empirical analysis I am left with a sample size of 513 households including individual information from 665 foreign migrant individuals and 2,170 household members at the origin in the balanced version. In the robustness checks, I conduct additional tests which show that, in addition to being small, attrition does not bias my estimates and that all results are robust to using the unbalanced panel dataset instead.

Panel A of Table 2 shows the geographical distribution of foreign migrant individuals from the sample households across the top 15 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 15 destination countries listed account for 94% of the total sample of migrants, with the remaining 6% spread over 15 other destinations.

Table 3 provides descriptive statistics on foreign migrant individuals. They tend to be relatively young, with a mean age of around 31 years. Due to the stratification 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%). Due to positive skill selection into migration, the share of low-skilled migrants with less than secondary educational attainment is relatively low at 22%. The majority of migrants have achieved at least a secondary level of education and 13% a tertiary degree before departure. As for the reasons for migration, economic considerations are by far the most important answer with 55% being reported having left for such motives, followed by family- (43%), and education-related reasons (17%).<sup>15</sup>

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<sup>15</sup>Descriptive statistics indicate that the majority of migrants being reported other than economic motives for migration still send remittances back home. This underlines the fact that economic motives, even if not explicitly reported, ultimately play a key role for any kind of migration decision among my sample households.

Table 4 presents summary statistics on the main outcome variables of migrants' families left behind in Vietnam. In line with the theoretical considerations, the sample is divided into low- and high-skilled households using their level of per capita consumption in 2008 with respect to the median to proxy for their level of education.<sup>16</sup> By construction, low- and high-skilled migrant households are different in many aspects along their observable characteristics. In terms of demography, low-skilled households are considerably larger in size, with almost 5 nucleus members (excluding any migrants) compared to high-skilled ones with only 3.5 in 2008. While low-skilled households are almost equally distributed across rural and urban areas, 63% of high-skilled households live in urban areas.

In line with the subsample selection criteria, domestic income is rather different for the two subgroups with 1,432 USD per capita for low-skilled households versus 2,525 USD for the high-skilled ones respectively.<sup>17</sup> Note that domestic income increases for both subgroups over time, but the increase is more pronounced for low-skilled households (32%) than for high-skilled ones (6%). In 2008, net remittances are larger for the high-skilled in absolute terms but constitute a higher share of domestic income for the low-skilled. The level of net remittances decreases over time for both types of households, but this trend is stronger for rich households whose remittances decrease by more than 50% over 5 years. The wealth gap between the two subgroups is even more extreme when considering total consumption, with the high-skilled household mean being more than three times larger than the low-skilled one.

Given the sample stratification strategy, all households have at least one foreign migrant abroad during baseline, such that:  $p(\text{migrant}) = 1$ , 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. Both the migrant status and the total number of migrants decrease over time for both groups. However, when looking at the number of foreign migrants conditional on having at least one such migrant, we actually observe an increase for both subgroups, which is more pronounced for low-skilled households, who send 20% more migrants. 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 clearly polarized between the two subgroups: low-skilled households' distribution is concentrated in the lower tail and *vice versa* for high-skilled

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<sup>16</sup>This approach is preferable over using categorical education information directly because it provides a smooth and continuous distribution and is highly correlated with household skill levels.

<sup>17</sup>Note that all monetary variables are expressed in real USD (PPP) per capita. Low-skilled migrant 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.



ones. This shows that the level of household consumption is a good proxy for, and highly correlated with, educational attainment.

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 low-skilled. While the incidence and number of domestic migrants increases for both subgroups over time, the trend is more pronounced for low-skilled households, with 20% of the sample changing status over time and the mean number of domestic migrants increasing threefold. Due to missing data on domestic migrants' occupation in the baseline survey, I am unable to determine the level of domestic labor migration in 2008. Therefore, the numbers reported reflect the flow of former household members who migrated domestically during the 5 years between baseline and follow-up and are reported working in 2013.

### 3.3 Shock Measure Construction

In order to construct a proxy for the economic shocks to migrant incomes abroad, I follow [Bartik \(1991\)](#) in combining cross-sectional information about foreign migrants' destinations and skill-levels prior to the Great Recession with time-varying data reflecting the change in unemployment rates by destination and skill-group during the crisis years. Using unemployment rates instead of alternative measures of economic shocks, such as GDP, allows me to exploit migrant skill-specific dynamics of unemployment within each destination. Due to a lack of data on foreign migrants' sector of employment abroad in the baseline, I am unable to repeat the same exercise for sector-specific GDP trends. Based on foreign migrants' location in 2008, [Figure 2](#) depicts the evolution of unemployment rates in the top 12 destination countries before, during, and after the Great Recession. While unemployment rates started to rise in most countries only in 2008, a few countries experienced a rise in 2007 already (most notably Japan, UK, and the USA). After the steep, but highly differential increases in the unemployment rates across destinations, 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:

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

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.  $M_{2008}$  is the total number of migrants from household  $h$ . Note that this shock measure carries the subscript  $d$  as it 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 2 (column 1). The geographic dispersion of foreign migrants during the baseline survey implied considerable variation in Great Recession shock exposure (see Figure 3 for visualization). With an increase of 4.67 percentage points, the USA experienced the biggest shock magnitude, followed by Canada (2.33 pp), United Kingdom (2.28 pp), Russia (2.2 pp), and Taiwan (1.94 pp). Note that the shocks were not particularly concentrated within certain continents apart from North America, and that some destinations were hardly affected at all, such as Korea (0.4 pp) and Germany (-0.91 pp), while their direct neighbors were (e.g. Japan with 1.23 pp and France with 1.8 pp). This suggests that the effective magnitude of the shock in each destination was rather unexpected.

While this benchmark measure is a good first order approximation of the economic shocks that sample households in Vietnam experienced through their migrants abroad, it implicitly assumes that all migrants were exposed to the same shock within each destination. In an extension, I relax this assumption by exploiting the variation in migrant skill levels in order to calculate a destination- and skill-specific shock measure as follows:

$$Shock_{hs} = \frac{\sum_{d=1}^D \sum_{s=1}^S (M_{h,d,s,2008} \times \Delta UR_{d,s,2007-2009})}{M_{h,2008}}, \quad (4)$$

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 (ISCED97). As described in Table 4, there is considerable variation in migrants' educational attainment across households, such that this second order shock approximation is strongly household-specific. Columns two to four in panel B of Table 2 report this measure for the main destinations. 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. 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 education within destinations, i.e. low-skilled migrants experience stronger shocks compared to high-skilled ones.

## 4 Empirical Approach

### 4.1 Identification Strategy

This study adopts a natural experiment approach using the following setup: First, I focus on a sample of international migrant households in Vietnam, whose migrants are spread over a large set of destination countries worldwide. Second, I rely on plausibly exogenous and heterogeneous economic shocks generated by the Great Recession, as suggested by [McKenzie and Yang \(2012\)](#), which affected households through their migrants in destination areas. Third, the data used provides the location of (domestic and foreign) migrants and the outcome variables of interest for a panel of households at the origin, both before and after the Great Recession. Consequently, I conduct a difference-in-difference analysis based on a continuous shock measure, comparing households subject to differential magnitudes of economic shocks, depending on the destination and skills of their migrants, before and after the shock. In the estimations, I control for time-invariant household and destination characteristics as well as for confounding changes at the level of the province of origin.

The identifying assumption of this approach is that if the shocks abroad had all been of the same magnitude, then changes in outcomes would not have varied systematically across families left behind conditional on their migrants' destination country and skill-level. In order to verify this parallel trend assumption, I conduct the following placebo test for the correlation between the shock measure and the pretreatment trends of my household outcomes of interest. Using data on the migration history of members and migrants from the baseline survey, I reconstruct the key outcome variables for my sample households in 2003, i.e. 5 years prior to the baseline survey. Relying on this pre-baseline data, in the robustness checks, I replicate my estimations as if the Great Recession had happened five years earlier, i.e. between the years 2003 and 2008 (See Figure 1). Note that this specification is a direct test for the presence of pre-Great Recession parallel trends among sample households and the results suggest that the identifying assumption holds.

A further threat to my identification strategy could be a correlation between the shock measure and unobserved household or destination country factors. This could, for instance, occur if more ambitious households migrated to more attractive destinations which, in turn, suffered from the crisis more severely. To account for this, I include household fixed effects in all regressions, which absorb unobserved, time-invariant characteristics of the household of origin. Note that this set of fixed effects also controls for time-invariant characteristics of the destination country in my setting, as long as household migrants target only one destination country (96% of sample). Relying on within destination country-variation of the shock measure, I also estimate a specification

including destination country dummies, which control directly for time-invariant factors.

Another potential concern when relying on treatment variation generated by economic shocks abroad is that they might be correlated with economic changes at the origin. For example, despite the fact that the Great Recession affected mainly developed countries, which tend to be traditional destination countries for Vietnamese migrants, there is some evidence that the crisis also had an indirect impact on the Vietnamese economy through a decrease in trade with and foreign direct investment from affected countries (Nabli 2011).<sup>18</sup> In order to deal with this, in all regressions, I include a set of province of origin-year dummies, which account for potential confounding changes in economic development over time in each of the Vietnamese sample provinces.

Additionally, taking advantage of the availability of a large non-migrant household sample from the same survey (i.e. households without migrants from the same enumeration areas), I also conduct a direct test to verify that the economic shocks that neighboring households experienced through their migrants at the destination are uncorrelated with the outcomes of non-migrant households in the same locality. The results of this test indicate that the shock measures are uncorrelated with changes in demographic or financial outcomes among non-migrant households in Vietnam.

Finally, a last concern could be the timing of the baseline data collection mid 2008, i.e. after the beginning of the Global Financial Crisis of 2007, but before turning into an economic crisis that affected general employment conditions in late 2008, which could potentially have captured precautionary coping actions. However, such behavioral patterns would in fact attenuate my estimates, making it more difficult to find any effect. In order to rule this out, I modify the underlying migration definition to capture only movements until the end of the year 2007. The results of this exercise are remarkably similar to my benchmark results.

## 4.2 Estimation Specification

Based on the two shock measures described, I estimate two alternative specifications, with the benchmark panel equation relying on the destination-specific shock measure as calculated in equation 3:

$$Y_{hpt} = \alpha + \beta_1 Shock_h \times T_t + \beta_2 T_t + \delta_h + \gamma_{pt} + \varepsilon_{hpt}, \quad (5)$$

where  $Y_{hpt}$  is an outcome for household  $h$  from province of origin  $p$ , and in year  $t$ , with  $t = 2008$  or  $2013$ .  $Shock_h$  is the destination country-specific shock measure, and  $T$  is a time dummy which equals 1 for the post-shock period 2013.  $\delta_h$  are household fixed effects and  $\gamma_{pt}$  is a set of province of origin-year-specific dummies.  $\varepsilon_{hpt}$  is the error term and,

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<sup>18</sup>Note that there was no correlation in the formal labor market performance between the destinations and Vietnam (see bold line in Figure 2).

following [Yang \(2008\)](#), standard errors are clustered according to the baseline destination country of foreign migrants.<sup>19</sup>

In robustness checks, I also estimate an alternative regression specification, using the household-specific shock measure, conditional on migrant destination and skills as calculated in equation 4:

$$Y_{hspt} = \alpha + \beta_1 Shock_{hs} \times T_t + \beta_2 T_t + \delta_h + \gamma_{pt} + \eta_d + \varepsilon_{hspt} \quad (6)$$

where  $Shock_{hs}$  is the destination and skill-specific shock measure and  $\eta_d$  is a set of destination-specific dummies.<sup>20</sup>  $\varepsilon_{hspt}$  is the error term and standard errors are clustered according to the destination country and migrant skill group. Given the relatively low number and unequal distribution of the destination (and skill-group) clusters among sample households, conventional cluster-robust standard errors have been criticized for being artificially low, leading to over rejection in standard asymptotic tests. I deal with this by implementing the wild bootstrap procedure proposed by [Cameron et al. \(2008\)](#) to calculate standard errors, which is the recommended approach for this setting ([Cameron and Miller 2015](#)).<sup>21</sup>

The coefficient of interest is  $\beta_1$ , the impact of the economic shock that households at origin were exposed to through their migrants abroad during the crisis years 2007 to 2009 on their respective outcome variable. Note that, due to a lag of 5 years between baseline and follow-up, the estimates capture the long-term impact, approximately 3 years after the official end of the Great Recession. In most of the regressions below, the outcome variable is an absolute measure of demographic changes at the household level. In robustness checks, I also consider an alternative outcome specification such as net numbers and index variations.

## 5 Results

This section is organized as follows. First, I analyze how the unemployment shock abroad affected the extensive margin of labor supply of families left behind in Vietnam. Second, I focus on the dynamics of foreign migration and, subsequently, proceed to analyze domestic migration patterns. Finally, I provide evidence on the impact of the crisis on households' key financial outcomes.

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<sup>19</sup>For households who had migrants to more than one destination, the error term is clustered according to the eldest migrant. In order to correct for endogenous sample design, all regressions are performed applying probability weights ([Solon et al. 2015](#)).

<sup>20</sup>However, due to the high correlation of destination choices within households, the destination dummies are effectively absorbed by the household fixed effects in the estimation procedure. In other words, household fixed effects effectively control for time-invariant destination country factors in my setting.

<sup>21</sup>Standard errors reported in the analysis are calculated relying on the user-written Stata command by [Caskey \(2015\)](#) based on 1,000 repetitions.

For all specifications in this chapter, I restrict my sample to the 2008 baseline and 2013 follow-up observations at the household level and estimate the benchmark specification based on equation 5. Given the continuous character of the shock measure used, each coefficient reflects the effect of a one percentage point increase in the unemployment rate that households in Vietnam were exposed to through their migrants abroad. However, since my shock measure is continuous and effectively ranges between -1.44 and +4.67 pp, one can also interpret the estimates as follows: multiplying the coefficients by the mean shock measure of 2 (4) 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. For each outcome variable, I estimate the benchmark specification first for the full sample and, subsequently, by low- and high-skilled subgroups separately in order to analyze their heterogeneous reactions. I do so by augmenting the regression equation by a complete set of interaction terms with a subgroup dummy variable, which is one for high-skilled households above median consumption per capita. In the regression tables, I only report  $\beta_1$  (labeled *Shock*) and the interaction term of  $\beta_1$  with the high-skilled dummy (*Shock*  $\times$  *High*), respectively.<sup>22</sup>

## 5.1 Home Labor Supply

Results on household labor supply at the origin are presented in Table 5. The coefficients in columns (1) and (2) capture the total number of household members (i.e. the household nucleus size, excluding both domestic and foreign migrants). The point estimate in column (1) is small and insignificant, suggesting no effect of the shock on the overall size of households at the origin. However, once I include an interaction term with the dummy for high-skilled households in column (2), the coefficients turn out to be much larger in magnitude and with opposite signs. The point estimates for the low-skilled subsample is not significant, but its magnitude suggests an increase in the household size of approximately 0.2 individuals for a one percentage point increase in the shock measure, or 0.4 individuals for the average shock of approximately two percentage points. The point estimate for the difference between the two subgroups is -0.3, suggesting that high-skilled households' size does not change significantly in response to the shock as the F-test on the net effect of the two coefficients rejects that it is significantly different from zero.

Looking at the results for the total number of working members in column (3), again, the shock coefficient is small and insignificant for the full sample, but is large in magnitude and statistically significant once estimated for the low-skilled subgroup in column (4). The point estimate indicates an increase of 0.3 in the number of working members among

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<sup>22</sup>Note that in the subgroup analysis, the *Shock* coefficient reflects the effect for the low-skilled subsample, while the interaction term *Shock*  $\times$  *High* measures the difference in treatment effects between the two subgroups. The separate effect for the high-skilled subgroup is determined by the net effect of the two coefficients and I test whether this difference is equal to zero using an F-test on the linear restriction.



low-skilled migrant households for the average shock ( $\approx 2 \times 0.146$ ). This corresponds to a 15% increase compared to baseline levels of the dependent variable and translates into every third low-skilled household increasing the number of members at work by one individual as a result of the crisis abroad. On the other hand, high-skilled households remain unaffected as indicated by the F-test.

This is the first key results of my study: as the crisis led to a deterioration of employment opportunities abroad, low-skilled migrant families left behind substantively increased their labor supply. For the sake of completeness, the coefficients in columns (5) and (6) capture the number of unemployed household members. The point estimates show the exact opposite signs compared to the previous ones, despite slightly lower magnitudes. The coefficient in column (6) suggests that two thirds of the increase in labor supply among low-skilled household at origin is driven by previously unemployed household members entering new work opportunities in response to the shock. On the other hand, the coefficient on the subgroup differences indicates no effect for high-skilled households.<sup>23</sup>

## 5.2 Foreign Migration

Results from the analysis of foreign migration responses are provided in Table 6. Columns (1) and (2) present the results for the total number of foreign migrants. The coefficient on the full sample is positive and highly significant, indicating a general increase of 0.14 individuals in the number of foreign migrants for the average shock. This translates into every seventh household sending one additional member abroad. When analyzing the effects by subgroup, the coefficients in column (2) have opposite signs and are both statistically significant, indicating that the general increase is exclusively driven by the low-skilled subsample. The point estimate suggests an increase of approximately 0.23 individuals per household for the average shock or every fourth low-skilled household sending one additional member abroad as a reaction to the crisis. Compared to baseline levels of international migration this translates into a 18% increase in the number of international migrants. The effect is again zero for high-skilled households as indicated by the F-test. This is the second key finding of my analysis: low-skilled households at the origin engaged in *more* migration to foreign destinations when they were hit by negative economic shocks through their migrants abroad. In line with the theoretical framework, these estimates provide evidence that the elasticity of foreign migration with respect to foreign wages was negative for low-skilled households.

In columns (3) and (4), the outcome variable is the number of foreign migrants condi-

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<sup>23</sup>In unreported regressions, I also check whether the crisis abroad had any impact on the skill formation process at the origin. It could potentially be the case that the crisis lead families left behind to invest more in education. When looking at the number of members in education, however, I find no effect.

tional on being reported to having left primarily for labor motives. While the coefficient on the full sample is close to zero, the estimates by subsample have opposite signs, are highly significant, and of similar magnitude compared to the aggregate change in foreign migration. The point estimate for the low-skilled subsample suggests an increase of almost 0.25 individuals which translates into every fourth low-skilled family left behind increasing foreign migration by one individual. The point estimate on the subgroup differences, again, indicates no effect for high-skilled households. Columns (5) and (6) report the results for a dummy that is specified to be one if migrants change the foreign destination country over the course of the five years between baseline and follow-up. Note that the descriptive statistics show very few households actually doing so and, unsurprisingly, the coefficients do not indicate any effect whatsoever. This suggests that, 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 migration destination decisions being path dependent and determined by social networks.

### 5.3 Domestic Migration

The results on domestic migration are provided in Table 7. Note that, due to data limitations, there are two different specifications of domestic migration outcomes in this section: *levels* of aggregate domestic migration in columns (1) and (2), and *flows* of domestic migration conditional on migrants' occupation and destination in the other columns. While the former unconditional coefficients are fully identified, the latter are not. This is due to a lack of information on domestic migrants' occupation in the baseline survey, which results in the *flow*-variables having only cross-sectional character. For this reason, these coefficients can only be interpreted as suggestive evidence, reflecting correlations instead of causal effects.

Column (1) and (2) provide the (causal) results for the aggregate level of domestic migration. While the point estimate on the full sample is small and insignificant, the coefficients in column (2) again have a large magnitude and opposite signs. The point estimate for the low-skilled is negative and statistically significant, suggesting a decrease of 0.25 in the number of domestic migrants as a response to the average shock. In other words, the results suggest that every fourth low-skilled household decreases the number of domestic migrants by one member in response to the average shock. For high-skilled households, again, the effect is zero as indicated by the F-test. This is the third key finding: low-skilled households decreased the absolute number of domestic migrants in response to the crisis abroad, while high-skilled ones remained unaffected.

There are two complementary explanations for this finding. First, in line with the theoretical considerations, this can be rational for low-skilled households who gain utility from keeping their family together at the origin and whose optimal shock coping strategy

is to increase foreign migration due to the foreign wages they face still being considerably higher than the domestic ones. In this case, the income from domestic migrants does not contribute to securing the minimum consumption of the household anymore so that it is preferable for the agent to call the domestic migrant home.<sup>24</sup> Empirically, this explanation is also consistent with the general increase in household size and can account for the remaining unexplained increase in household labor supply from Section 5.1. Second, former domestic migrants might have relocated abroad as a reaction to the crisis, and thus be partly driving the increase in foreign migration from the previous section. Due to data limitations, however, I cannot separate the two cases empirically. In other words, I cannot identify unambiguously whether the trade-off between domestic and foreign migration is direct (i.e former domestic migrants relocating abroad) or indirect (i.e former domestic migrants returning home and another member relocating abroad).

Columns (3) and (4) present suggestive evidence on the flows of baseline household members to domestic labor migration destinations. While there is no correlation when estimated for the full sample, the coefficient for the low-skilled subsample is negative and significant, suggesting that the shock is negatively correlated with the probability of sending a member to a domestic migration labor destination among the low-skilled subsample. For high-skilled households, there is no significant correlation. Columns (5) and (6) capture only the flows of domestic labor migration to long-distance destinations, outside of the households' province of origin. The results are very similar to the previous one, suggesting that inter-provincial migration is the main driver for this correlation.

In essence, the results in this section indicate that low-skilled households decreased the absolute number of domestic migrants in response to the shock, while the effect was zero for high-skilled households. Combining the two key findings on domestic and foreign migration from the previous section provides evidence in favor of a *trade-off* between domestic and international labor migration, with low-skilled households increasing foreign while decreasing domestic migration simultaneously. In line with this, I also find suggestive evidence based on domestic migration flows that low-skilled households were less likely to send their members to domestic labor migration destinations ex-post. I now move to the results on household financial outcomes in order to assess the monetary consequences of the labor supply and migration decisions outlined.

## 5.4 Household Finance

In order to study how the shock affects the budget constraint of households, this section provides evidence on their financial outcomes. I first analyze how home income responds and compare the results to those for migrant income, i.e. remittances. I then describe

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<sup>24</sup>This would also apply in a modified theoretical framework in which additional income above the minimum threshold yields low positive utility for the household, if the disutility or psychic costs of domestic migration outweighs the utility gain from domestic migrant income.

the results on household assets and overall consumption. A way to understand this exercise is to write down the household budget constraint. In period  $t$ , the household receives income  $y_t^h$  from its activities at home, receives transfers from domestic and foreign migrants sources  $\tau_t = \sum_s \tau_t^s$  ( $s \in \{d, f\}$ ), and adjusts its asset position  $\Delta b_t$ . Transfers are positive if there is a net inflow to the origin household and  $\Delta b_t$  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 supposedly lowers remittances from foreign migrants ( $\tau_t^f$ ) initially, and I want to investigate how they react ex-post, after the increase of foreign migration has taken place, and whether  $\tau_t - \Delta b_t$  is sufficiently large to allow the household to maintain constant consumption.

The results are presented in Table 8.<sup>25</sup> Starting with home income in columns (1) and (2), the point estimates are generally close to zero, suggesting that home income remained constant, despite the increase in labor supply. One explanation for that could be that the increase in labor supply was directed towards household subsistence production, other unpaid work, or work at low pay.

Looking at the second specification with net remittances from overseas migrants in column (3), the point estimate has a positive sign and is large in magnitude.<sup>26</sup> The results in column (4) show that the aggregate increase is driven by the low-skilled subsample in particular. The point estimate suggests a 40% increase in remittances per capita for the low-skilled subgroup. On the other hand, the coefficient for the subgroup differences is negative and, despite of lower magnitude, indicates no effect for the high-skilled according to the F-test. Note, however, that the standard errors are relatively large in these specifications and the tests are underpowered.

Looking at specifications (5) and (6), which 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 negative, indicating a general decrease. The estimates in column (6) show that this aggregate effect is, again, driven by low-skilled households. The point estimate for this subgroup is large and statistically significant, suggesting a decrease in savings of around 70% for the mean shock. Although not statistically significant, the coefficient on the subgroup difference suggests that the effect is zero for the high-skilled subgroup.

Turning to the expenditure measures in column (7), the coefficient on the full sample is again close to zero and insignificant, suggesting no change. Looking at the separate effects by subsample in column (8), the coefficients become much larger, statistically significant, and carry opposite signs. For the mean shock, the point estimate for the low-

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<sup>25</sup>Note that all variables are expressed in logarithmic US\$ (PPP) per capita, i.e., adjusted by the number of permanent household members in each period, excluding any migrants.

<sup>26</sup>Due to data constraints, I do not observe transfers from domestic migrants ( $\tau_t^d$ ) in the baseline.

skilled subsample translates into a decrease in household consumption of around 15%, measured five years after the baseline survey and approximately three years after the peak of the crisis. The effect on the high-skilled is again zero.

Taken together, the results on the household budget constraint correspond to the ones on labor supply and migration decisions in the following way: poor households were negatively affected by the shock while high-skilled households remained largely unaffected. While there is hardly any change in home income ( $y_t^h$ ), the relatively strong magnitude of the increase in remittances ( $\tau_t^f$ ) for the low-skilled subsample corresponds qualitatively to the increase in foreign migration. Together, these results provide evidence that the allocation of additional labor abroad was relatively successful for low-skilled households and resulted in an increase of remittances receipts at the origin, consistent with the theoretical framework.

Further, the results also provide evidence that the crisis had a negative effect on the asset position ( $\Delta b_t$ ) of the low-skilled subsample. This is consistent with the fact that foreign migration tends to be quite expensive in Vietnam and requires substantial upfront investment on behalf of sending households (Hoang and Yeoh 2015). Despite the increase in remittances, the pronounced deterioration of household assets ultimately implied a decrease in consumption ( $c_t$ ). Identifying a negative impact on low-skilled households' consumption, even three years after the peak of the Great Recession and despite all shock coping efforts, can be interpreted as the long-term adverse effect of the Great Recession. These findings suggest that foreign migration can be understood as a high-risk, high-return livelihood strategy for low-skill households in developing countries, which may create a migration poverty trap among the most remittance dependent at origin, especially if domestic income opportunities are insufficient and households struggle to finance additional foreign migration.

## 6 Robustness Checks

I perform a series of robustness checks that are divided into three groups for the ease of exposition: sample modification are reported in Table 9, shock measure modifications in Table 10, and Table 11 is dedicated to robustness checks involving modifications of the outcome variables.

Starting with Table 9, panel A presents the results when estimating equation 5 in a placebo setup between the years 2003 and 2008 as if the Great Recession had happened five years earlier (compare Figure 1).<sup>27</sup> This is a direct test for the presence of parallel trends among my household sample before the occurrence of the Great Recession. The coefficients are altogether close to zero and insignificant, indicating no evidence of correla-

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<sup>27</sup>In this exercise, I rely on recall data from the baseline survey in order to reconstruct the main outcomes of interest at the household level in 2003.

tions between the economic shocks in destination countries and the trends in households' main outcome variables before the occurrence of the Great Recession.

In panel B, I draw on the non-migrant household sample 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 from the same enumeration area (EA).<sup>28</sup> I then estimate 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. Despite some of the coefficients from this exercise indicating modest correlations, none of them is statistically significant. Taken together, the results from this exercise provide evidence that the shock measure used is exogenous to the outcomes of non-migrant households in Vietnam, controlling for time-invariant household and year-specific provincial factors at origin. In other words, the results suggest that economic shocks in migrant destination countries during the Great Recession did not affect demographic or financial household outcomes at the origin other than through migrants at the destination.

In panel C, I estimate the benchmark specification on the unbalanced household panel. The results are remarkably similar to those from the regressions on the balanced panel, both qualitatively and quantitatively, indicating that attrition is not a concern. Importantly, in addition to being small, attrition is not correlated with the shock measure.

The second set of robustness checks with modifications to the benchmark shock measure is reported in Table 10. Results on the destination and skill-specific shock measure are reported in panel A. Note that the estimations include a set of destination country dummies, which explicitly accounts for time-invariant characteristics of the migrants' host countries on top of the household fixed effects. Due to the different mean of this modified shock measure, the effect for the average shock is derived by multiplying the point estimates by 2.5 instead of 2 in these regressions. Doing so shows that the magnitudes of the effects in this exercise are between 10–30% lower than the ones in the benchmark specification in response to the average shock. Nevertheless, the results remain both quantitatively and qualitatively similar, which provides evidence that my empirical approach successfully controls for time-invariant destination country characteristics.

Panel B summarizes the results for the specification relying on a shock measure of destination-specific changes in the unemployment rate between 2008 (instead of 2007)

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<sup>28</sup>Each 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 representative of potential migration options that neighboring non-migrant households are exposed to. There are around 3 households per EA, on average, 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.



and 2009. By using this reduced time window, the measure does not capture the full extent of the Great Recession impact on unemployment rates, which started to rise in certain destinations already in 2007 (Compare Figure 2). Consequently, the mean of this modified treatment variable is lower with 1.7 percentage points and a standard deviation of 1.2, compared to 1.9 and 1.8 for the benchmark specification, respectively. Despite some of the coefficients having lower levels of significance compared to the benchmark specification, the results are qualitatively and quantitatively similar.

Panel C presents the results for an alternative shock measure, which captures relative changes in the unemployment rates abroad instead of absolute ones, i.e. the percentage increase of the benchmark shock measure. Due to the different scaling of this shock measure, which reflects the effect for a hypothetical increase of the unemployment rate at destination from 0 to 1, i.e. a 100% increase, the coefficients appear much larger than the ones using the absolute shock measures. In order to derive the effect for the average shock, the coefficients must be multiplied by the shock variable mean (0.33). When rescaling the point estimates in this manner, they turn out to be very similar to the ones from the preferred specification, both in qualitative and quantitative terms.

The third set of robustness checks is reported in Table 11. In panel A, 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. The results are very similar to the ones from my benchmark specifications and suggest that the results are robust to alternative specifications of the outcome variable capturing *changes* instead of *levels*.

In panel B, the independent variable is specified to be a net migration index, taking on the value of 1 if the household experiences positive net out-migration in year  $t$ , 0 if the household's net migration is neutral, and -1 when the household experiences negative net migration (i.e. positive return migration). In contrast to my benchmark specification which captures the intensive margin of migration decisions via the number of migrants sent, this specification is informative about the extensive margin of migration, capturing net changes in the households' migration status. Despite the magnitudes of these coefficients being slightly smaller, the results are comparable to the estimates from my benchmark specification, both in quantitative and qualitative terms.

One last concern could be that the timing of the baseline data collection (mid 2008) allowed households anticipating the labor market impact of the Great Recession. If this resulted in a pre-cautionary revision of their migration decisions it would in fact have attenuated my estimates, making it more difficult to find any effect. Although the descriptive statistics do not indicate any patterns which could be interpreted that way, in Panel C, I exclude all domestic and foreign migration decisions from the baseline observations, which took place in 2008. In other words, relying on historical migration data from the baseline survey, I redefine the migration outcome variable to capture the

households' number of migrants at the end of the year 2007. Again, the results remain basically the same than in my benchmark specification, suggesting that this was not an issue.

## 7 Conclusion

The evidence presented in this paper documents that high-skilled households remain largely unaffected by economic shocks that they experience through their migrants abroad. By definition, they have higher earnings and assets and thus tend to be more resilient to negative income shocks in general. On the other hand, my results also provide evidence that low-skilled households at origin are negatively affected by the economic shocks abroad during the Great Recession. They cope by substituting domestic with foreign migration, sending additional migrants to the same foreign destinations. By definition, the subgroup of low-skilled households has lower earnings and assets and is, therefore, more vulnerable to economic shocks. They appear to be relatively successful in their shock coping efforts, which result in an increase in remittance receipts as a consequence of additional foreign migration, consistent with my theoretical framework.

The fact that low-skilled households experience a decrease in expenditure due to a strong depletion of assets, even three years after the end of the Great Recession and despite higher remittances, is consistent with the explanation that foreign migration tends to be quite expensive in Vietnam and requires substantial investment on behalf of sending households before departure ([Hoang and Yeoh 2015](#)). From this perspective, foreign migration can be understood as a high-risk, high-return livelihood strategy for low-skilled households in developing countries. For the most remittance-dependent ones, the returns from migration can quickly be converted into losses in times of economic crisis abroad. Such a situation may result in a migration poverty trap if subsequent labor mobility cannot be financed and remaining income opportunities at the origin are insufficient to maintain subsistence levels of consumption. From the perspective of the developing country of origin, labor export policies like the one implemented in Vietnam, should, therefore, be scrutinized such as to minimize the risks attached to foreign labor migration. Different approaches should be evaluated in this regard, for example, raising the awareness about migration-related risks among potential migrants through pre-departure seminars ([Barsbai et al. 2016](#)) or improving households' financial decision making skills ([Seshan and Yang 2014](#)).

The results also provide evidence that, contrary to classic migration theories, emigration may be self-reinforcing through economic crisis abroad. Simultaneously, the skill selection into migration may become less positive. While the impact of migration decisions 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 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? My analysis faces two important limitations: First, due to the relatively large time gap in data collection between baseline and follow-up, my results are only informative about the long-term outcomes and, therefore, do not allow me to draw direct conclusions about the short-term consequences of the crisis. Second, the analysis does not account for potential spill-over effects from changes in migration decisions on either end of the migration corridor, which might have important repercussions for the assessment of general welfare effects. Further research is required to answer these important questions.

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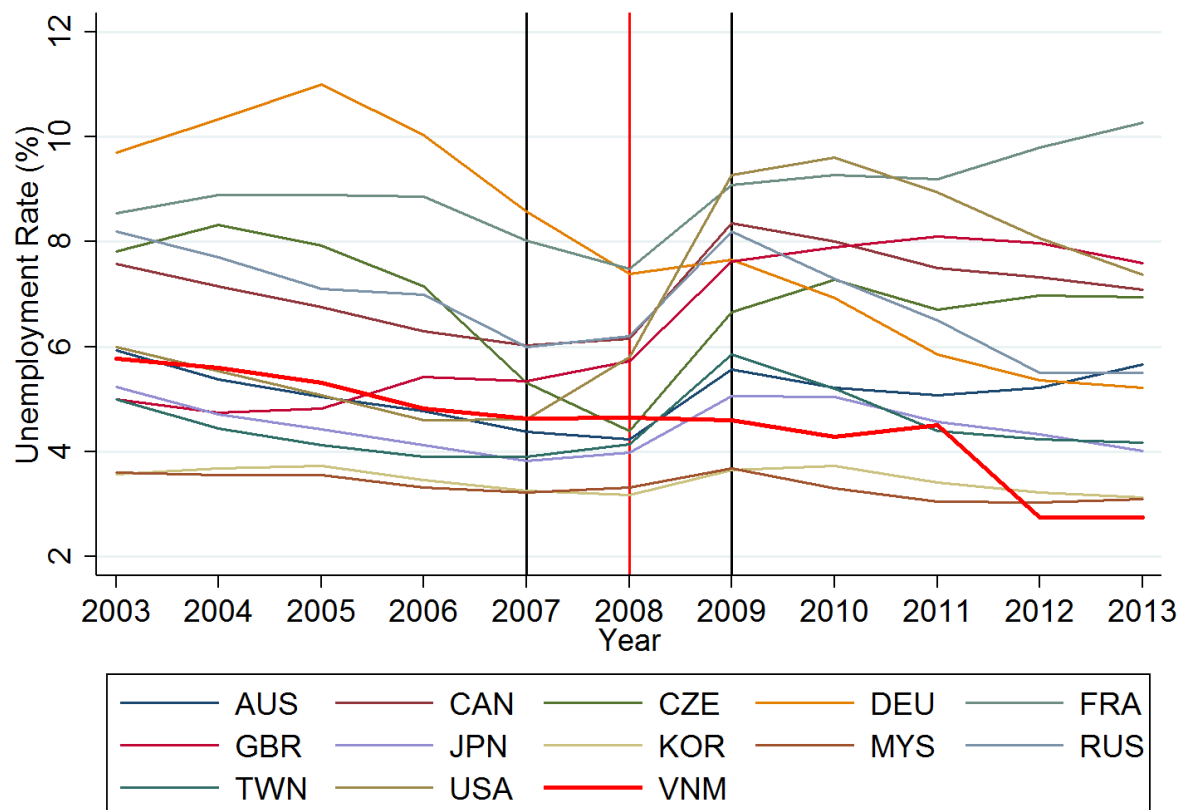
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## A Figures and Tables

Figure 1: Data Collection and Shock Timeline

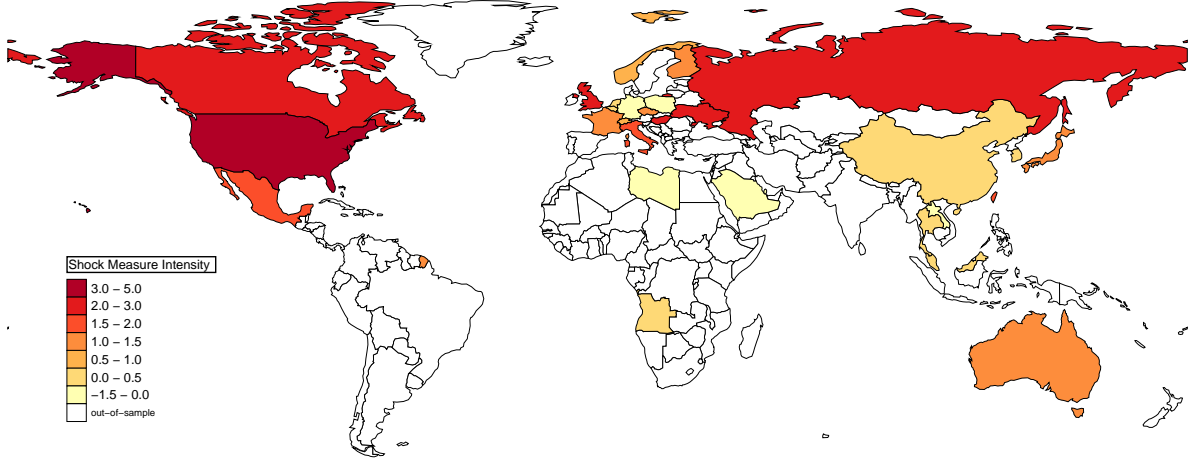


Figure 2: Unemployment Rates in Top 12 Destination Countries and Vietnam



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.

Figure 3: Change in Unemployment Rate in Migrant Destination Countries 2007-2009



Source: IMF World Economic Outlook database. Note: Percentage point changes in unemployment rate (percent of total labor force) between 2007 and 2009 in migrant destination countries. Visualization by [Pisati \(2007\)](#).

Table 1: Parametrization of Household Migration Model

Parameters — Skills	Period 0 ( <i>before</i> )		Period 1 ( <i>after</i> )	
	Low	High	Low	High
Domestic wage ( $w_d$ )	2	4	2	4
Foreign wage ( $w_f$ )	8	9	6	7
Foreign wage shock ( $\Delta w_F$ )			-2	-2
Domestic cost parameter ( $\alpha$ )	0.1	0.1	0.1	0.1
Foreign cost parameter ( $\beta$ )	0.3	0.3	0.3	0.3
<b>Results</b>				
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 ( $\bar{c}^*$ )	10	13	12	11

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

Table 2: Top 15 Migrant Destinations in 2008 and Shock Measure

Panel A: Migrant Destinations			Panel B: Shock Measure			
Country	Count	Percent	Total	<i>by educational attainment</i>		
				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]
France	12	1.8	1.07	1.9 [1]	3.5 [6]	-0.9 [5]
United Kingdom	9	1.4	2.28	-	2.7 [6]	1.0 [3]
Lao P.D.R.	9	1.4	0.0	-	-	-
Poland	7	1.1	-1.44	-	-1.0 [7]	-
Singapore	6	0.9	0.90	0.4 [2]	0.6 [2]	0.6 [2]
<i>Other</i> <sup>†</sup>	40	6.0				
<b>Total</b>	<b>665</b>	<b>100.0</b>	<b>2.01</b>	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' previous educational attainment (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, Hungary, Italy, Libya, Mexico, Netherlands, Norway, Qatar, Saudi Arabia, Switzerland, Thailand, and Ukraine.

Table 3: Migrant Individual Characteristics 2008

	<i>Mean</i>	<i>SD</i>	<i>Percentiles</i>		
			10%	50%	90%
Number of observations: 665					
Age	31.3	11.7	21	28	46
Year of departure	2004	4.4	1999	2005	2007
Gender (=female) ( <i>indicator</i> )	0.56				
Marital status is married ( <i>indicator</i> )	0.62				
Highest educational attainment before departure ( <i>indicator</i> )					
≤ <i>primary</i>	0.44				
<i>secondary</i>	0.43				
> <i>secondary</i>	0.13				
Reasons for departure ( <i>indicator</i> )*					
<i>economic</i>	0.55				
<i>family</i>	0.43				
<i>education</i>	0.17				

*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 4: Household Descriptive Statistics 2008/2013 by Skill Level

Number of observations: 518		2008				2013			
Skills		Low		High		Low		High	
		Mean	<i>SD</i>	Mean	<i>SD</i>	Mean	<i>SD</i>	Mean	<i>SD</i>
Demography*									
Total household size		4.93	1.86	3.5	1.65	4.84	2.23	3.69	1.75
<i>thereof</i> : Working		2.30	1.33	1.75	1.11	1.98	1.19	1.68	1.19
Urban location ( <i>indicator</i> )		0.48		0.63		0.48		0.63	
Finance*									
Domestic income		1,432	1,102	2,525	2,652	1,894	1,909	2,674	3,171
Net remittances		492	1,013	558	1,856	296	681	250	2,660
Total consumption		1,659	589	5,734	3,383	2,663	2,595	4,740	3,720
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
<i>thereof</i> : Labor		0.87	0.65	0.93	0.77	0.72	0.73	0.86	0.88
<i>conditional on migrant</i>		1.2	0.53	1.36	0.81	1.44	0.85	1.59	1.02
No. migrants ( <i>indicator</i> )									
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 ( <i>indicator</i> )									
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 ( <i>indicator</i> )									
<i>pre-primary</i>		0.01		0.02		0.00		0.00	
<i>primary</i>		0.27		0.13		0.35		0.16	
<i>lower secondary</i>		0.29		0.17		0.26		0.18	
<i>upper secondary</i>		0.26		0.39		0.23		0.39	
<i>post-secondary</i>		0.08		0.09		0.05		0.05	
<i>tertiary first stage</i>		0.09		0.18		0.11		0.19	
<i>tertiary second stage</i>		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
<i>thereof</i> : Labor						0.41	0.80	0.29	0.62
Shock Measure									
Destination-specific						1.75	1.73	2.03	1.86
Destination-Skill-specific						2.21	2.50	2.52	2.40

*Source*: DOTM panel data 2008–2013. *Note*: Descriptive statistics by the households level relative to the consumption per capita median in 2008. \* Working: Members reported employed or self-employed. \* All monetary variables are expressed in real USD per 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 5: Home Labor Supply

	Number of Household Members					
	(1)	(2)	(3)	(4)	(5)	(6)
	All		Working		Unemployed	
Shock	0.0295 (0.0734)	0.208 (0.135)	0.0367 (0.0416)	0.146** (0.0705)	-0.0413 (0.0258)	-0.0947* (0.0572)
Shock $\times$ High		-0.293** (0.122)		-0.179*** (0.0579)		0.0872 (0.0656)
Household FE	✓	✓	✓	✓	✓	✓
Province-Year FE	✓	✓	✓	✓	✓	✓
Observations	1,026	1,026	1,026	1,026	1,026	1,026
Households	513	513	513	513	513	513
Cluster	30	30	30	30	30	30
$R^2$	0.033	0.053	0.074	0.089	0.092	0.110
Mean Dep. Var.	4.20	4.20	2.02	2.02	0.12	0.12
F-test ( $p$ -value)		0.22		0.30		0.72

Source: DOTM panel data 2008–2013. Note: Each column displays the result of a separate regression based on equation 5. I only report the Difference-in-Difference coefficients, i.e. the shock coefficient interacted with a dummy for the ex-post wave 2013 and a triple interaction including a dummy for the high-skilled subgroup. The F-test  $p$ -value is for the null hypothesis of the net effect for high-skilled households being zero. Wild bootstrapped standard errors based on 1,000 replications in parentheses. \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$ .

Table 6: Foreign Migration

	Number of Foreign Migrants					
	(1)	(2)	(3)	(4)	(5)	(6)
	All		Labor		Destination	Change
Shock	0.0703*** (0.0255)	0.113*** (0.0424)	0.0224 (0.0394)	0.122** (0.0514)	-0.0183 (0.0206)	0.00453 (0.00850)
Shock $\times$ High		-0.0695* (0.0361)		-0.163** (0.0647)		-0.0375 (0.0287)
Household FE	✓	✓	✓	✓	✓	✓
Province-Year FE	✓	✓	✓	✓	✓	✓
Observations	1,026	1,026	1,026	1,026	1,026	1,026
Households	513	513	513	513	513	513
Cluster	30	30	30	30	30	30
$R^2$	0.183	0.190	0.139	0.163	0.081	0.120
Mean Dep. Var.	1.28	1.28	0.90	0.90	0.00	0.00
F-test ( $p$ -value)		0.14		0.28		0.13

Source: DOTM panel data 2008–2013. Note: Each column displays the result of a separate regression based on equation 5. I only report the Difference-in-Difference coefficients, i.e. the shock coefficient interacted with a dummy for the follow-up wave 2013 and a triple interaction with a dummy for the specifications on the subgroup of high-skilled households with above median consumption in the baseline respectively. The F-test  $p$ -value is for the null hypothesis of the effects for the low- and high-skilled subgroups to be jointly zero. Wild bootstrapped standard errors based on 1,000 replications in parentheses. \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$ .

Table 7: Domestic Migration

	<i>Number</i>		<i>Flow of Domestic Migrants</i>			
	(1)	(2)	(3)	(4)	(5)	(6)
	All		Labor		Labor	Long-Distance
Shock	-0.0366 (0.0373)	-0.130* (0.0676)	-0.0195 (0.0326)	-0.0995* (0.0512)	-0.0287 (0.0325)	-0.0998** (0.0465)
Shock $\times$ High		0.155** (0.0652)		0.132*** (0.0457)		0.117*** (0.0406)
Household FE	✓	✓	✓	✓	✓	✓
Province-Year FE	✓	✓	✓	✓	✓	✓
Observations	1,026	1,026	1,026	1,026	1,026	1,026
Households	513	513	513	513	513	513
Cluster	30	30	30	30	30	30
$R^2$	0.098	0.138	0.177	0.232	0.171	0.229
Mean Dep. Var.	0.32	0.32				
F-test ( $p$ -value)		0.37		0.11		0.39

*Source:* DOTM panel data 2008–2013. *Note:* There are two the different specifications of domestic migration in this table: *levels* of aggregate domestic migration in columns (1) and (2) and *flows* of domestic migration conditional on migrants' occupation and education in the other columns. The flow-variables have only cross-sectional character and are, therefore, not identified. For this reason, they should be interpreted as suggestive evidence, reflecting correlations only instead of causal effects. Each column displays the result of a separate regression based on equation 5. I only report the Difference-in-Difference coefficients, i.e. the shock coefficient interacted with a dummy for the ex-post wave 2013 and a triple interaction including a dummy for the high-skilled subgroup. The F-test  $p$ -value is for the null hypothesis of the net effect for high-skilled households being zero. Wild bootstrapped standard errors based on 1,000 replications in parentheses. \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$ .

Table 8: Household Financial Outcomes Per Capita

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Income		Remittances		$\Delta$ Assets		Expenditure	
Shock	-0.0255 (0.294)	-0.0278 (0.0835)	0.153 (0.414)	0.201 (0.417)	-0.159 (0.172)	-0.360** (0.157)	-0.0204 (0.0295)	-0.0776*** (0.0250)
Shock $\times$ High		0.00557 (0.0778)		-0.0827 (0.380)		0.332 (0.283)		0.0982** (0.0482)
Household FE	✓	✓	✓	✓	✓	✓	✓	✓
Province-Year FE	✓	✓	✓	✓	✓	✓	✓	✓
Observations	1,026	1,026	1,026	1,026	1,026	1,026	1,026	1,026
Households	513	513	513	513	513	513	513	513
Cluster	30	30	30	30	30	30	30	30
$R^2$	0.035	0.051	0.263	0.263	0.041	0.065	0.023	0.081
F-test ( $p$ -value)		0.89		0.66		0.89		0.54

*Source:* DOTM panel data 2008–2013. *Note:* All variables are expressed in logarithmic US\$ (PPP) per capita, i.e., adjusted by the number of permanent household members excluding migrants. Income is from labor activities within the household of origin only and net of informal transfers, such as remittances. Remittance receipts from overseas migrants are net of any remittances sent by the household. Assets are the stock of savings in cash and kind. Each column displays the result of a separate regression based on equation 5. I only report the Difference-in-Difference coefficients, i.e. the shock coefficient interacted with a dummy for the ex-post wave 2013 and a triple interaction including a dummy for the high-skilled subgroup. The F-test  $p$ -value is for the null hypothesis of the net effect for high-skilled households being zero. Wild bootstrapped standard errors based on 1,000 replications in parentheses. \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$ .

Table 9: Robustness Checks I – Sample Modifications

<b>Panel A:</b> <b>Placebo Shock</b>	Number of Household					
	(1)	(2)	(3)	(4)	(5)	(6)
	Members		Domestic Migrants		Foreign Migrants	
Shock	0.0129 (0.0336)	0.0337 (0.0522)	0.0244 (0.0264)	0.0220 (0.0364)	-0.00870 (0.0152)	-0.0483 (0.0618)
Shock $\times$ High		-0.0331 (0.0479)		0.00369 (0.0327)		0.0519 (0.0426)
Household FE	✓	✓	✓	✓	✓	✓
Province-Year FE	✓	✓	✓	✓	✓	✓
Observations	1,026	1,026	1,026	1,026	1,026	1,026
Households	513	513	513	513	513	513
Cluster	30	30	30	30	30	30
$R^2$	0.387	0.396	0.062	0.068	0.543	0.543
<b>Panel B:</b> <b>Non-migrant</b>	(1)	(2)	(3)	(4)	(5)	(6)
	Migrants					
	Members	Domestic	Foreign	Income	Savings	Expenditure
Shock	-0.241 (0.411)	0.187 (0.333)	0.00197 (0.0107)	-0.253 (0.229)	-0.0034 (0.0130)	-0.0451 (0.0566)
Shock $\times$ High	0.289 (0.402)	-0.156 (0.343)	-0.00168 (0.00830)	0.218 (0.142)	0.316 (0.399)	0.0490 (0.0298)
Household FE	✓	✓	✓	✓	✓	✓
Province-Year FE	✓	✓	✓	✓	✓	✓
Observations	710	710	710	710	710	710
Households	355	355	355	355	355	355
Cluster	30	30	30	30	30	30
$R^2$	0.038	0.016	0.082	0.026	0.074	0.127
<b>Panel C:</b> <b>Attrition</b>	Number of Household					
	(1)	(2)	(3)	(4)	(5)	(6)
	Members		Domestic Migrants		Foreign Migrants	
	All	Working	All	Working	All	Working
Shock	0.200 (0.126)	0.136* (0.0711)	-0.118** (0.0578)	-0.0920** (0.0443)	0.111*** (0.0364)	0.0483 (0.0371)
Shock $\times$ High	-0.283** (0.110)	-0.163*** (0.0528)	0.137*** (0.0533)	0.119*** (0.0443)	-0.0709** (0.0335)	-0.100** (0.0430)
Household FE	✓	✓	✓	✓	✓	✓
Province-Year FE	✓	✓	✓	✓	✓	✓
Observations	1,103	1,103	1,103	1,103	1,103	1,103
Households	513	513	513	513	513	513
Cluster	33	33	33	33	33	33
$R^2$	0.051	0.080	0.127	0.218	0.182	0.209

*Source:* DOTM panel data 2008–2013. *Note:* Each column displays the result of a separate regression based on equation 5. I only report the Difference-in-Difference coefficients, i.e. the shock coefficient interacted with a dummy for the ex-post wave 2013 and a triple interaction including a dummy for the high-skilled subgroup. The F-test p-value is for the null hypothesis of the net effect for high-skilled households being zero. Wild bootstrapped standard errors based on 1,000 replications in parentheses. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1.

Table 10: Robustness Checks II – Shock Measure Modifications

<b>Panel A:</b> <b>Destination-Skill</b> <b>Shock Measure 2</b>	Number of Household					
	(1)	(2)	(3)	(4)	(5)	(6)
	Members		Domestic Migrants		Foreign Migrants	
	All	Working	All	Working	All	Working
Shock	0.117*	0.0971***	-0.0832***	-0.0679***	0.0601**	0.0492**
	(0.0617)	(0.0353)	(0.0268)	(0.0219)	(0.0239)	(0.0237)
Shock $\times$ High	-0.242***	-0.104	0.114**	0.0826***	-0.0220	-0.0605***
	(0.0780)	(0.0993)	(0.0518)	(0.0262)	(0.0313)	(0.0195)
Household FE	✓	✓	✓	✓	✓	✓
Province-Year FE	✓	✓	✓	✓	✓	✓
Destination FE	✓	✓	✓	✓	✓	✓
Observations	996	996	996	996	996	996
Households	498	498	498	498	498	498
Cluster	69	69	69	69	69	69
$R^2$	0.059	0.087	0.134	0.231	0.176	0.161
<b>Panel B:</b> <b>2008-2009</b> <b>Shock Measure 1</b>	(1)	(2)	(3)	(4)	(5)	(6)
	Members		Domestic Migrants		Foreign Migrants	
	All	Working	All	Working	All	Working
	All	Working	All	Working	All	Working
Shock	0.223	0.192	-0.180*	-0.134	0.182***	0.0792
	(0.172)	(0.162)	(0.108)	(0.0908)	(0.0685)	(0.0555)
Shock $\times$ High	-0.366*	-0.255**	0.196*	0.179*	-0.114*	-0.170**
	(0.194)	(0.117)	(0.115)	(0.0974)	(0.0645)	(0.0659)
Household FE	✓	✓	✓	✓	✓	✓
Province-Year FE	✓	✓	✓	✓	✓	✓
Observations	1,026	1,026	1,026	1,026	1,026	1,026
Households	513	513	513	513	513	513
Cluster	30	30	30	30	30	30
$R^2$	0.045	0.085	0.138	0.227	0.194	0.226
<b>Panel C:</b> <b>Percentage</b> <b>Shock Measure 1</b>	(1)	(2)	(3)	(4)	(5)	(6)
	Members		Domestic Migrants		Foreign Migrants	
	All	Working	All	Working	All	Working
	All	Working	All	Working	All	Working
Shock	1.512	1.048*	-0.782	-0.560	0.878***	0.500*
	(0.992)	(0.578)	(0.489)	(0.397)	(0.283)	(0.257)
Shock $\times$ High	-2.011**	-1.253**	0.920*	0.764**	-0.587*	-0.767*
	(0.947)	(0.509)	(0.492)	(0.386)	(0.301)	(0.458)
Household FE	✓	✓	✓	✓	✓	✓
Province-Year FE	✓	✓	✓	✓	✓	✓
Observations	1,026	1,026	1,026	1,026	1,026	1,026
Households	513	513	513	513	513	513
Cluster	30	30	30	30	30	30
$R^2$	0.051	0.087	0.136	0.223	0.194	0.224

*Source:* DOTM panel data 2008–2013. *Note:* Each column displays the result of a separate regression based on equation 6 (panel A) and equation 5 (panel B and C), respectively. I only report the Difference-in-Difference coefficients, i.e. the shock coefficient interacted with a dummy for the ex-post wave 2013 and a triple interaction including a dummy for the high-skilled subgroup. The F-test p-value is for the null hypothesis of the net effect for high-skilled households being zero. Wild bootstrapped standard errors based on 1,000 replications in parentheses. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1.

Table 11: Robustness Checks III – Outcome Variable Modifications

<b>Panel A:</b> <b>Net Number</b>	Number of Household					
	(1)	(2)	(3)	(4)	(5)	(6)
	Members		Domestic Migrants		Foreign Migrants	
	All	Working	All	Working	All	Working
Shock	0.174 (0.172)	0.165* (0.0967)	-0.156* (0.0823)	-0.101** (0.0485)	0.165 (0.117)	0.136*** (0.0440)
Shock $\times$ High	-0.261* (0.152)	-0.234*** (0.0811)	0.153** (0.0694)	0.136*** (0.0440)	-0.124 (0.0790)	-0.169* (0.0932)
Household FE	✓	✓	✓	✓	✓	✓
Province-Year FE	✓	✓	✓	✓	✓	✓
Observations	1,026	1,026	1,026	1,026	1,026	1,026
Households	513	513	513	513	513	513
Cluster	30	30	30	30	30	30
$R^2$	0.190	0.060	0.090	0.227	0.448	0.397
<b>Panel B:</b> <b>Net Index</b>	(1)	(2)	(3)	(4)	(5)	(6)
	Members		Domestic Migrants		Foreign Migrants	
	All	Working	All	Working	All	Working
Shock	0.0817** (0.0350)	-0.0457** (0.0182)	-0.0668*** (0.0251)	-0.0669*** (0.0232)	0.183 (0.115)	0.150*** (0.0308)
Shock $\times$ High	-0.0643* (0.0342)	0.0502** (0.0234)	0.0652 (0.0410)	0.0987*** (0.0303)	-0.126 (0.0896)	-0.139*** (0.0484)
Household FE	✓	✓	✓	✓	✓	✓
Province-Year FE	✓	✓	✓	✓	✓	✓
Observations	1,026	1,026	1,026	1,026	1,026	1,026
Households	513	513	513	513	513	513
Cluster	30	30	30	30	30	30
$R^2$	0.087	0.091	0.049	0.173	0.498	0.419
<b>Panel C: Pre-2008 Migration</b>	(1)	(2)	(3)	(4)		
	Domestic Migrants		Foreign Migrants			
Shock	-0.0412 (0.0372)	-0.127* (0.0656)	0.0425 (0.0304)	0.0988** (0.0455)		
Shock $\times$ High		0.141** (0.0666)		-0.0923** (0.0403)		
Household FE	✓	✓	✓	✓		
Province-Year FE	✓	✓	✓	✓		
Observations	1,026	1,026	1,026	1,026		
Households	513	513	513	513		
Cluster	30	30	30	30		
$R^2$	0.127	0.146	0.103	0.112		

*Source:* DOTM panel data 2008–2013. *Note:* Each column displays the result of a separate regression based on equation 5. I only report the Difference-in-Difference coefficients, i.e. the shock coefficient interacted with a dummy for the ex-post wave 2013 and a triple interaction including a dummy for the high-skilled subgroup. The F-test p-value is for the null hypothesis of the net effect for high-skilled households being zero. Wild bootstrapped standard errors based on 1,000 replications in parentheses. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1.

## B Appendix

### B.1 Theoretical Framework: Mathematical Derivation

#### 1. Elasticity of domestic 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  $m_f$ ,

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

- and replace  $m_h$  and  $m_f$  in the maximization problem:

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

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

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

- Total differentiation yields:

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

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

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

## 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:

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

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

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

- Total differentiation yields:

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

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

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