

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

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## Abstract

This article investigates the impact of negative income shocks in migrant destination countries around the world on the domestic and international labor migration decisions of their family members left behind at origin. Exploiting differences in labor market shocks across and within destinations during the Great Recession, I find large and heterogeneous effects on both types of migration decisions. Poor migrant households reduced domestic and increased international labor migration in response to the shock. Rich migrant households remained largely unaffected. I provide a theoretical framework, which rationalizes this heterogeneity by the relative magnitudes of income and substitution effects caused by the shock. The results imply a deterioration in the skill selection of aggregate international migrant flows as poor households had below average skill levels. New international migrants targeted the same destinations as established ones from the same household, providing evidence of strong kinship migration networks. The results show that domestic and foreign migration decisions are interrelated and jointly determine aggregate migration flows.

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# 1 Introduction

Migration has been growing rapidly over the past decades,<sup>1</sup> both within and across countries (World Bank, 2009), and this trend is expected to continue (IOM/Gallup, 2011). International labor migration typically yields substantial income gains to workers from developing countries (McKenzie et al., 2010) and remittance receipts have become a major source of income for families left behind in the developing world (World Bank, 2017). In this environment of increasing migration intensity, households at origin become dependent on overseas incomes through remittances and exposed to economic shocks through their migrants abroad. Despite a growing literature on the effects of migration at origin, little is known about how negative income shocks affect households' subsequent migration decisions: do migrants return home when work prospects in their destination of choice deteriorate or do they "diversify" into new destinations? What is the relationship between domestic and international migration? And who selects into which type of migration and return? Answering these questions is important, not only because of development concerns at origin (Clemens, 2011), but also because of the ongoing immigration debate in receiving countries (Hanson and McIntosh, 2016).

Relying on a unique panel of migrant households, this article provides causal evidence on these questions in the context of Vietnam. I exploit a quasi-experiment relying on plausibly exogenous variation in labor market conditions abroad during the Great Recession that had a strong negative effect on migrant incomes and the remittance receipts of their families left behind at the origin. I find that shocks had large and heterogeneous effects on households' domestic and international migration decisions: poor migrant households increased the number of international migrants by around 0.17 individuals (i.e. 1 in 6 households sent an additional labor migrant abroad) in response to the average labor market shock at destination, while decreasing the one of domestic migrants by a similar margin. This finding can be interpreted as a substitution effect between domestic and

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

international migration among poor migrant households<sup>2</sup> Rich migrant households remained largely unaffected. These responses were driven by labor migration in particular and new international labor migrants were predominantly females and targeted the US. I find no evidence of changes in the skill selection of new international migrants relative to absent ones from the same household. However, these results imply a deterioration in the skill selection of aggregate international migrant flows as new departures were concentrated among the poor subgroup which also had lower average skill levels, compared their rich counterparts. I find no evidence of destination switching among established migrants or of a diversification in households' destination portfolios as a reaction to the crisis. The latter is consistent with the presence of strong kinship migration networks. I also find evidence of selective sorting of domestic and international migrants with spouses left behind into return to the origin household which resulted in a reunification of intimate partners. These changes in migration resulted in changes in the demographic composition of affected households and resulted in an increase of the fertility rate at origin by 50%, compared to the baseline mean. These results show that the transmission of negative labor market shocks across countries through migrant remittances can have strong and heterogeneous effects on subsequent migration decisions and result in unexpected demographic changes at origin. The findings have important implications for policy makers and research concerned with the effects of migration in both origin and destination countries.

From a theoretical perspective, labor market shocks in migrant destinations lead to a deterioration of household income at the origin through remittances and create a substitution and income effect for the family left behind. The substitution effect implies that the returns to foreign migration decrease in response to the shock, which makes migration to that destination less attractive. On the other hand, the income effect makes households at origin poorer and, thereby, creates incentives to send more members abroad. The substitution of domestic with international migrants among the poor subgroup can thus be rationalized by the relative magnitudes of income and substitution effects caused by the shock. For this subgroup, which has binding budget constraints due to consump-

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<sup>2</sup>With respect to the labor literature, this can also be understood as an "added international migrant effect" (Stephens, Jr., 2002).

tion levels close to the minimum threshold, the income effect dominates the substitution effect, leading to a net increase in foreign migration. Rich households, in turn, that have consumption levels far higher than the consumption minimum also have a higher income shock coping capacity which makes them more resilient. In their case, income and substitution effects may be balancing each other out or even go the opposite direction.

Estimating the effects of migration on the family left behind is complicated as selection into migration and return tends to be correlated with unobserved characteristics. In addition, data on migrants and their family members back home tends to be scarce. Following [McKenzie and Yang \(2012\)](#), this study overcomes these issues by adopting a quasi-experimental approach, taking advantage of unique panel survey data from a representative sample of 500 migrant households in Vietnam, which was collected in two waves in 2008 and 2013. The household data is based on individual information from 670 international migrants in 26 destination countries around the world and approximately 2,200 origin household members and domestic migrants. I rely on the fact that families left behind were exposed to unexpected and differential labor market shocks generated by the Great Recession, conditional on the destination choices and pre-migration skill levels of their international migrants. I use this plausibly exogenous source of variation and conduct a difference-in-difference analysis comparing origin households with differential shock exposure, before and after the crisis occurred. The estimation strategy enables me to control for time-invariant characteristics of the household of origin, pre-migration worker characteristics, as well as for aggregate changes in the province of origin over time. This setting allows identifying the causal effects of economic shocks abroad on the outcomes of families left behind at origin. I address a number of potential concerns regarding the empirical approach. Based on recall data from the baseline survey, I replicate my benchmark estimations in a placebo setup as if the Great Recession had happened five years earlier. The results provide evidence of the presence of pretreatment parallel trends for my key outcome variables. Relying on a sample of non-migrant households from the same survey, I also show that labor market shocks abroad did not have any impact at origin other than through households' foreign migrants at the destination.

This study contributes to at least three different strands of the literature in development, labor, and migration: 1) the effects of migration at origin; 2) determinants of migration; and 3) selection into migration. The existing literature dedicated to studying the effects of migration on families left behind is concerned with the multifaceted development impacts that migration unfolds in origin communities.<sup>3</sup> Previous work has focused exclusively on the effects of either domestic or international migration, which can be attributed to the scarcity of household survey data that captures both domestic and international migration. To the best of my knowledge, this study is the first one to show that domestic and foreign migration are interrelated and jointly determine outcomes among families left behind. I find that households make use of both migration strategies for labor motives in a flexible way to cope with income shocks. This finding has important implications for both policy makers concerned with migration in sending countries as well as for migration research in general and calls for a joint analysis of the two types of migration. An additional contribution to this literature is to provide evidence on the effect of migration on households' demographic composition and fertility decisions among families left behind.<sup>4</sup>

The findings in this paper also contribute to the literature on the determinants of migration in general, and those on migration responses to changes in the returns to migration in particular. Most existing work finds a positive elasticity of migration with respect to changes in the returns from migration.<sup>5</sup> Other studies find evidence of contra-

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<sup>3</sup>See [Antman \(2012\)](#) for an overview. Outcomes include, for example, education ([Edwards and Ureta, 2003](#); [Beine et al., 2008](#); [Antman, 2011, 2006](#); [McKenzie and Rapoport, 2011](#); [Alcaraz et al., 2012](#); [Batista et al., 2011](#); [de Brauw and Giles, 2017](#)), health ([Hildebrandt and McKenzie, 2005](#); [Macours and Vakis, 2007](#); [Stillman et al., 2012](#)), labor supply ([Amuedo-Dorantes and Pozo, 2006](#); [Lokshin and Glinskayai, 2008](#); [Binzel and Assaad, 2011](#); [Mu and de Walle, 2011](#); [Mendola and Carletto, 2012](#)), or insurance ([Rosenzweig and Stark, 1989](#); [De La Brière et al., 2002](#); [Yang and Choi, 2007](#)), while some studies investigate multiple outcomes ([Yang, 2008](#); [Gibson et al., 2011](#); [Gröger and Zylberberg, 2016](#); [Gibson, 2015](#)) among families left behind.

<sup>4</sup>See [Beine et al. \(2013\)](#) for a review of this literature. Most existing work has studied the effect of migration on migrant fertility ([Hiday, 1978](#); [Hervitz, 1985](#); [Stephen and Bean, 1992](#); [Sato and Yamamoto, 2005](#); [Sato, 2007](#); [Lindstrom and Saucedo, 2007](#); [Daudin et al., 2019](#)) or the transfer of fertility norms through migration ([Fargues, 2007](#); [Blau et al., 2011](#); [Fargues, 2011](#); [Bertoli and Marchetta, 2015](#)).

<sup>5</sup>For example, [Hatton and Williamson \(1993\)](#); [Hanson and Spilimbergo \(1999\)](#); [Munshi \(2003\)](#); [Hanson and McIntosh \(2012\)](#); [Hornbeck \(2012\)](#); [Marchiori et al. \(2012\)](#); [Bohra-Mishra et al. \(2014\)](#); [Gröger and Zylberberg \(2016\)](#); [Abarcar \(2017\)](#); [Missirian and Schlenker \(2017\)](#); [Boustan et al. \(2020\)](#); [Baez et al. \(2017\)](#); [Minale \(2018\)](#); [Kleemans and Magruder \(2018\)](#); [Mahajan and Yang \(2020\)](#) rely on shocks in origin areas that change the returns to migration, while [Yang \(2006\)](#); [Wozniak \(2010\)](#); [McKenzie et al. \(2014\)](#); [Bertoli et al. \(2017\)](#) use destination shocks.

dicting patterns in which increases in the returns to migration lead to lower migration.<sup>6</sup> The results from this paper are consistent with the latter studies in that they imply a negative elasticity of international migration with respect to the returns to migration. I find a strong temporary decrease in the returns from foreign migration due to the Great Recession to cause an *increase* in foreign migration up to three years after the end of the crisis among families left behind.<sup>7</sup> A distinguishing feature of my study is that it allows me to analyze both domestic and international migration within the same household and the results provide novel evidence of a substitution effect between the two types of migration.

The literature on selection into migration typically investigates the observable characteristics of migrants in comparison to the general population at origin or destination.<sup>8</sup> One important dimension of comparison in this literature is migrant human capital as measured by education or skills.<sup>9</sup> The results presented in this study show no effect on the skill selection of international migrants within the household (i.e. new migrants had about the same education level as previous ones), but across households as new migrants left exclusively from the poor subgroup with below average education levels. Additionally, I find a clear effect on gender selection as additional foreign migration was driven by females. These findings help to better understand migrant selection patterns in the face of negative income shocks at origin and may inform policy-makers interested in predicting the skill levels of new migrant arrivals during times of crisis.

Since skills tend to be positively correlated with income (and negatively with poverty), another branch of the selection literature investigates to which extent household wealth

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<sup>6</sup>See, [Halliday \(2006\)](#); [Yang and Choi \(2007\)](#); [Yang \(2008\)](#); [Fajardo et al. \(2018\)](#).

<sup>7</sup>This finding is also linked to the "added worker effect", which explains how unemployment of one household member may lead to increased labor supply by remaining members ([Lundberg, 1985](#); [Stephens, Jr., 2002](#)). Along these lines, the finding in this paper could be interpreted as an "added international migrant effect" among migrant households.

<sup>8</sup>See [Greenwood \(1985\)](#); [Borjas \(1987\)](#); [Taylor \(1987\)](#); [Borjas \(1991\)](#); [Stark and Bloom \(1985\)](#); [Chiswick \(1999\)](#); [Beine et al. \(2001\)](#); [Feliciano \(2005\)](#); [Chiquiar and Hanson \(2005\)](#); [Clark et al. \(2007\)](#); [Ibarraran and Lubotsky \(2005\)](#); [Beine et al. \(2008\)](#); [Dolfin and Genicot \(2010\)](#); [McKenzie and Rapoport \(2006\)](#); [Akee \(2010\)](#); [Abramitzky et al. \(2012\)](#); [Ortega and Peri \(2013\)](#); [Bertoli et al. \(2013, 2017\)](#); [Dustmann et al. \(2017\)](#).

<sup>9</sup>See [Docquier and Rapoport \(2012\)](#) for an overview of this literature and, for example, [Fernández-Huertas Moraga \(2013\)](#) for empirical evidence on domestic and [Grogger and Hanson \(2011\)](#) for international migration.

constraints constitute barriers to migration. Most empirical studies are indicative of binding financial constraints, but there is no consensus whether income shocks at origin lead to more or less migration.<sup>10</sup> The findings in this paper contribute to this literature by providing novel evidence that financial constraints among migrant households are not strictly binding, as they manage to finance (costly) international migration in the face of an income shock. The results suggest two complementary explanations: First, migrant households tend to have superior wealth levels compared to the average household in origin countries (due to positive wealth selection into migration in the first place), which also makes them more able to overcome financial constraints with respect to additional departures (Angelucci et al., 2015). Second, the presence of strong kinship migration networks through established migrants from the same family plays an important role in reducing the fixed costs of migration and facilitate chain migration through family sponsorship (Jasso and Rosenzweig, 2006; Mahajan and Yang, 2020).

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

## 2 Theoretical Framework

I provide a simple theoretical framework in which migration decisions are determined at the household level (Stark and Bloom, 1985; Borjas, 1991; Chen et al., 2003) and agents choose to send family members away for work in two competing markets: the domestic and the foreign one. The objective of this exercise is to understand how remittance-dependent migrant families left behind revise their migration decisions when they are hit

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<sup>10</sup>Studies with results consistent with binding financial constraints are, for example, Chiquiar and Hanson (2005); Ardington et al. (2009); McKenzie and Rapoport (2006); Bryan et al. (2014); Angelucci et al. (2015); Chernina et al. (2014); De Janvry et al. (2015); Bazzi (2017); Boustan et al. (2020); Majlesi and Narciso (2018). In contrast, Imbert and Papp (2020) find that an easing of financial constraints in rural India does lead to less domestic migration, which they attribute to the presence of high non-monetary costs from living and working in the city. Mahajan and Yang (2020) find that negative income shocks at origin lead to a positive effect on international migration, which is mediated through the size of existing migration networks between origin and destination.

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. Household members earn wages depending on the location of the job with:  $w_h < w_d < w_f$ .<sup>11</sup> The economic shock is assumed to depress foreign wages, while domestic ones remain unchanged. Income from the family's labor supply is pooled at the household level.<sup>12</sup> Household utility is determined by a concave function with respect to the number of household members left behind, which has arguments for  $h$ ,  $d$ , and  $f$ . Households maximize their utility by keeping as many members as possible at home while allocating labor optimally across domestic and foreign locations in order to secure a minimum level of consumption ( $\underline{c}$ ). The intuition behind this is that securing home production is imperative and requires a minimum number of members at home, but that productivity is marginally decreasing with labor supply (Jayachandran, 2006).<sup>13</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). This 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 ( $\alpha < \beta$ ). For simplicity, my framework abstracts from (plausibly heterogeneous) monetary migration costs, assuming that wages are net of the respective costs for each location. Normalizing home wages to zero, the household maximization problem is:

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<sup>11</sup>Note that the wage comparison in the context of this study is between the rural areas and domestic migration destinations in Vietnam, a relatively poor developing country, and a range of more developed destination countries as listed in Panel A of Table 1. Gröger and Zylberberg (2016) provide empirical evidence on domestic migrant wages in Vietnam being superior to those in their origin areas, while Clemens et al. (2008) provide evidence on the positive wage premium of international migrants.

<sup>12</sup>This assumption is not restrictive since it suffices for results to hold that only a share of migrant labor income in domestic and foreign destinations is pooled through remittances.

<sup>13</sup>The incentive of keeping family members at home is very prevalent in the Vietnamese context due to the historic household registration system (*Ho Khau*), which conditions property rights and access to social services on the presence of a minimum number of family members in origin areas (Hardy, 2001).

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

This setup highlights how the choice of families left behind between keeping the family together and sending members away for work is affected by changes in foreign wages. Securing a certain pay-off from migration corresponds qualitatively to a situation in which falling below  $\underline{c}$  puts the family's welfare at risk.<sup>14</sup> Solving this model and deriving the elasticities of domestic and foreign migration with respect to foreign wages yields that they are determined by the sign of the following expressions respectively (see Appendix Section 2 for a step-by-step solution):

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

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

Intuitively, changes in the foreign wage cause income and substitution effects to the households at origin. Due to the negative shock at destination, foreign labor markets become relatively less attractive, constituting a substitution effect that pushes all families to reduce the amount of foreign labor supply. Simultaneously, the reduction in remittances from foreign migrant wages makes families left behind poorer, which implies an income effect that increases the incentive for additional migration to secure minimum consumption levels. The difference between these two effects ultimately determines the elasticity of domestic and foreign labor supply with respect to foreign wages.<sup>15</sup>

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<sup>14</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. Note that abstracting from the adaptation of the minimum consumption level is of analytical convenience and helps focusing the model's comparative statics on the essential effect of labor allocation across different destinations. A modification of this assumption that allows positive decreasing marginal returns to additional consumption does qualitatively yield similar predictions.

<sup>15</sup>The specific sign of each elasticity depends on the shape of the utility function, the cost parameters, the relative wage premium of foreign to domestic migration and the magnitude of the shock.

The main goal of this simple framework is to illustrate how poor and rich migrant households in terms of their consumption level ( $c$ ) respond to income shocks through domestic and foreign migration decisions. The intuition behind this exercise is that poor households are more likely to have a binding budget constraint as their consumption level is closer to the minimum level ( $\underline{c}$ ), compared to richer ones. In other words, the income effect from a labor market shock should be stronger for poor households, potentially outweighing the substitution effect, so that they would be more likely to react by increasing foreign migration in response to the shock abroad. In Appendix Section 3, I provide a calibration exercise which simulates the empirical setting of a poor migrant household with a consumption level close to the minimum. In this situation the income effect outweighs the substitution effect and the poor household responds by reducing domestic and increasing foreign migration in response to the shock abroad.<sup>16</sup> In the empirical analysis I test this by exploring heterogeneous effects along the distribution of household expenditure. For simplicity and due to a small sample size, I split the sample by households' level of expenditure and define poor households as those below the median and rich ones as those above.

Although this framework relies on the change of the foreign wage level as the exogenous parameter, there is evidence that the period of study during the Great Recession was characterized by nominal wage rigidities in several destination countries, especially for low-skilled workers receiving minimum wages (McKenzie et al., 2014; Cadena and Kovak, 2013). Therefore, in my empirical strategy, I use changes in the level of unemployment, which is a more suitable proxy for economic shocks in this case. Alternatively, one could also change the definition of  $w_i$  to capture the expected wage, which is a weighted average of the effective wage and the probability of being employed at destination (Harris and Todaro, 1970). In such a framework, the empirical effects would then capture changes in the probability of being employed given a constant level of wages.

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<sup>16</sup>For simplicity, this framework abstracts from the selection aspect of the household migration decision and it remains an empirical question how families select additional foreign migrants from available members.

## 3 Background

### 3.1 Migration in Vietnam

Vietnam provides an interesting setting for this study as the country has been experiencing a sharp increase in both domestic and foreign migration since the beginning of the economic and political liberalization of the early 1990s (*Doi Moi*). 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 foreign migration alongside remittances receipts (Abella and Ducanes, 2011). Nowadays, domestic migration is widespread and 6.6 million individuals were identified as having migrated domestically during the five years leading up to the 2009 census (Marx and Fleischer, 2010).<sup>17</sup>

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 are better employment opportunities and higher wages in the industrial sector of urban centers and surrounding provinces, 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 rural population, seasonal migration is an important way of increasing household expenditure and alleviating poverty (Brauw and Harigaya, 2004). Furthermore, domestic labor migration is also used as a

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<sup>17</sup>This corresponded to 8.6% of the total population, compared to 4.5 million (6.5%) during the previous census round in 1999. Note that these figures represent 5-year migration flows and, therefore, underestimate the stock of domestic migrants.

shock-coping strategy in rural areas in order to smooth negative shocks to agricultural incomes (Gröger and Zylberberg, 2016).

In contrast, there is a general lack of data and empirical evidence on international migration in Vietnam. Aggregated data confirms that the stock of foreign migrants from Vietnam has been increasing strongly in recent years (United Nations, 2013). For 2008, Dang et al. (2010) estimated that 1 million Vietnamese were living abroad, corresponding to 1.2% of the total population.<sup>18</sup> Remittance receipts also grew rapidly and reached approximately 8.3 billion USD in 2010, constituting 7% of GDP (World Bank, 2018). During recent years, an important channel of international migration was the country’s labor export program (Ministry of Foreign affairs of Vietnam, 2012). Alternative channels are overseas family reunification and other forms of sponsorship. Independent of the channel of migration, economic motives are the main driver of foreign migration and migrants typically remit large shares of their overseas income.<sup>19</sup>

## 3.2 Household and Migrant Data

The analysis in this paper focuses on Vietnamese households with international migrants having left prior to the onset of the Great Recession who were, therefore, exposed to the deterioration of labor market conditions abroad through their migrants. Data on households and their migrants was collected in two rounds in 2008 and 2013.<sup>20</sup> The survey was designed as a stratified random sample of households in 6 Vietnamese provinces, with the selection probability proportional to the migration density at different administrative levels.<sup>21</sup> Therefore, the sample is representative of international migrant households

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<sup>18</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>19</sup>Due to a lack of appropriate survey data, academic research on international migration in Vietnam is very limited. I know of only three studies investigating the impact of remittances on a range of household outcomes using randomly sampled population surveys (Nguyen et al., 2011; Nguyen and Mont, 2012; Binci and Giannelli, 2018). However, to 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 left behind in Vietnam.

<sup>20</sup>The first round of this survey was commissioned by the Global Development Network (GDN) and the Institute for Public Policy Research (IPPR) as part of a global project under the name *Development on the Move* (DOTM). See Tchaidze and Torosyan (2010) for a technical report. The follow-up round in 2013 was organized by the author.

<sup>21</sup>In the first stage, provinces in each region of the country – North, Center, and South of Vietnam – were stratified into metropolitan and non-metropolitan strata. Six provinces were selected, one in each stratum, out of 64 provinces. Consequently, the selected provinces (Hanoi and Hung Yen in the North,

in Vietnam and, consequently, their characteristics are very similar compared to a nationally representative samples of households with international migrants in Vietnam.<sup>22</sup> Consequently, I expect the findings from this analysis to be relevant for Vietnam on a national level.

The sample used in the analysis is constituted by households that had at least one migrant abroad during the baseline in 2008 who had left the household within ten years. Detailed information on all nucleus member as well as domestic and international migrants was collected through proxy respondents, usually the head of the household. Out of the initial sample of 576 migrant households interviewed in the baseline survey, 546 of them could be successfully tracked and interviewed in the follow-up survey. This translates into an attrition rate of just slightly above 5% over five years, which is remarkably low compared to similar datasets.<sup>23</sup> Accounting for missing observations, in the empirical analysis I am left with a sample size of 500 households.<sup>24</sup>

Panel A of Table 1 shows the geographical distribution of international migrant individuals from the sample households across the top 10 destination countries recorded in the baseline survey. Among those, the United States of America stand out as the single most important destination country with 27.7% of the total sample. Taiwan comes in second with 14.9%, followed by Malaysia (9.2%), South Korea (8.7%), Germany (6.6%), and Russia (6.3%). Together, the top 10 destination countries listed account for 87.5% of the total sample of migrants, with the remaining 12.5% spread over 16 other destinations.

Table 2 provides descriptive statistics on foreign migrant individuals at baseline. Similar to migrants from other developing countries, they belong to the group of working age adults, with a mean age of around 31 years. Due to the sampling strategy, migrants

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Nghe An and Da Nang in the Centre, and Ho Chi Minh City and Can Tho in the South) are among the ones with the highest international migration rates within each stratum. As a result of this sampling strategy, urban households were somewhat overrepresented among the sample. Further details on the study design can be found in [Dang et al. \(2010\)](#).

<sup>22</sup>See Appendix Section 4 for a comparison of descriptive characteristics between the sample used and a similar sample derived from the nationally representative Vietnam Household Living Standards Survey (VHLSS).

<sup>23</sup>In the robustness checks, I conducted additional tests which show that, in addition to being small, attrition does not bias my estimates.

<sup>24</sup>Including individual information from 665 foreign migrant individuals and 2,170 household members and domestic migrants in the balanced version.

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

Panel A: Migrant Destinations			Panel B: Shock Measures			
Country	Count	Percent	$\Delta UR_d$	by education level: $\Delta UR_{d,s}$		
				Primary	Secondary	Tertiary
United States	184	27.7	4.67	10.8 [50]	6.0 [102]	1.4 [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 [44]	-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 [17]	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]
<i>Other</i> <sup>†</sup>	83	12.5				
<b>Total</b>	<b>665</b>	<b>100.0</b>	<b>2.01</b>	<b>4.7 [139]</b>	<b>2.5 [414]</b>	<b>0.7 [87]</b>

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

captured in the sample have left the household between 1998 and 2008, with the average migrant having left in 2004. 56% of migrants are female and 62% are reported to be married. The majority of migrants have achieved at least a secondary level of education and 14% a tertiary degree before departure. As for migration motives, economic considerations are most frequently reported (54%), followed by family- (41%), and education-related reasons (16%). However, even if not explicitly reported, economic motives and remittance sending ultimately play a key role for any kind of migration decision among my sample households.

Table 3 presents summary statistics on sample of households and their migrants.<sup>25</sup> Motivated by the theoretical considerations outlined above, the sample is divided into poor and rich migrant households using their level of per capita expenditure in 2008 with respect to the median as a proxy.

By construction, poor and rich migrant households exhibit some differences in observable characteristics. With respect to demography, poor households were somewhat

<sup>25</sup>Individuals were included in the household member section of the survey if they "lived - sharing place and food - in the household continuously for at least three months" by the time of the interview. Consequently, the definition of a household is that of a household nucleus, excluding any permanent migrants or relatives residing outside the household.

Table 2: Foreign Migrant Individual Characteristics 2008

	<i>Mean</i>
Number of observations: 665	
Age	31.3
Year of departure	2004
Gender (=female) ( <i>indicator</i> )	0.56
Marital status is "married"/"in partnership" ( <i>indicator</i> )	0.62
Highest educational attainment before departure ( <i>indicator</i> )	
$\leq$ <i>primary</i>	0.22
<i>secondary</i>	0.64
<i>tertiary</i>	0.14
Reasons for departure ( <i>indicator</i> ) <sup>*</sup>	
<i>economic</i>	0.54
<i>family</i>	0.41
<i>education</i>	0.16
Frequency of communication with origin ( <i>indicator</i> )	
$\leq$ <i>weekly</i>	0.41
<i>weekly</i> $\leq$ <i>monthly</i>	0.43
$>$ <i>monthly</i>	0.16

*Source:* DOTM data 2008. *Note:* Descriptive statistics reported for the balanced panel, including 665 migrants in 26 destination countries. <sup>\*</sup> 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".

larger in size, with 4.6 nucleus members (excluding any migrants) compared to rich ones with 3.86 members in 2008. Despite these aggregate differences in household size, on average, both subgroups can be characterized as three-generational households, based on the composition of (remaining) members by age groups. Furthermore, both subgroups have a relatively large "migration opportunity set" – the sum of the number of young adults and adult members who tend to be the ones able to migrate – which ranges, on average, between 2.5 to three individuals.<sup>26</sup>

In terms of household financial indicators and in line with the subsample selection criteria, domestic income also differed between the two subgroups with 1,683 USD p.c. for poor versus 4,080 USD for rich households, respectively.<sup>27</sup>

<sup>26</sup>The selection of migrants at the level of the origin household is constrained by its demographic composition. The existence of (remaining) household members with suitable characteristics to become a prospective migrant and potential child care arrangements are prerequisites for sending (additional) migrants. As in other developing countries, households tend to be larger and more integrated across generations in Vietnam compared to those in industrialized countries. Child care concerns also tend to be less binding in such integrated households in which, typically, elderly members take care of the children left behind in case their parents migrate. In other words, in the cultural context of this study, the "migration opportunity set" among both subgroups of households tends to be relatively large, constituted by the group of working age adults, excluding only children and elderly people.

<sup>27</sup>Note that all monetary variables are expressed in real USD (PPP) per adult capita (i.e. all nucleus members of 16 years and above). Poor migrant households were still considerably richer than the aver-

Table 3: Household Descriptive Statistics 2008/2013

Baseline expenditure p.c.	2008				2013			
	Poor		Rich		Poor		Rich	
	Mean	<i>SD</i>	Mean	<i>SD</i>	Mean	<i>SD</i>	Mean	<i>SD</i>
	<b>Demography*</b>							
No. household nucleus members	4.60	1.91	3.86	1.84	4.60	2.22	3.95	1.85
<i>thereof</i> : children (<16y)	0.78	0.94	0.85	0.90	0.94	1.03	0.74	0.90
<i>thereof</i> : young adults (16-30y)	1.32	1.08	0.79	0.97	1.00	1.11	0.82	0.92
<i>thereof</i> : adults (31-64y)	1.98	0.98	1.78	0.99	2.08	1.20	1.90	1.09
<i>thereof</i> : elderly (>64y)	0.51	0.77	0.43	0.70	0.58	0.81	0.49	0.70
Age head of household	55.00	11.95	52.26	15.58	54.95	13.88	54.40	14.47
	<b>Finance*</b>							
Domestic income	1,683	1,316	4,080	6,495	2,285	2,729	4,285	6,644
Foreign remittances	876	1,328	861	1,420	513	1,049	421	971
Total expenditure	1,631	512	4,820	2,642	2,687	2,288	4,872	4,180
	<b>Foreign Migration†</b>							
Probability(migrant)	1		1		0.66		0.72	
Total no. migrants	1.2	0.51	1.36	0.83	0.94	0.94	1.15	1.15
<i>thereof</i> : Labor	0.91	0.67	0.90	0.75	0.75	0.74	0.84	0.88
No. migrants ( <i>indicator</i> )								
0	0		0		0.34		0.28	
1	0.84		0.78		0.48		0.49	
2+	0.16		0.22		0.18		0.23	
No. destinations ( <i>indicator</i> )								
0	0		0		0.34		0.28	
1	0.95		0.97		0.62		0.69	
2+	0.05		0.03		0.04		0.03	
Migrant education ( <i>indicator</i> )								
<i>pre-primary</i>	0.08		0.04		0.10		0.04	
<i>primary</i>	0.15		0.12		0.22		0.08	
<i>lower secondary</i>	0.28		0.17		0.23		0.21	
<i>upper secondary</i>	0.28		0.39		0.29		0.37	
<i>post-secondary</i>	0.13		0.10		0.05		0.07	
<i>tertiary first stage</i>	0.08		0.18		0.11		0.22	
<i>tertiary second stage</i>	0.00		0.01		0.00		0.01	
<b>Domestic</b>								
Probability(migrant)	0.18		0.20		0.36		0.29	
Total no. migrants	0.23	0.56	0.40	0.99	0.67	1.12	0.59	1.18
<i>thereof</i> : Labor	-	-	-	-	0.38	0.73	0.33	0.73

*Source*: DOTM panel data 2008–2013. *Note*: Number of observations: 500. Descriptive statistics by subsamples of households level relative to the expenditure per adult capita median in 2008. \* Working: Members reported employed or self-employed. \* All monetary variables are expressed in real USD per adult capita. † Foreign labor migration includes former household members being reported to having left the country to work abroad or for one of the following motives: "easier to get a steady job", "earn more money", and "send money back". Migrant educational attainment prior to departure according to International Standard Classification of Education 1997 levels. Domestic labor migration includes former household members being reported to having migrated domestically and were either employed or self-employed during the reference period. ‡ Conditional on the household head being employed or self-employed.

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 was 1.2 for the poor and 1.36 for the rich subgroup during the baseline, with 84% (78%) of the former (latter) households having just one age Vietnamese (non-migrant) household that earned 1,149 USD p.c. in 2008 according to the World Development Indicators.

one migrant, while 16% (22%) have two or more. While sample migrants are spread across many different destinations, the number of destinations is rather concentrated within households, with only 4% of the sample having migrants in different destination countries simultaneously. The distribution of migrants' educational attainment prior to departure is also polarized between the two subgroups: poor households' distribution is more concentrated in the lower tail and *vice versa* for rich ones.

In terms of domestic migration, about 20% of households report a domestic migrant at baseline, with the total number of domestic migrants being almost twice as high for the rich compared to the poor subgroup. While the incidence and number of domestic migrants increases for both subgroups over time, the trend is more pronounced for the poor subgroup, with the share of households with domestic migrants doubling and the mean number of domestic migrants increasing threefold.

### 3.3 Shock Measure Construction

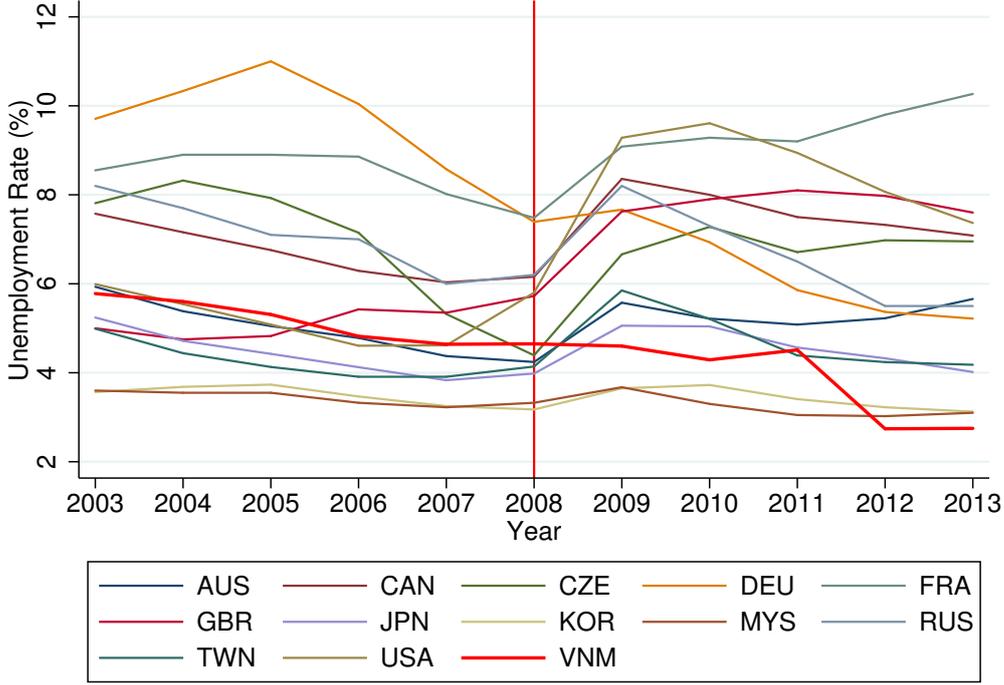
To construct migrant labor market shocks, I combine cross-sectional information on foreign migrants' destinations and their skill levels prior to migration with time-varying data reflecting the skill-specific change in unemployment rates at destination during the crisis years. Using unemployment rates instead of alternative measures of economic shocks, such as GDP, allows me to exploit variation within each destination.<sup>28</sup>

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

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<sup>28</sup>Figure 1 depicts the evolution of aggregate unemployment rates in the top 12 migrant destination countries (and Vietnam) before, during, and after the Great Recession. Due to a lack of data on foreign migrants' sector of employment abroad, I am unable to exploit sector-specific GDP or sector of last employment-specific unemployment shocks.

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



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

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

with  $M_{h,d,s,2008}$  being the number of foreign migrants from household  $h$ , at destination  $d$ , with skill level  $s$  in the baseline year 2008.  $UR_{d,s,2007-2009}$  is the destination-skill-specific change in unemployment rates between the crisis years 2007 to 2009. In order to proxy for the level of skills, I use data on migrants' educational attainment prior to departure following the International Standard Classification of Education with 1997 levels (ISCED97). As shown in Table 3, there is considerable variation in migrants' educational attainment across households, such that the benchmark shock measure is strongly household-specific. Columns two to four in panel B of Table 1 report the resulting measure for the main destinations.<sup>29</sup> The distribution of migrant skills across all destinations is concentrated in the secondary education cell (65% of the total number of migrants),

<sup>29</sup>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.

followed by the primary (22%), and tertiary category (13%). On average, the effective shock measure decreases with individual levels of educational attainment, i.e. low-skilled workers experienced stronger labor market shocks compared to high-skilled ones during the Great Recession.

Note that this benchmark specification relies on the assumption that migrant skill levels, as reflected by their educational achievement prior to migration, match well to the skill levels of the general population at destination for which unemployment rates are reported. Empirical evidence on migrant job mismatch and downgrading at destination give rise to concerns of misclassification, which could lead to biased parameter estimates (Weiss et al., 2003; Dustmann et al., 2013). To deal with this concern, I conduct two robustness checks using alternative shock specifications that are independent of migrant education. First, I use aggregate destination-specific unemployment rates to calculate the shock.<sup>30</sup> Note that this measure is destination country-specific for 96% of sample households with one destination reported in the baseline. For them, the shock variable turns out to be the simple destination country average, as listed in Panel B of Table 1 (column 1) and depicted in Appendix Figure A.1. Second, I rely on destination-, age- and gender-specific unemployment rates to construct the shock measure.<sup>31</sup> Importantly, the results are robust to using any of these measures.

## 4 Empirical Strategy

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

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<sup>30</sup>It is calculated as:  $Shock2_h = \frac{\sum_{d=1}^D (M_{h,d,2008} \times \Delta UR_{d,2007-2009})}{M_{h,d,2008}}$ , with  $M_{h,d,2008}$  being the number of foreign migrants from household  $h$  at destination  $d$  during the baseline.  $\Delta UR_{d,2007-2009}$  is the destination-specific change in unemployment rates between the crisis years 2007 and 2009.

<sup>31</sup>It is calculated as:  $Shock3_h = \frac{\sum_{d=1}^D \sum_{a=1}^A \sum_{g=1}^G (M_{h,d,a,g,2008} \times \Delta UR_{d,a,g,2007-2009})}{M_{h,2008}}$ , with  $M_{d,a,g,2008}$  being the number of foreign migrants from household  $h$  at destination  $d$ , in age bracket  $a$ , and with gender  $g$  during the baseline.  $\Delta UR_{d,a,g,2007-2009}$  is the destination-, age- and gender-specific change in unemployment rates between the crisis years 2007 and 2009.

before the Great Recession occurred. The identifying variation comes from unemployment shocks during the Great Recession that affected migrants differentially, conditional on their destination choice and educational attainment prior to migration. I estimate the following difference-in-difference benchmark equation:<sup>32</sup>

$$Y_{ht} = \beta_0 + \beta_1(Shock_h \times Post_t) + \alpha(X_h \times Post_t) + \gamma_{p(h)t} + \delta_h + \varepsilon_{ht} \quad (4)$$

where  $h$  indexes the household in year  $t$ , with  $t = 2008$  or  $2013$ .  $Y_{ht}$ , the dependent variable will be either migration incidence as measured by the number of migrants, measures of the households' demographic composition, or financial outcomes, depending on the specification.  $Shock_h$  is the destination- and skill-specific shock measure as calculated in equation 3 and  $Post$  is a time dummy which equals 1 for the post-shock period 2013.  $X_h$  is vector of pre-crisis household and migrant baseline characteristics.  $\delta_h$  are household fixed effects and  $\gamma_{p(h)t}$  are sets of province of origin-year-specific dummies.  $\varepsilon_{ht}$  is the error term and standard errors are clustered according to the baseline destination country of foreign migrants.<sup>33</sup> In order to cope with concerns of over rejection in standard asymptotic tests due to a small and unbalanced distribution of clusters in this empirical setting, I rely on the effective degrees of freedom (EDF) correction proposed by Young (2016).<sup>34</sup>

The coefficient of interest,  $\beta_1$ , reflects the aggregate effect of a unit change in the unemployment rate at destination on the respective outcome among households at origin in Vietnam. The identifying assumption is that if destination labor market shocks faced by migrants had been of the same magnitude, then changes in outcomes at origin would

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<sup>32</sup>In the following regression equations, I omit those terms which are effectively absorbed by the set of fixed effects included.

<sup>33</sup>For households who had migrants to more than one destination, the error term is clustered according to the destination country of the eldest migrant (Yang, 2008)

<sup>34</sup>As MacKinnon and Webb (2018) show, this approach is more reliable than the wild bootstrap procedure proposed by Cameron et al. (2008) if the number of treated clusters is small. In this case, the wild restricted bootstrap p-values have a tendency to over reject and the unrestricted ones to under reject and neither of them can be trusted. For this reason, I rely on the EDF p-values as the benchmark criterion for establishing inference throughout the analysis. As recommended by Solon et al. (2015), regressions are unweighted as the sampling probabilities in this setting can be assumed independent of the error term based on the estimation equation.

not have varied systematically across families left behind.<sup>35</sup> The main concern with respect to this parallel trends assumption is if the shock measure was systematically correlated with household or migrant characteristics. If the latter were also associated with differential changes in outcomes among families left behind, independent of the shock, this would bias my coefficient estimates.<sup>36</sup> To investigate this potential issue, I conduct a balance test of household and migrant baseline characteristics with respect to the shock measure in Appendix Table A.4. The results show no evidence of systematic correlations between the shock variable and household or migrant baseline characteristics. According to both the CRSE and EDF standard errors, eight variables show significant correlations and I control for these variables in all regressions by including them in the vector of pre-crisis characteristics ( $X_h$ ).<sup>37</sup>

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

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<sup>35</sup>Autor et al. (2013) and Dix-Carneiro and Kovak (2017) find that workers leave the labor force when affected by negative labor market shocks. Note that this could lead to a downward bias in the magnitude of unemployment shocks if migrants behaved similarly. I do not expect this effect to be widespread among migrants in my sample since migration tends to be temporary and their main motivation is to support their families left behind. More importantly, such a bias does not affect the estimates of my coefficient of interest.

<sup>36</sup>For instance, this could occur if high expenditure households with more educated members sent migrants to more attractive destinations which, in turn, suffered from the crisis more severely and if these educational characteristics also lead to differential outcomes at origin at the same time.

<sup>37</sup>The control variables included are: gender, employment status, and occupation of the household head, the number of children, elderly, domestic, and international migrants, as well as foreign migrant age and education. I also include the number of young adults to control for the "migration opportunity set", as explained in section 3.2. Note that the inclusion of these baseline controls makes little difference to the coefficient estimates in general and, in many instances, increases the estimation precision.

had happened five years earlier. This specification is a direct test for the presence of pretreatment parallel trends and the results provide evidence in favor of the identifying assumption.

Based on the considerations outlined above, I am particularly interested in the heterogeneous effects of the shock along the distribution of household consumption levels. To explore this, following my benchmark estimation, I also conduct a subgroup analysis comparing the reactions of poor and rich households separately. To explore this, I estimate the following triple difference equation:

$$Y_{ht} = \beta_0 + \beta_1(Shock_h \times Post_t) + \beta_2(Shock_h \times Post_t \times Rich_h) + \beta_3(Rich_h \times Post_t) + \alpha(X_h \times Post_t) + \gamma_{p(h)t} + \delta_h + \varepsilon_{ht} \quad (5)$$

where  $Rich_h$  is a subgroup dummy being equal to one if the household's expenditure per capita level is above the sample median and zero otherwise. For each outcome variable, I estimate the benchmark specification 4 first and then the subgroup specification 5. In the following regression tables, I report  $\beta_1$  (labeled " $Shock \times Post$ " in the Tables) and the triple interaction term  $\beta_2$  with the subgroup dummy (labeled " $Shock \times Post \times Rich$ "), respectively. In subgroup specification 5, the coefficient on  $\beta_1$  reflects the effect for the poor subgroup, while  $\beta_2$  measures the difference in treatment effects between the two subgroups. The separate effect for the rich subgroup is determined by the net effect of the two coefficients. I report p-values on the null hypothesis of the linear restriction ( $\beta_1 + \beta_2 = 0$ ).

Given the continuous character of the shock measure, each coefficient reflects the impact of a one percentage point increase in the unemployment rate during the crisis years 2007 to 2009 on the respective outcome measure. However, since the shock measure effectively ranges between -2.0 and +8.9 pp, an alternative interpretation is as follows: multiplying the coefficients by the mean shock measure of 2.3 (4.8) gives the effect for the average shock (respectively of one additional standard deviation).<sup>38</sup> In what follows,

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<sup>38</sup>The preferred shock measure ( $shock_h$ ), as calculated in equation 3, has a mean of 2.34 and a standard deviation of 2.46. In the robustness checks, I also present results based on two alternative shock

I refer to the effect of the average shock, unless otherwise indicated.

## 5 Results

### 5.1 Foreign Migration

Results from the analysis of households' foreign migration decisions are provided in Table 4 (gender and labor), Table 5 (destination choice), and Table 6 (skill selection and destination diversification). Starting with Table 4, columns (1) and (2) report the results for the total number of foreign migrants. The coefficient on the full sample in column (1) is positive and statistically significant,<sup>39</sup> indicating an aggregate increase of around 0.13 individuals migrating to foreign destinations in response to the average shock ( $0.058 \times 2.3$ ). This translates into a 10% increase compared to baseline levels. When analyzing the effects by subgroup in column (2), the coefficient on the poor subgroup is positive, statistically significant and of larger magnitude compared to column (1). The point estimate indicates an increase of 0.15 in the number of foreign migrants (+12% compared to baseline levels). The coefficient on the subgroup difference is close to zero and implies an increase of 0.13 individuals among rich households ( $(0.065 - 0.011) \times 2.3$ ), which translates into a 10% increase. Note that the test of the linear restriction ( $\beta_1 + \beta_2 = 0$ ) indicates that the effect for the rich subgroup is insignificant (p-value: 0.11).

In columns (3) and (4), I focus on international labor migration in particular, i.e. a subset of foreign migrants reported for having left for labor-related motives explicitly. The point estimate on aggregate labor migration in column (3) is positive, but statistically insignificant. The coefficients in column (4) again have opposite signs, larger magnitudes, and are statistically significant. The point estimate for the poor subgroup is positive and suggests an increase of 0.17 labor migrants in response to the average shock or 19% with respect to baseline levels. In contrast, the point estimate on the sub-

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measures as described in section 3.3. Shock measure 2, based on destination-specific unemployment rates ( $shock2_h$ ), has mean 1.95 and standard deviation 1.80. Shock measure 3, based on destination-, age- and gender-specific unemployment rates ( $shock3_h$ ) has mean 3.29 and standard deviation 2.69.

<sup>39</sup>Throughout the analysis, I refer to the bias corrected p-values based on the effective degrees of freedom (EDF) for interpretation (Young (2016)), unless otherwise indicated.

Table 4: Foreign Migration: Gender and Labor

Panel A:	Number of foreign migrants					
	Total		Labor		Female labor	
	(1)	(2)	(3)	(4)	(5)	(6)
Shock×Post ( $\beta_1$ )	0.0580** (0.0296)	0.0652* (0.0342)	0.0280 (0.0391)	0.0732* (0.0348)	0.00842 (0.0197)	0.0505** (0.0232)
EDF (p-value)	0.046	0.071	0.419	0.051	0.624	0.046
Shock×Post×Rich ( $\beta_2$ )		-0.0113 (0.0209)		-0.0824** (0.0351)		-0.0754** (0.0278)
EDF (p-value)		0.577		0.040		0.023
$\beta_1 + \beta_2 = 0$ (p-value)		0.111		0.854		0.388
Household FE	✓	✓	✓	✓	✓	✓
Province-Year FE	✓	✓	✓	✓	✓	✓
Baseline controls	✓	✓	✓	✓	✓	✓
Observations	1,000	1,000	1,000	1,000	1,000	1,000
Households	500	500	500	500	500	500
Cluster	26	26	26	26	26	26
$R^2$	0.797	0.797	0.704	0.707	0.747	0.752
Mean Dep. Var.	1.28	1.28	0.91	0.91	0.44	0.44

*Source:* Author's calculations based on DOTM panel data 2008–2013. *Note:* Each column displays the result of a separate regression based on equation 4 and 5 respectively. I only report the shock coefficient interacted with the *Post* dummy for the follow-up wave 2013 ( $\beta_1$  in equation 4 and 5) and the triple interaction term with the subgroup dummy ( $\beta_2$  in equation 5). Cluster robust standard errors in parenthesis. Bias corrected p-values based on the effective degrees of freedom (EDF) calculated using the "edfreg" Stata module (Young, 2016). The F-test p-value is for the null hypothesis of the net effect for the rich subgroup being zero. Significance level based on EDF adjusted standard errors. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1.

group differences is negative, of similar magnitude, and the test of the linear restriction indicates that the null hypothesis cannot be rejected. This provides evidence that only poor migrant households reacted to the shock in terms of labor migration and suggests that the aggregate migration response among the rich subgroup was driven by non-labor motives exclusively. In columns (5) and (6), I further disaggregate labor migration by gender and focus on female labor migration. While the coefficient in column (5) is close to zero, the point estimates on the poor subgroup in column (6) suggests an increase of 0.12 in the number of female labor migration abroad (+26%). In contrast, the coefficients on male labor migration are small and statistically insignificant (see additional results in Appendix Table A.1). The point estimate on the subgroup differences in column (6) is negative, statistically significant, and the test of the linear restriction suggests no change in female labor migration among the rich subgroup.

To explore which destinations new migrants selected into ex-post, Table 5 provides results on migration flows by destination. Given the distribution of foreign migration

Table 5: Foreign Migration: Destination Choice

	Number of foreign migrants					
	Total Non US		Labor US		Labor Non US	
	(1)	(2)	(3)	(4)	(5)	(6)
Shock $\times$ Post ( $\beta_1$ )	0.0462 (0.0302)	0.0404 (0.0327)	0.0186** (0.00924)	0.0454** (0.0167)	0.00937 (0.0351)	0.0278 (0.0346)
EDF (p-value)	0.103	0.209	0.041	0.020	0.759	0.396
Shock $\times$ Post $\times$ Rich ( $\beta_2$ )		0.0113 (0.0213)		-0.0464 (0.0266)		-0.0360 (0.0338)
EDF (p-value)		0.584		0.103		0.287
$\beta_1 + \beta_2 = 0$ (p-value)		0.147		0.950		0.853
Household FE	✓	✓	✓	✓	✓	✓
Province-Year FE	✓	✓	✓	✓	✓	✓
Baseline controls	✓	✓	✓	✓	✓	✓
Observations	1,000	1,000	1,000	1,000	1,000	1,000
Households	500	500	500	500	500	500
Cluster	26	26	26	26	26	26
$R^2$	0.798	0.798	0.897	0.899	0.710	0.711
Mean Dep. Var.	0.92	0.92	0.22	0.22	0.69	0.69

*Source:* Author's calculations based on DOTM panel data 2008–2013. *Note:* Each column displays the result of a separate regression based on equation 4 and 5 respectively. I only report the shock coefficient interacted with the *Post* dummy for the follow-up wave 2013 ( $\beta_1$  in equation 4 and 5) and the triple interaction term with the subgroup dummy ( $\beta_2$  in equation 5). Cluster robust standard errors in parenthesis. Bias corrected p-values based on the effective degrees of freedom (EDF) calculated using the "edfreg" Stata module (Young, 2016). The F-test p-value is for the null hypothesis of the net effect for the rich subgroup being zero ( $\beta_1 + \beta_2 = 0$ ). Significance level based on EDF adjusted standard errors. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1.

destinations at baseline, I disaggregate flows into US vs. non-US, with the latter mainly including European and Asian countries as listed in Table 1. Columns (1) and (2) capture total migration into non-US destinations. The coefficient on the full sample in column (1) is positive, suggesting an overall increase of 0.11 foreign migrants (+12%) to non US countries.<sup>40</sup> Looking at the subgroup specification in column (2), the coefficient on the poor subgroup is positive but insignificant and the one on the subgroup difference is close to zero. Columns (3) and (4) report the results for labor migration to the US. The coefficient on the full sample in column (3) is positive and statistically significant, suggesting an increase of 0.04 individuals leaving for work to the US in response to the average shock (+19%). In the subgroup analysis in column (4), we again observe that the coefficients become larger in magnitude and carry opposite signs. The point estimate for the poor subgroup is positive and significant, suggesting an increase of 0.10 in the number

<sup>40</sup>In unreported regressions, I also disaggregate non-US destinations further, for example into Asian and EU countries. Despite those tests being underpowered, they provide suggestive evidence that most of the non-US flows were directed towards Asian destinations.

of individuals leaving for work to the US (+47%). On the other hand, the point estimate on the subgroup differences is negative and of similar magnitude, suggesting no effect among rich households. Comparing the magnitudes of the effects in column (4) to those on aggregate labor migration in Table 4 shows that the effect on labor migration to the US accounts for 60% of the overall effect on labor migration. For completeness, columns (5) and (6) report the results on labor migration to non-US destinations. The coefficients carry the same signs as in the previous specification, but are of smaller magnitude and less precisely estimated. For the poor subgroup, this suggests an increase of 0.06 in the number of labor migrants to non US destinations and a zero effect for the rich ones.

Table 6: Foreign Migration: Skill Selection and Destination Diversification

	Foreign migrants					
	Average skill level		Number destinations		Destination change	
	(1)	(2)	(3)	(4)	(5)	(6)
Shock×Post ( $\beta_1$ )	-0.0312 (0.0562)	-0.000556 (0.0810)	0.0227 (0.0233)	0.0226 (0.0282)	-0.00548 (0.00534)	-0.000304 (0.00520)
EDF (p-value)	0.527	0.994	0.277	0.397	0.255	0.949
Shock×Post×Rich ( $\beta_2$ )		-0.0651 (0.101)		0.000103 (0.0251)		-0.0121 (0.00978)
EDF (p-value)		0.510		0.977		0.222
$\beta_1 + \beta_2 = 0$ (p-value)		0.373		0.406		0.195
Household FE	✓	✓	✓	✓	–	–
Province-Year FE	✓	✓	✓	✓	✓	✓
Baseline controls	✓	✓	✓	✓	✓	✓
Observations	1,000	1,000	1,000	1,000	1,000	1,000
Households	500	500	500	500	500	500
Cluster	26	26	26	26	26	26
$R^2$	0.799	0.800	0.668	0.668	0.543	0.553
Mean Dep. Var.	2.68	2.68	1.04	1.04	–	–

*Source:* Author's calculations based on DOTM panel data 2008–2013. *Note:* Each column displays the result of a separate regression based on equation 4 and 5 respectively. I only report the shock coefficient interacted with the *Post* dummy for the follow-up wave 2013 ( $\beta_1$  in equation 4 and 5) and the triple interaction term with the subgroup dummy ( $\beta_2$  in equation 5). Cluster robust standard errors in parenthesis. Bias corrected p-values based on the effective degrees of freedom (EDF) calculated using the "edfreg" Stata module (Young, 2016). The F-test p-value is for the null hypothesis of the net effect for the rich subgroup being zero ( $\beta_1 + \beta_2 = 0$ ). Significance level based on EDF adjusted standard errors. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1.

Other questions of interest are related to the comparison of established versus new migrants from a given household in terms of skill selection and destination diversification: are additional migrants more or less skilled than previous ones and do they target new destinations or the same ones? Columns (1) and (2) in Table 6 report the results on

skill selection. Here, the dependent variable is the average education level of foreign migrants in each household based on the seven stages ISCED-97 scale. The coefficient in column (1) is small, negative, and statistically insignificant. Its magnitude appears economically insignificant compared to the baseline mean of 2.68. In column (2), both point estimates are negative, remain statistically insignificant and quantitatively small. This suggests no effect on intra-household skill selection or, in other words, that new migrants are largely comparable to previous ones from the same household in terms of education levels.<sup>41</sup> Columns (3) and (4) report the results from a specification taking the number of unique destination countries among international migrants from the same household as the dependent variable. Note that the descriptive statistics show very few households actually having a diversified destination country portfolio (approximately 4% report more than one at baseline). The coefficients are generally small and indicate no such effect whatsoever. In columns (5) and (6), the dependent variable is a dummy which equals 1 if the destination country of the eldest migrant changed between baseline and follow-up. Again, the coefficients are close to zero, providing no evidence of crisis related destination changes. Together, these results imply a high degree of path dependency in the selection of destinations among foreign migrants: despite of the shock abroad, additional foreign migrants targeted the same destinations of previous migrants instead of diversifying into new ones. This is consistent with an explanation of kinship migration networks or chain migration, in which the destination choice of established migrants is highly predictive of the those for subsequent ones.

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<sup>41</sup>In unreported regressions, I also analyze the average education level of labor migrants. The point estimate on the poor subgroup is negative and slightly larger than the one for total migration, but it remains statistically insignificant.

## 5.2 Domestic Migration

The results on households' domestic migration decisions are provided in Table 7.<sup>42</sup> Columns (1) and (2) provide the results for the total number of domestic migrants in the household. The point estimate on the full sample in column (1) is negative and statistically insignificant. Looking at the coefficients in column (2) by subgroup, we again observe that the estimates become larger in magnitude and carry opposite signs. The point estimate for the poor subgroup is negative and statistically significant, suggesting a decrease of 0.18 ( $0.077 \times 2.3$ ) in the number of domestic migrants in response to the average shock. This translates into a decrease of around 56% compared to baseline levels of domestic migration. For the rich subgroup, the effect is zero as indicated by the test on the linear restriction. Note that the magnitude of the point estimate on domestic migration among poor households is similar to the one on foreign migration with opposite signs, suggesting a one-to-one substitution of domestic migrants with foreign ones in net terms.

Columns (3) and (4) present suggestive evidence on domestic labor migration.<sup>43</sup> While the coefficient in column (3) is small and negative, but insignificant, the one on the poor subgroup in column (4) provides suggestive evidence that the decrease in domestic migration is mainly driven by labor migration. Again, the null hypothesis for the test of the linear restriction cannot be rejected, implying no such correlation for the rich subgroup. In columns (5) and (6), labor migration is further disaggregated into flows targeting long-distance domestic destinations, i.e. outside of the households' province of origin. The results are qualitatively and quantitatively similar to the ones on labor migration in general, providing suggestive evidence that total domestic migration is mainly driven by long-distance labor movements. This implies that families of domestic migrants are likely living separated from their migrants for most of the time throughout the year.

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<sup>42</sup>Note that there are two different specifications in this table: coefficients in columns (1) and (2) are estimated according to equation 4 and 5, respectively, and can be considered causal effect estimates. Due to missing information on a range of domestic migrant characteristics in the baseline survey, the variation of the dependent variable in columns (3) through (6) is only cross-sectional and estimated as  $Y_h = \beta_0 + \beta_1(Shock_h) + \beta_2(Shock_h \times Rich_h) + \gamma_{p(h)} + \varepsilon_h$  on the follow-up wave in 2013. For this reason, these coefficients should only be interpreted as suggestive evidence, reflecting correlations instead of causal effects.

<sup>43</sup>Domestic migrants are defined as individuals who were members of the household previously and have left to live in another household within the country permanently. This excludes temporary or

Table 7: Domestic Migration

	Number of domestic migrants					
	Total		Labor		Labor long-distance	
	(1)	(2)	(3)	(4)	(5)	(6)
Shock×Post ( $\beta_1$ )	-0.0444 (0.0325)	-0.0774** (0.0307)	-0.0281 (0.0215)	-0.0569** (0.0182)	-0.0290 (0.0212)	-0.0548** (0.0194)
EDF (p-value)	0.140	0.026	0.155	0.010	0.140	0.017
Shock×Post×Rich ( $\beta_2$ )		0.0665 (0.0379)		0.0551** (0.0198)		0.0516** (0.0204)
EDF (p-value)		0.101		0.021		0.030
$\beta_1 + \beta_2 = 0$ (p-value)		0.808		0.948		0.903
Household FE	✓	✓	-	-	-	-
Province-Year FE	✓	✓	✓	✓	✓	✓
Baseline controls	✓	✓	✓	✓	✓	✓
Observations	1,000	1,000	500	500	500	500
Households	500	500	500	500	500	500
Cluster	26	26	26	26	26	26
$R^2$	0.710	0.712	0.585	0.588	0.587	0.591
Mean Dep. Var.	0.32	0.32	-	-	-	-

*Source:* Author's calculations based on DOTM panel data 2008–2013 in columns (1) and (2) and DOTM cross-section data 2013 in columns (3) to (6). *Note:* There are two the different specifications of domestic migration in this table. Coefficients in columns (1) and (2) are estimated according to equation 4 and 5 respectively and can be considered causal effect estimates. Due to a lack of information on domestic migrants' occupation in the baseline survey, the dependent variable in estimations in columns (3) to (6) is only cross-sectional. These coefficients are estimated as  $Y_h = \beta_0 + \beta_1(Shock_h) + \beta_3(Shock_h \times Rich_h) + \varepsilon_h$ . For this reason, the estimates should only be interpreted as suggestive evidence, reflecting correlations instead of causal effects. For columns (1) and (2), I report the shock coefficient interacted with the *Post* dummy for the follow-up wave 2013 ( $\beta_1$  in equation 4 and 5) and the triple interaction term with the subgroup dummy ( $\beta_2$  in equation 5). Cluster robust standard errors in parenthesis. Bias corrected p-values based on the effective degrees of freedom (EDF) calculated using the "edfreg" Stata module (Young, 2016). The F-test p-value is for the null hypothesis of the net effect for the rich subgroup being zero. Significance level based on EDF adjusted standard errors. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1.

Summarizing the findings so far, I find evidence that labor market shocks abroad led to important changes in subsequent migration decisions among families left behind in Vietnam. Poor migrant households at baseline responded by increasing the number of foreign migrants and decreasing the number of domestic migrants by about the same margin. The differential reactions of poor households along the two migration dimensions can be interpreted as a substitution effect between domestic and international migration in response to the crisis abroad. These findings suggest that the elasticity of foreign (domestic) labor migration with respect to foreign wages was negative (positive) for the poor subgroup. The magnitude of the decrease in domestic migration (coefficient: -0.077) is somewhat larger than that of the increase in foreign migration (+0.065), suggesting small seasonal migration as well as household members commuting for work.

return migration to the origin household in net terms. I find no evidence of changes in skill selection or a diversification in foreign destination portfolios. In contrast, rich migrant households remained largely resilient. In what follows, I take stock of the demographic composition of the family left behind and analyze how these changes in migration patterns were reflected at the origin.

### 5.3 Origin Household

Results on the demographic composition of the origin household are presented in Table 8 (gender and labor). Columns (1) and (2) capture the total number of household nucleus members (i.e. the household nucleus size, excluding any migrants). The point estimate on the full sample in column (1) is close to zero. In column (2), however, the two coefficients turn out to be large in magnitude and carry opposite signs. The point estimate for the poor subsample is positive, but statistically insignificant, suggesting an increase in the number of household members of around 0.2. In contrast, the one on the subgroup differences is negative, statistically significant, and of larger magnitude. While the coefficients in this specification have relatively large standard errors and statistical tests are underpowered, they suggest, if anything, a modest decrease in the household size among the rich subgroup.

Looking at the number of employed household members in column (3), the coefficient is positive but insignificant, suggesting an increase of around 0.09. In column (4), the coefficient on the poor subgroup is close to zero and the one on the subgroup difference turns out to be positive and statistically insignificant. If anything, this provides suggestive evidence of an increase in employed members among the rich subgroup.<sup>44</sup> Columns (5) and (6) capture the number of male household members. While the point estimate in column (5) is zero, the coefficients in column (6) turn larger in magnitude and carry opposite signs. The point estimate on the poor subgroup is positive, but statistically insignificant, suggesting an increase of 0.09, while the one on the subgroup differences

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<sup>44</sup>Note that this specification captures only the extensive margin of labor supply through the number of household members reported being employed, including both employees and self-employed. Due to data limitations, I do not observe the intensive margin of labor supply.

Table 8: Origin Household: Gender and Labor

	Number of household nucleus members					
	Total		Labor		Male	
	(1)	(2)	(3)	(4)	(5)	(6)
Shock×Post ( $\beta_1$ )	0.00127 (0.0682)	0.0884 (0.0667)	0.0392 (0.0552)	0.00475 (0.0841)	-0.00347 (0.0420)	0.0385 (0.0374)
EDF (p-value)	0.983	0.181	0.422	0.951	0.924	0.285
Shock×Post×Rich ( $\beta_2$ )		-0.169*** (0.0481)		0.0496 (0.0938)		-0.0812** (0.0292)
EDF (p-value)		0.007		0.585		0.020
$\beta_1 + \beta_2 = 0$ (p-value)		0.289		0.448		0.399
Household FE	✓	✓	✓	✓	✓	✓
Province-Year FE	✓	✓	✓	✓	✓	✓
Baseline controls	✓	✓	✓	✓	✓	✓
Observations	1,000	1,000	1,000	1,000	1,000	1,000
Households	500	500	500	500	500	500
Cluster	26	26	26	26	26	26
$R^2$	0.803	0.806	0.712	0.715	0.817	0.818
Mean Dep. Var.	4.23	4.23	2.04	2.04	1.98	1.98

*Source:* Author's calculations based on DOTM panel data 2008–2013. *Note:* Each column displays the result of a separate regression based on equation 4 and 5 respectively. "Labor" is the number of household members reported being employed, including employees and self-employed. I only report the shock coefficient interacted with the *Post* dummy for the follow-up wave 2013 ( $\beta_1$  in equation 4 and 5) and the triple interaction term with the subgroup dummy ( $\beta_2$  in equation 5). Cluster robust standard errors in parenthesis. Bias corrected p-values based on the effective degrees of freedom (EDF) calculated using the "edfreg" Stata module (Young, 2016). The F-test p-value is for the null hypothesis of the net effect for the rich subgroup being zero ( $\beta_1 + \beta_2 = 0$ ). Significance level based on EDF adjusted standard errors. \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$ .

is twice as large in magnitude, suggesting a decrease in the number of male members of similar magnitude for the rich subgroup. Note, however, that the net effect is not statistically different from zero, mainly due to large standard errors.

The previous results are consistent with those on migration for the poor subgroup as we observe an increase in the number of household members for this subgroup which corresponds to the (small) net return of former migrants to the origin. However, the implied increase in the household size is much larger than what can be explained by return migration. For rich households, the results provide suggestive evidence of a decrease in the household size at origin, which can partly be explained by the net increase in foreign (non-labor) migration. Apart from migration decisions, another factor that could explain changes in household size is fertility.<sup>45</sup> I shed light on this dimension by focusing the analysis on the gender dimension, cohabitation of intimate partners, and fertility decisions

<sup>45</sup>Mortality could also influence household size and I investigate this in unreported regressions. The coefficients from this exercise are, however, close to zero and provide no evidence for that.

at origin.

Table 9: Origin Household: Cohabitation and Fertility

	Number of household nucleus members					
	Female		Female fertile age cohabiting		Children (0-5y)	
	(1)	(2)	(3)	(4)	(5)	(6)
Shock $\times$ Post ( $\beta_1$ )	0.00668 (0.0363)	0.0520 (0.0408)	0.0140 (0.0209)	0.0498* (0.0268)	0.0173* (0.00978)	0.0555*** (0.0137)
EDF (p-value)	0.832	0.196	0.447	0.076	0.066	0.003
Shock $\times$ Post $\times$ Rich ( $\beta_2$ )		-0.0885** (0.0294)		-0.0697** (0.0227)		-0.0661*** (0.0177)
EDF (p-value)		0.015		0.013		0.005
$\beta_1 + \beta_2 = 0$ (p-value)		0.313		0.334		0.435
Household FE	✓	✓	✓	✓	✓	✓
Province-Year FE	✓	✓	✓	✓	✓	✓
Baseline controls	✓	✓	✓	✓	✓	✓
Observations	1,000	1,000	1,000	1,000	1,000	1,000
Households	500	500	500	500	500	500
Cluster	26	26	26	26	26	26
$R^2$	0.805	0.806	0.684	0.689	0.599	0.605
Mean Dep. Var.	2.25	2.25	0.53	0.53	0.25	0.25

*Source:* Author's calculations based on DOTM panel data 2008–2013. *Note:* Each column displays the result of a separate regression based on equation 4 and 5 respectively. I only report the shock coefficient interacted with the *Post* dummy for the follow-up wave 2013 ( $\beta_1$  in equation 4 and 5) and the triple interaction term with the subgroup dummy ( $\beta_2$  in equation 5). Cluster robust standard errors in parenthesis. Bias corrected p-values based on the effective degrees of freedom (EDF) calculated using the "edfreg" Stata module (Young, 2016). The F-test p-value is for the null hypothesis of the net effect for the rich subgroup being zero ( $\beta_1 + \beta_2 = 0$ ). Significance level based on EDF adjusted standard errors. \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$ .

Table 9 analyzes the cohabitation of intimate partners and fertility decisions. In columns (1) and (2), I first report the results on the total number of female members. While the coefficient in column (1) is close to zero, the ones in column (2) are similar to the ones on male members, but of slightly larger magnitude.<sup>46</sup> The point estimate for the poor subgroup is positive but statistically insignificant. The coefficient on the subgroup difference is negative, statistically significant, and of larger magnitude, suggesting a small decrease among rich households. An open question is concerning the cohabiting situation of intimate partners, who might have been separated by distance during previous migra-

<sup>46</sup>Note that the increase in family size appears to be biased towards females which seems inconsistent with the increase in foreign migration being driven by women. The coefficients are relatively noisy and their difference is statistically insignificant. Nevertheless, such an effect could be explained by at least two circumstances. First, there may be sorting of domestic migrants in terms of gender, such that especially females select into returning to the origin household. Note that I cannot test for that due to the lack of information on domestic migrants in the baseline survey. Second, there may be non-members joining the household, e.g. women may join from the extended family network or someone being hired as care giver for the children or elderly. Bertoli and Murard (2020) find evidence for this in the context of Mexico.

tion spells. In columns (3) and (4), I therefore analyze the number of females of fertile age (16–45 years) who report living in the same household with their intimate partner. While the point estimate on the full sample in column (3) is small and statistically insignificant, the coefficients in column (4) are larger in magnitude, statistically significant, and carry opposite signs again. The point estimate for the poor subgroup is positive and indicates an increase of 0.11 in the number of women of fertile age cohabiting with their partner (+22%). In contrast, the coefficient on the subgroup difference is negative and somewhat larger in magnitude, indicating a small decrease for the rich subgroup, if anything. This suggests that the changes in migration patterns among poor households resulted in a reunification of intimate partners at the household of origin. One possible explanation is that domestic migrants with an intimate partner left behind selected to return to the origin, while single members at origin left to go abroad instead. In other words, it suggests that the substitution of domestic with foreign migration was partly indirect and not necessarily driven by the same individual changing status from domestic to international migrant.<sup>47</sup>

Finally, I analyze the number of young children between the age of 0–5 years (i.e. those who were born only after the baseline survey). The coefficient for the full sample in column (5) is positive and relatively small. In column (6), again, we observe strong subgroup heterogeneity: the point estimate for the poor subgroup is positive and indicates an increase in the number of young children (0–5 years) of 0.13 for the mean shock (+51%). Note that the magnitude is similar to the one in column (4), which suggests that almost every couple, previously separated due to migration of the partner, turns out having had one child on average upon reunification, during the five years between baseline and follow-up. In contrast, fertility among rich households did not change. Note that the increase in the number of children is the main driver of the effect on family size among the poor subgroup (Table 8, column 2). In what follows, I provide additional results on remittances and household financial outcomes to evaluate the monetary consequences of

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<sup>47</sup>In unreported regressions, I also investigate whether household members married in reaction to the shock, so as to rule out that the increase in cohabitation was due to the formation of new partnerships. The results do not provide any evidence for this explanation.

the documented changes in migration and demographic composition.

## 5.4 Remittances and Household Finance

I first analyze how remittances responded to the changes in migration patterns and compare the results to those for household income, changes in liquid assets, and expenditure. A way to understand this exercise is to write down the household budget constraint. In period  $t$ , the household generates income  $y_t^h$  from its activities at home, receives transfers from domestic and foreign migrants  $\tau_t = \sum_s \tau_t^s$  ( $s \in \{d, f\}$ ), and adjusts its asset position  $\Delta b_t$ . Transfers are positive if there is a net inflow of remittances 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 produced a strong decrease in remittances from foreign migrants ( $\tau_t^f$ ) during the peak of the crisis in 2009/2010. Due to the timing of the DOTM survey, I do not observe the level of remittances during those years. Nevertheless, this shock to international remittance flows is well documented at the aggregate global level (Sirkeci et al., 2012), for aggregate flows to Vietnam (World Bank, 2018) as well as at the household level in Vietnam.<sup>48</sup> In what follows, I am interested in studying households' medium-term financial outcomes, as documented in the DOTM 2013 data, i.e. after demographic and labor supply adjustments, and whether  $\tau_t - \Delta b_t$  is sufficiently large to allow the household to maintain constant consumption.

The results are presented in Table 10.<sup>49</sup> Note that standard errors are large in these specifications and statistical tests are under powered. The results should only be considered suggestive. Columns (1) and (2) report the results on total remittance receipts from foreign migrants. The coefficient in column (1) is positive and large in magnitude (suggesting a 23% increase for the average shock), but statistically insignificant. In col-

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<sup>48</sup>Using the VHLSS repeated cross-sections in 2008 and 2010, I compared changes in international remittances for the full sample. The data shows that total household remittance receipts decreased from 102 USD per adult capita in 2008 to 81 USD in 2010, which amounts to a drop of around 20%. This constitutes a significant shock and its magnitude has likely been even more pronounced among the subsample of households with absent international migrants.

<sup>49</sup>Note that all variables are expressed in logarithmic US\$ (PPP) per adult capita, i.e., adjusted by the number of adult nucleus members, excluding any migrants. In unreported regressions, I also find the results to be robust to a specification with total household financial outcomes.

Table 10: Remittances and Household Financial Outcomes

LOG US\$ PC	Total remittances		Home income		Savings		Expenditure	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Shock×Post ( $\beta_1$ )	0.102 (0.115)	0.0870 (0.118)	0.0164 (0.0961)	-0.0320 (0.0840)	-0.162 (0.123)	-0.207 (0.163)	-0.0378* (0.0226)	-0.0378 (0.0255)
EDF (p-value)	0.323	0.436	0.845	0.681	0.152	0.199	0.080	0.143
Shock×Post×Rich ( $\beta_2$ )		0.0247 (0.146)		0.100 (0.138)		0.0824 (0.199)		0.0310 (0.0189)
EDF (p-value)		0.860		0.459		0.668		0.121
$\beta_1 + \beta_2 = 0$ (p-value)		0.499		0.638		0.455		0.757
Household FE	✓	✓	✓	✓	✓	✓	✓	✓
Province-Year FE	✓	✓	✓	✓	✓	✓	✓	✓
Baseline controls	✓	✓	✓	✓	✓	✓	✓	✓
Observations	993	993	993	993	993	993	993	993
Households	500	500	500	500	500	500	500	500
Cluster	26	26	26	26	26	26	26	26
$R^2$	0.683	0.683	0.677	0.678	0.618	0.619	0.659	0.685

*Source:* Author’s calculations based on DOTM panel data 2008–2013. *Note:* All variables are expressed in logarithmic US\$ (PPP) per capita, i.e., adjusted by the number of permanent adult household members excluding any migrants. Income is from labor activities within the household of origin only and net of informal transfers, such as remittances. Remittance receipts from foreign migrants by country of destination. Savings are the stock of savings in cash and kind. Each column displays the result of a separate regression based on equation 4 and 5 respectively. Number of observations slightly smaller than in previous regressions due to trimming of dependent variables. I only report the shock coefficient interacted with the *Post* dummy for the follow-up wave 2013 ( $\beta_1$  in equation 4 and 5) and the triple interaction term with the subgroup dummy ( $\beta_2$  in equation 5). Cluster robust standard errors in parenthesis. Bias corrected p-values based on the effective degrees of freedom (EDF) calculated using the "edfreg" Stata module (Young, 2016). The F-test p-value is for the null hypothesis of the net effect for the rich subgroup being zero ( $\beta_1 + \beta_2 = 0$ ). Significance level based on EDF adjusted standard errors. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1.

umn (2), the point estimate for the poor subgroup is positive as well, although somewhat smaller in magnitude. The coefficient on the subgroup difference suggests that there is no marked difference. The results appear to be consistent with those on foreign labor migration in the sense that poor households seem to be successful in increasing remittances in the medium term by sending additional members abroad.<sup>50</sup> Rich households, however, seem to also achieve higher remittances even without changing the number of labor migrants. This could be interpreted as low-skilled foreign migrants being most adversely affected during recessions, struggling longer to recover, and vice versa for higher skilled ones.

Columns (3) and (4) present the results on home income. The point estimate in column (3) is small and insignificant, suggesting a small aggregate increase, if anything.

<sup>50</sup>Due to a lack of data in the baseline survey, I cannot conduct the same test for domestic remittances, which were only collected in 2013. Regressing these cross-sectional observations on the shock measure and its interaction term with the subgroup dummy shows a negative and sizable coefficient for the poor subgroup, suggesting a decrease of around 125 USD (or 18%) for the average shock. The coefficient on the subgroup differences is positive at 30 USD, indicating a small negative correlation for the rich subgroup, if anything. This provides suggestive evidence that domestic remittances decreased in accordance with the decrease in domestic migration among poor households.

In column (4), the coefficient for poor households is small and negative, while the one for the subgroup differences is positive and sizable, suggesting a 16% increase for rich households. This is consistent with the increase in the number of working household members in Table 8 for the latter. Specifications in columns (5) and (6) capture the change in the household asset position as measured by the stock of savings in cash and kind. The coefficient on the full sample is negative, suggesting a decrease of around 37%, and the estimates in column (6) show that this is mainly driven by the poor subgroup (-48%). The coefficient on the subgroup difference is positive and, if anything, indicating a less pronounced decrease among rich households. Turning to the last specification in columns (7) and (8), the coefficient on the full sample is small, negative and marginally significant, indicating a decrease of 8% in expenditures for the average shock. In column (8), the point estimate for the poor subgroup has the same magnitude, suggesting that the aggregate decrease is completely driven by this subgroup. The point estimate for the subgroup difference is positive and of similar magnitude indicating no effect for rich households.

Taken together, these results provide suggestive evidence that poor households achieved to increase remittances in the aftermath of the crisis by allocating additional labor migrants abroad. Home income remained relatively stable among this subgroup, but their asset position deteriorated strongly ( $\Delta b_t$ ) along with a decrease in expenditures ( $c_t$ ). This is consistent with the fact that foreign migration, especially to high-income countries like the US, tends to be quite expensive for Vietnamese and requires substantial upfront investment on behalf of sending households (Hoang and Yeoh, 2015). Apart from the costs of additional migration, assets might have also been used directly to compensate for the loss of remittances during the immediate crisis, thereby contributing to the deterioration in the assets position. With respect to the household budget constraint, despite the increase in international remittances, expenditure decreases among poor households, while it remained constant among the rich subgroup. This can be interpreted as a long-term effect of the crisis in the sense that poor households had to strongly restrict expenditure

during the immediate crisis and have not achieved to fully recover yet.<sup>51</sup>

## 6 Robustness Checks

I perform a series of robustness checks that are divided into two groups for the ease of exposition: placebo tests are reported in Appendix Table A.5 and modifications to the specification of the shock measure and outcome variables in Appendix Table A.6. Starting with Table A.5, panel A presents the results when estimating equation 4 in a placebo shock setup between the years 2003 and 2008 as if the Great Recession had happened five years earlier.<sup>52</sup> Note that this is a direct test for the presence of parallel trends in the pretreatment period, i.e. before the occurrence of the Great Recession. The coefficients are small and statistically insignificant according to the EDF p-values, providing no evidence of any significant correlations between the economic shocks in destination countries and the trends in the outcome variables before the occurrence of the Great Recession.

In panel B and C, I rely on a sample of non-migrant households from the same survey and enumeration area which, by definition, had not been exposed to unemployment shocks abroad through any migrants. One way of thinking about this exercise is to test for the exogeneity of the shock measure to outcomes at the origin.<sup>53</sup> I assign those households

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<sup>51</sup>Alternatively, this pattern would also be consistent with a temporary restriction on expenditure to rebuild the stock of assets.

<sup>52</sup>In this exercise, I rely on demographic recall data from the baseline survey in order to reconstruct the main outcomes of interest at the household level in 2003. I then replicate my benchmark estimations regressing the pre-crisis household outcomes in 2003 and 2008 on the original shock measure 3. Note that there are no control variables included in this specification due to the lack of data for 2003. While recall data on continuous and high-frequency outcomes such as expenditure or working hours may be subject to strong biases, changes in demographic outcomes as represented by these variables tend to be less affected. Extensive consistency checks confirmed the high quality of the recall data used.

<sup>53</sup>One concern is that labor market shocks from abroad may transmit to Vietnam through foreign direct investment (FDI) and could cause confounding changes in domestic migrant destinations. This would lead to a violation of the identifying assumption if labor market shocks that Vietnamese migrants in, say Germany, experience are correlated with FDI shocks in the specific Vietnamese province through a German factory that employs Vietnamese domestic migrants. Provincial FDI data from the Vietnamese Statistical Yearbook between 2002 and 2010 for the two largest destinations of domestic labor migrants in Vietnam (Hanoi and Ho-Chi-Minh-City) show a steady increase in the stock of FDI over time, providing no evidence of such a correlation. Despite this, I am unable to fully control for this potentially confounding change in my econometric specification due to a lack of information about the destination of domestic migrants in the baseline survey.

the average shock of neighboring migrant households from the same enumeration area.<sup>54</sup> I then estimated equation 4 on the sample of non-migrant households to analyze the correlation of economic shocks abroad on the outcomes of non-migrant households in Vietnam. For example, in case of a direct negative effect of the Great Recession on Vietnamese domestic labor migration through a decrease in FDI, we would expect a sizable negative coefficient especially for the poor households who tend to send domestic labor migrants to work in manufacturing. The respective coefficient is close to zero (see panel B, column 4,  $\beta_1$ ) providing no evidence of such an effect. We can observe a similar picture for income and expenditure (panel C, columns 2 and 6). Reassuringly, these results suggest that foreign labor market shocks related to the Great Recession did not have a direct effect on Vietnamese households other than through households' foreign migrants at the destination.

Panel A and B of Appendix Table A.6 present the results from estimations using alternative specifications of the shock measure. The results in panel A are based on shock measure 2, which relies on destination-specific variation in unemployment rates. The coefficients in these estimations carry the same sign as in my preferred specification and are statistically significant, despite at a lower level. Note that the magnitudes of the coefficients reported here have to be adjusted by the mean of the respective shock measure to be comparable in terms of implied effects. The mean of shock measure 2 using destination-specific unemployment rates is 1.9 instead of 2.3 for my preferred specification. Adjusting for this difference shows that the implied effect of  $\beta_1$ , for example on foreign labor migration (column 6), is:  $1.9 \times 0.11 = 0.21$ , compared to  $2.3 \times 0.07 = 0.16$  (Table 4, column 4) for my preferred shock measure.

In panel B, I present the result using shock measure 3, which relies on destination-

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<sup>54</sup>Each enumeration area (EA) is constituted by small sub-village cluster 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 strongly 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. On average, there are around 3 households per EA and, in line with the sample stratification strategy, one migrant and one non-migrant household in each of them. In 40 out of 466 EAs where more than one migrant household is present, I randomly chose one of them to be matched to the non-migrant household.

age-, and gender-specific unemployment rates. Again, the coefficients carry the same signs as in my preferred specification and have similar magnitudes.<sup>55</sup> Taken together, all three specifications lead to remarkably similar implied effects. This suggests that the results from using the preferred shock measure are unlikely to be biased by educational misclassification. Therefore, I rely on the benchmark shock measure in the main results not only because of higher estimation precision, but also because it is the most conservative version of the three measures in terms of implied effects size.

In panel C, the dependent variable is specified to be the net number of the respective outcome, instead of the total number. In other words, this specification captures the change in the outcome variables between period  $t - 1$  and  $t$  for both waves in 2008 and 2013.<sup>56</sup> Again, the results are very similar, both in qualitative and quantitative terms.

Another potential concern in this empirical setting is related to sample attrition, which can be worrisome if it is correlated with the shock variable. Sample selectivity could then lead to biased estimates. To explore this potential issue, I regress a dummy equal to one for households that could not be tracked in the follow-up survey in 2013 (and zero otherwise) on my benchmark shock measure in the cross-section of households in 2008. The coefficient on the shock measure is small and statistically insignificant, providing no evidence that attrition could be a problem in this setting (coefficient: 0.0061, standard error: 0.0049).<sup>57</sup>

## 7 Conclusion

The results presented in this study document that labor market shocks abroad, which translated into income shocks at origin through remittances, led to large and heterogeneous changes in subsequent migration decisions, labor allocation, and the demographic composition among families left behind in Vietnam. Poor migrant households substituted

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<sup>55</sup>The mean of this shock variable is 3.3 and adjusting the coefficient as before shows that the implied effect of  $\beta_1$  for foreign labor migration is  $3.3 \times 0.06 = 0.2$ .

<sup>56</sup>Note that the change in the dependent variable for the baseline year 2008 is constructed using recall data from the household survey on the respective outcome 5 years ago.

<sup>57</sup>Additionally, in unreported regressions, I estimate the benchmark specification on the unbalanced household panel. The results are similar to those from the balanced benchmark regressions.

domestic migrants with international ones. These effects were driven by labor migration in particular, and new foreign migrants were predominantly female and targeted the US. The observed feminization of international migration is consistent with recent trends in East Asia and the Pacific region (Cortes, 2015; Le Goff, 2016). I find no evidence of a diversification of foreign migrant destinations at the household level which is consistent with the presence of kinship migrant networks for facilitating chain migration. The results indicate no changes in intra-household skill selection, but suggest aggregate changes as new migrants left exclusively from the subgroup with lower overall education levels. Previous migrants with intimate partners left behind sorted selectively into returning to the origin, leading to an increase in cohabitation and resulting in an increase in fertility. These results reveal that different types of migration are interrelated and jointly determine migration and development outcomes among families left behind. The findings are informative for developing countries both in the regional context and potentially in other regions with similar development and migration patterns.

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

The analysis in this article does not account for potential spillover effects. While the impact on the destination country is out of the scope of this paper, sustained immigration despite economic crises raises important questions about the impact on the host economy: where do new low-skilled newcomers work, which jobs are they doing, and how do their skills compete with those of the native population? Also, what role do host country

immigration policies play in this context and is there a case for a change in these policies? Further research is required to answer these important questions.

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