

Abundance from Abroad: Migrant Earnings and Economic Development in the Philippines*

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Abstract

How do earnings by international migrants affect development in migrant origin areas? We examine the impacts of shocks to international migrant earnings on economic outcomes across Philippine municipalities over two decades. We exploit exogenous variation in migrant earnings driven by persistent exchange rate shocks across Filipino migrant destinations due to the 1997 Asian Financial Crisis. These shocks have heterogeneous effects across municipalities on migrant earnings per capita, depending on pre-shock migrant earnings and the distribution of migrants across overseas destinations. Positive municipality-level shocks to migrant earnings lead to increases in household assets, child schooling, and entrepreneurship. These results are consistent with binding credit constraints on household investment, which are loosened as international migrant earnings opportunities improve.

Keywords: Migration, remittances, assets, entrepreneurship, schooling, labor force participation, Philippines

JEL classification: F22, J24, L26, O15, O16

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1 Introduction

International migration is a large and growing phenomenon. In 2015, 244 million people were living outside their country of birth, up from 153 million in 1990 (United Nations (2015)). Labor migration to the developed world leads to large income gains (Clemens et al. (2016)), which makes possible substantial benefits for migrants and those remaining behind in origin countries to whom migrants are connected. Much, but not all, of the gains to those left behind are due to the remittances that migrants send to their home countries. These migrant remittances to developing countries amounted to \$432 billion in 2015, a number that far exceeded official development assistance (World Bank (2016)). There has been great interest in academic and policy circles in development policies related to migration.¹

One of the most general questions in the economics of migration has to do with how migration affects economic development in migrants' areas of origin. Such local-level impacts include direct impacts on the migrant's own origin households, as well as impacts via spillovers or general equilibrium effects on non-migrant households in the local economy. There are a number of reasonable ways to frame the research question. One might ask examine the impact of variation in the rate of migration, or of changes in remittance receipts per capita in a locality. Our approach is to examine the impact of variation in international *migrant earnings per capita* across localities (total earnings of international migrants from a locality divided by the locality's population). We view this as a reasonable framing of the high-level question, since migrant earnings per capita is itself determined by the migration rate and average migrant wages, and determines the capacity of migrants to send remittances home.

We take advantage of a natural experiment that generated an exogenous shock to migrant earnings per capita across localities in the Philippines. The key event was the 1997 Asian Financial Crisis, which led to large, persistent changes in exchange rates across the many destination countries of Filipino migrants. Crucially for the analysis, these exchange rate shocks were heterogeneous across migration

¹Policy-oriented publications include Pew Hispanic Center (2002), Terry and Wilson (2005), Fajnzylber and Lopez (2007), World Bank (2006) and World Bank (2007). Yang (2011) reviews recent research on the economics of migrant remittances.

destinations. Between 1997 and 1998, the US dollar and currencies in key Middle Eastern destinations of overseas Filipino workers rose 50% in value against the Philippine peso. Over the same time period, by contrast, the currencies of Taiwan, Singapore and Japan rose by only 26%, 29% and 32%, while those of Malaysia and Korea actually fell slightly (by 1% and 4%, respectively) against the peso.

How did these exchange rate shocks lead to heterogeneous shocks to migrant earnings per capita across Philippine localities? The variation we exploit derives from two dimensions of heterogeneity across more than 900 municipalities that, in combination, we argue can be taken as plausibly exogenous. The first dimension of heterogeneity is in the pre-shock distribution of a municipality's migrants across destination countries. This heterogeneity in destinations generated heterogeneity in the size of the *destination-weighted* exchange rate shock across municipalities. A municipality with a high share of migrants earning in dollars or currencies linked to the US dollar experienced a much more positive exchange rate shock than one in which a relatively large share of migrants were in Malaysia or Korea (whose currencies depreciated substantially due to the crisis).² For example, the municipality of Dipaculao in Aurora province experienced a positive exchange rate shock of 37.2% from 1997 to 1998, while over the same period Sigma, Capiz had a much larger exchange rate shock of 46.5%.³

The second dimension of heterogeneity is in migrant earnings per capita at baseline, prior to the shock. There is a wide variation in migration rates (the share of population migrating internationally) across municipalities, and therefore wide variation in baseline migrant earnings per capita. For example, the municipality of San Narciso, Quezon had migrant earnings per capita in 1993 of just PhP 148, while in Cabanatuan City, Nueva Ecija the corresponding figure was roughly 20 times

²It is crucial for the empirical approach that origin municipalities not be able to completely flexibly adjust their migration destinations after the shock (in other words, that there be some "stickiness" in migration destinations), so that the destination-weighted exchange rate shocks have lasting effects. We empirically test and do find a degree of stickiness in migration destinations at the municipality level. This is consistent with the broader literature in the economics of migration that uses "shift-share" instruments, such as Theoharides (forthcoming), Card (2001), and many others.

³All the municipality-level shocks are positive, since most migration destination currencies appreciated against the Philippine peso. So our analysis exploits variation in the magnitude of positive destination-weighted exchange rate shocks.

larger, PhP 2,910 (as it happens, both experienced roughly the same destination-weighted exchange rate shock of 41.3%).

A municipality's shock to migrant earnings per capita is the product of these two dimensions of heterogeneity: the municipality's destination-weighted exchange rate shock multiplied by the municipality's baseline (pre-shock) migrant earnings per capita. In our analysis, we take only the product of these two dimensions of heterogeneity as exogenous, not either dimension on its own.⁴

Taking advantage of this variation in migrant earnings shocks, we examine their impacts on aggregate municipality outcomes, as observed in Census data over two decades from before to after the shock. We examine impacts on municipality migration rates, first of all, and then on municipality-level averages of household asset ownership, years of schooling of children, employment rates, and entrepreneurship. We conduct difference-in-difference analyses with a continuous "treatment" variable (the post-1997 shock to migrant earnings per capita). Regression analyses control for municipality fixed effects, year fixed effects, and time trends related to key baseline municipality characteristics. (It is important that we also control for the destination-weighted exchange rate and baseline migrant earnings per capita interacted with a post-shock indicator, so that identification comes only from the product of these two variables.)

The first step in our analysis is to show that the initial shock to municipality-level migrant earnings per capita is highly persistent over time. A measure of the immediate migrant earnings shock (over 1997-1998), is predictive of the change in migrant earnings per capita over the subsequent decade (calculated using earnings reported in 2007-2009 work contracts). This persistence arises from the fact that the exchange rate shocks themselves were highly persistent, as are migration rates and the destination-country composition at the municipality level.⁵

⁴While the weighted exchange rate shock might be plausibly taken as exogenous on its own, baseline migrant earnings per capita at the municipality level is certainly endogenous, and is associated with a number of baseline municipality characteristics.

⁵This positive impact of the shock on municipal migrant earnings per capita occurs even as the shock causes the migration *rate* (migrants as a share of population) to decline slightly. Remaining at home (rather than migrating) is likely to be a normal good, and so households appear to be responding to the gains from the positive income shock by doing slightly less international migration. This shock-induced reduction in migration is not so large, however, to prevent there from being a

We find these positive shocks to migrant earnings lead to improvements in a set of key outcomes observable in the Census data. First, there is a shift of prime-age workers from wage work into work in household enterprises (either as sole proprietors or as workers in a family enterprise). Second, we see increases in years of schooling completed by children aged 7-12 (primary school) and 13-15 (early secondary). Third, the shock leads to higher household asset ownership, whether we examine a composite measure of assets or subcomponents such as durable goods, utilities access, or property ownership.

Overall, these results suggest that, on net, localities are better off on a variety of important dimensions when international migrant earnings improve. They help assuage concerns that international migrant earnings opportunities can somehow have negative consequences for home areas due, for example, to the departure of skilled individuals for the economy (“brain drain”), lower parental time investment in children, or by creating a culture of “dependency” or reliance on remittances. The increases we see in household enterprise work, years of schooling, and assets are consistent with the existence of binding credit constraints, which are loosened as international migrant earnings opportunities improve.

This paper makes a number of distinct contributions. Most importantly, it provides plausibly strong causal identification of impacts on locality-level outcomes. The focus on locality-level outcomes is relatively rare in the migration literature, owing to substantial challenges in finding plausibly exogenous variation in migration-related right-hand-side variables of interest.⁶ The central methodological concern in such an investigation is that migrant earnings are in general not randomly allocated across localities, so that any observed relationship with development outcomes may simply reflect the influence of unobserved omitted variables.⁷ A key contribution

net increase in migrant earnings per capita in response to the shock.

⁶Previous work on the aggregate impacts of international migration on origin areas (either sub-national or national) include [Orrenius et al. \(2010\)](#), [Lopez-Cordoba \(2005\)](#), [Adams and Page \(2005\)](#), [Acosta et al. \(2008\)](#), [Dinkelman and Mariotti \(2016\)](#), [Barsbai et al \(2017\)](#), and [Theoharides \(forthcoming\)](#). [Barham and Boucher \(1998\)](#) and [McKenzie and Rapoport \(2010\)](#) have investigated impacts on income distribution in migrant home areas. In the context of internal migration, [Kinnan et al. \(2017\)](#) examine impacts of access to migration on origin areas in China.

⁷For example, areas with higher education levels could send more migrants, and also have better outcomes. Alternatively, areas that recently experienced an adverse economic shock might send migrants overseas to make up lost income, so that migration and remittances might be negatively

of our work is to identify and exploit a natural experiment that provides plausibly exogenous variation in migrant earnings across localities, and estimate its effects on locality outcomes.

In addition, this paper is the first to estimate the impact of shocks to locality-level migrant earnings on local development outcomes. To our knowledge, no previous study has had access to data on total earnings of international migrants at the locality level, which we are able to calculate with the POEA/OWWA dataset.⁸

Examining locality-level impacts is important, because it is unclear from a theoretical standpoint whether the effect of migration or migrant earnings on local-level outcomes should be positive or negative, on net, particularly once spillovers from migrant to non-migrant households and general equilibrium effects are accounted for (as we discuss further in Section 2 below). Our findings are also important from the standpoint of policy. As developing country policymakers seek to create migration policy that will foster economic development at home, it is important to determine the effects of migration not just on migrant households but on migrant sending regions more broadly.

In addition, because of unique information requirements, our work also necessitates advances related to data. First, we require detailed data on migration destinations at the migrant origin-locality level, which allows calculation of the destination-weighted exchange rate shock. Very few datasets globally have such data, and when available they are typically for relatively small survey samples, leading to imprecision in resulting estimates. We use a unique dataset, the Philippine government's administrative data on the universe of formal work contracts of Filipinos departing for temporary contract jobs internationally (the POEA/OWWA dataset). These data (which we describe further in Section 4) provide the municipality of origin of migrants on work contracts overseas. Second, the analysis requires data on the total earnings of international migrants across origin localities. Such data are even more rare in migration studies, whether in economics or other disciplines. We have migrant earnings data from the same POEA/OWWA dataset, allowing us to calculate total migrant annual earnings at the municipality level.

correlated with locality outcomes.

⁸McKenzie et al. (2014) make secondary use of the earnings data in the POEA/OWWA dataset.

This paper is organized as follows. In Section 2, we discuss relevant theoretical models that have bearing on our analyses. Section 3 provides a brief overview of Philippine international migration over the last few decades. Section 4 describes the data used in the empirical analyses, and Section 6 reports empirical results. Section 8 concludes.

2 Conceptual Issues

We are interested in understanding the long-run impact at the locality level of a positive shock to international migrant labor earnings. What possible impacts might we expect? We first consider possible impacts on migrants' origin households themselves, and then discuss spillover or general equilibrium effects. The effects we estimate in our analysis will of course encompass both types of effects.

The shocks we examine were persistent, leading to increases in household and locality-level permanent income. A change in permanent income can have substantial effects on household investment and other behaviors even with perfect financial markets, due to income effects. Various household assets (e.g., durable goods) are clearly normal goods, and it is plausible that households may also consider child human capital and small business ownership to be normal goods as well (Becker (1965), Hurst and Lusardi (2004)).

Once one allows for financial market (credit, savings, insurance) constraints, alleviation of such constraints could be another channel through which positive migrant earnings shocks could cause higher investment. When households are credit-constrained and investments for entry into new productive activities require a fixed cost, initial wealth will be positively correlated with transitions out of subsistence agriculture and negatively correlated with the marginal rate of return on investment (Lloyd-Ellis and Bernhardt (2000)). Poverty traps can emerge if there are credit constraints and the poor find investment to be too risky (Banerjee (2000), Galor and Zeira (1993), Banerjee and Newman (1993)). Improvements in capital access and insurance, both of which can be provided by international migrants,⁹ leads to an improved ability to cope with risk from idiosyncratic shocks and facilitates allocation

⁹Yang (2008a) and Yang and Choi (2007) show that migrant remittances serve an insurance role, rising when migrants' origin households or areas experience negative shocks.

of capital to the highest-return investments (Gine and Townsend (2004), Greenwood and Jovanovic (1990), Townsend and Ueda (2006).) Kaboski and Townsend (2005) find empirically that expansion of financial institutions in Thailand leads to greater asset growth, consumption smoothing, and occupational mobility. Such effects can occur even when shocks are transitory, rather than permanent. Yang (2008b) finds that positive exchange rate shocks lead to short-run increases in educational and small enterprise investments in migrants' households in the Philippines.^{10,11}

On the other hand, others have argued that resources received from overseas rarely fund productive investments, and mainly lead to higher consumption.¹² If households consider leisure to be a normal good, it could be possible for labor supply, including household entrepreneurial effort, to decline in response to a positive shock to migrant earnings income (Cox-Edwards and Rodriguez-Oreggia (2009), Hanson (2007)).

In the context of questioning whether migrant earnings are used for investment or less productive purposes in the home country, an important complication comes into play that is specific to the migration context. Migrants often differ from their remittance recipients in their preferences for how remittances should be spent. In particular, migrants may have greater preferences for investment and savings than recipient households (Ashraf et al. (2015)). A key problem, however, is asymmetry of information within the transnational household: migrants can only imperfectly monitor how remittances are used. Geographic distance between income-earners

¹⁰Yang (2008b) also examines impacts of the 1997 Asian Financial Crisis exchange rate shocks on outcomes over a 15-month post-shock period. Over this short run period, it is not clear whether households would have perceived the shock as transitory or permanent. In our current paper, looking up to 13 years after the shock, households should have recognized that the shock had a substantial persistent, permanent component.

¹¹Many studies find migration and remittance receipts to be positively correlated with various types of household investments in developing countries. For example: Brown (1994), Massey and Parrado (1998), McCormick and Wahba (2001), Dustmann and Kirchkamp (2002), Woodruff and Zenteno (2007), and Mesnard (2004) on entrepreneurship and small business investment in a variety of countries; Adams (1998) on agricultural land in Pakistan; Cox-Edwards and Ureta (2003) and Borraz (2005) on child schooling in El Salvador and Mexico, respectively; Taylor et al. (2003) on agricultural investment in China; and others. Also see Gibson and Stillman (2014) and Gibson et al. (2014).

¹²Lipton (1980), Reichert (1981), Grindle (1988), Massey et al. (1987), Ahlburg (1991), Brown and Ahlburg (1999) and references cited in Durand et al. (1996).

and their households back home makes informational problems more pervasive, and hence strategic behavior more likely, than is the case with income earned in the local economy by co-resident household members. In other words, the standard unitary model of the household with a single decision-maker maximizing aggregate household well-being seems particularly unlikely to hold for transnational households (De Laat, 2014; Chen, 2013; Genicot et al., 2014). Recent research provides evidence that asymmetric information affects remittance uses by recipients, migrants desire more control over remittance-recipient spending, and alleviating asymmetric information changes how households use remittances (Ashraf et al. (2015), Ambler et al. (2015), Ambler (2015), DeArcangelis et al. (2015), Batista and Narciso (2016), Seshan and Zubrickas (2015), Viceisza and Torero (2015), Wang et al. (forthcoming)).¹³ One may therefore raise questions as to whether increases in migrant earnings would necessarily translate into higher investment in home households and localities.

Another consideration specific to the migration context is effects due to the physical absence of migrant household members. Positive migrant earnings shocks affect outmigration and return decisions (Yang (2006), McKenzie et al. (2014), Abarcar (forthcoming), Llull (2016), Groger (2017)). When parents migrate, children in the household lose parental time investments, which may not be perfectly made up by a remaining parent or other relatives. This may be detrimental to child schooling and other outcomes (Antman (2011)). Absent migrants cannot contribute their own labor time to household enterprises, which is important in contexts with imperfect labor markets (Benjamin (1992)).

In addition to direct impacts on the origin households of international migrants, non-migrant households may also be affected by spillovers and general equilibrium effects. There may be pecuniary externalities, such as higher prices for local non-tradables due to higher demand in migrant households. Increases in outmigration or reductions in return may increase wages in skill-groups from which migrants differentially originate (Mishra (2007)).

¹³Also relevant is empirical evidence, outside of the transnational household context, that individuals often prefer to control the uses to which gifted resources are put (Batista et al. (2015), Eckel et al. (2017)).

Perhaps the most widely debated type of spillover is “brain drain”, hypothesized negative impacts due to the departure of relatively highly-skilled individuals from the local economy (Docquier and Rapoport (2012) provide a review). Migration opportunities for skilled individuals need not have negative development impacts, however, if they stimulate general investment in education in the home economy (Stark et al. (1997), Mountford (1997), Gibson and McKenzie (2011)) to gain gain access to the international labor market. Empirical evidence of such “brain gain” has been provided by Batista et al. (2012), Shrestha (2017), Chand and Clemens (2008), and Abarcar and Theoharides (2017).¹⁴

All told, then, there are a number of possible channels through which an increase in migrant earnings could affect investment outcomes (assets, entrepreneurship, and schooling) in origin localities. Not all channels imply that investment in origin localities would increase as a result. Given the theoretical ambiguity, it is important to examine empirical evidence, to which we now turn.

3 Philippine Migration: Overview

3.1 Filipino Migration

As one of the world’s largest senders of migrants and the first country to adopt temporary overseas contract migration on a large scale, the Philippines provides an excellent setting to study the effect of migrant earnings on development in the migrant’s location of origin. In 1974, the Philippine government began the Overseas Employment Program to aid Filipinos in finding work overseas due to poor economic conditions in the Philippines. Since the program’s inception, migration from the Philippines has increased dramatically, with almost 2% of the population moving abroad each year.¹⁵ Migration from the Philippines is largely temporary and legal, and occurs through licensed private recruitment agencies. Recruiting agencies legally can charge fees up to one month’s wages, but migrants incur numerous other costs prior to migrating such as travel to Manila, health checks, and passport processing. Overseas temporary contract work is the primary channel through

¹⁴See also Gibson and McKenzie (2012), Ozden and Phillips (2015), Beine et al. (2008), and Docquier et al. (2008).

¹⁵Authors’ calculations from 2010 Philippine Census.

which Filipinos migrate, and most contracts are two years in duration with many Filipinos renewing existing contracts for multiple years. Between 1992 and 2000, 83 percent of Filipinos abroad were engaged in contract work,¹⁶ with most of the rest being non-temporary workers migrating through family reunification policies or other permanent migration channels. The Philippines now serves as a model for other countries like Indonesia, Sri Lanka, and Bangladesh, who have adopted or are in the process of adopting their own temporary contract migration programs (Agu-nias, 2012; Rajan and Misha, 2007; Ray, Sinah, and Chaudhuri, 2007; World Bank, 2011).

Crucial to our identification strategy, Filipinos migrate to a wide variety of destination countries. Table 1 shows the top twenty destination countries for all Filipino migrants prior to the Asian financial crisis. Approximately 42% of migrants work in Saudi Arabia, and 16% of migrants work in Japan. The other top destinations each account for less than 10% of the total. The top 20 countries account for 97.6% of all Filipino migrants, with the other 2.41% migrating to 142 other destinations. There is also substantial heterogeneity in the wages earned by migrants in different destinations. Average annual earnings for the top 20 destination countries are shown in Column 3 of Table 2. For instance, migrants in Saudi Arabia earn, on average, 114,000 Philippine pesos per year (approximately USD 2,651), while migrants to Japan earn Php 545,000. The lowest annual earnings are in Lebanon, while the highest are in the United States.

Within the Philippines, migration is more prevalent in certain municipalities. Table 2 shows that the average municipality-level international migration rate is 2.3%. However, migration rates range from 0% of the municipality population to 24.2%. Even amongst high migration municipalities, the choice of destination varies substantially with some municipalities, for instance, sending most migrants to Saudi Arabia, while other municipalities send migrants mostly to Taiwan. This pattern is likely due to social networks and the locations of overseas recruiting agencies ([Theoharides \(forthcoming\)](#)). As a result, overseas destinations tend to be persistent: municipalities sending migrants to a certain destination in one year also

¹⁶Authors' calculation from the Survey of Overseas Filipinos (SOF), a rider survey of the Labor Force Survey in the Philippines.

tend to do so in future years. Table 2 also shows summary statistics for per capita migrant earnings at the municipality level. The average is Php1,659 (USD 38.60), and the range runs from Php510 to Php42,522.

3.2 Exchange Rate Shock

Because Filipino municipalities differ in the destination composition of their international migrants, there was substantial heterogeneity in the exchange rate shocks experienced by migrants across different municipalities following the Asian financial crisis. In July 1997, the Thai baht was devalued, setting off a series of speculative attacks on national currencies located primarily in Southeast and East Asia. The crisis was unexpected on the part of the affected countries themselves as well as financial market analysts (Radelet and Sachs, 1998), and so migrants (and their municipalities more broadly) should also have been surprised by the shock. The crisis led to the devaluation of numerous currencies throughout Southeast and East Asia, including the Philippines. As a result, the Philippine peso per foreign currency unit exchange rate changed dramatically in many of the key destinations of Filipino migrants. An increase in the exchange rate in a given destination country provides a positive income shock to Filipino migrants working in that destination. Each unit of foreign currency earned while abroad could now be converted into more Philippine pesos.

To create a measure of the exchange rate shock experienced by Philippine municipalities, we follow [Yang \(2006\)](#). For each country j , we construct the following measure of the change in the exchange rate between the year preceding July 1997 and the year preceding October 1998:

$$ERCHANGE_j = \frac{\text{Average country } j \text{ exchange rate from Oct. 1997 to Sep. 1998}}{\text{Average country } j \text{ exchange rate from Jul. 1996 to Jun. 1997}} - 1 \quad (1)$$

A 1% improvement in the exchange rate would be expressed as 0.01, whereas a 1% decline in the exchange rate would be expressed as -0.01. Exchange rate changes for the 20 major destinations of Filipino migrants are listed in Table 1, Column 4. Migrants in Saudi Arabia, Hong Kong, and the United Arab Emirates experienced positive exchange rate shocks of approximately 50%. Migrants in Japan

and Taiwan experienced positive shocks, but of a smaller magnitude. Migrants in Malaysia and South Korea actually experienced slightly negative shocks. Because of differences in migrant earnings across destinations (as shown in Column 3), even for countries with the same exchange rate shocks (Saudi Arabia and the United States, for instance), the effect of the shock on migrant earnings will vary substantially for municipalities that send migrants to Saudi Arabia compared to the United States.

We construct a municipality-level exchange rate shock as follows. Let the countries in the world where Filipino migrants work be indexed by $j \in \{1, 2, \dots, J\}$. Let n_{mj} indicate the number of migrants from municipality m that are abroad in a particular country j prior to the Asian financial crisis. The exchange rate shock measure for each municipality m is:

$$ERSHOCK_m = \frac{\sum_{j=1}^J n_{mj} ERCHANGE_j}{\sum_{j=1}^J n_{mj}} \quad (2)$$

In other words, the exchange rate shock for a municipality is the weighted average exchange rate change across those countries, with each country's exchange rate weighted by the number of the municipality's migrants in that country. We restrict the sample used in the analysis to include only those municipalities with at least one migrant prior to the Asian financial crisis since the research question of interest is about the impact of shocks on migrants' origin locations.

Figure 1 shows the exchange rates for the top ten destinations for Filipino migrants over time. The Asian financial crisis is denoted by the dashed line in 1997, and, as expected, the exchange rates are much more dispersed following the shock. Notably, the exchange rate shock is persistent, with effects persisting through the year 2010. Table 1 also illustrates the persistence of exchange rate shocks in Columns 5 and 6. Column 5 shows the percent change in the exchange rate between 1997 and 2000, while Column 6 shows the percent change between 1997 and 2010.¹⁷

¹⁷We provide statistical tests of this persistence in Appendix Table 1. In Columns 1 through 3, we regress the three-year (1997-2000) change in the exchange rate on the one-year (1997-1998) change in the exchange rate. The shocks are persistent across various subsamples (all countries, as well as only countries with large numbers of Filipino migrants). Columns 4 through 6 show the correlation

4 Data

4.1 The POEA/OWWA Dataset

To calculate the share of migrants from each municipality to a given destination country, we obtained two unique administrative datasets from agencies of the the Philippine government. The first dataset is from the government's Overseas Worker Welfare Administration (OWWA), the government agency tasked with ensuring the safety of overseas migrants and their families. All Filipinos departing on overseas work contracts are required to obtain OWWA membership prior to departure, and OWWA keeps a detailed membership database that includes both the migrant's municipality of origin as well as where details on their overseas work contracts. Using these data, we calculate migrant shares from each municipality to each destination country prior to the 197 crisis.¹⁸

We use a second administrative data set from the Philippine Overseas Employment Agency (POEA) in order to calculate per capita migrant earnings by municipality. POEA is tasked with managing work contracts of OFWs. In particular, POEA verifies that contracted wages meet minimum wages requirements (see [McKenzie et al. \(2014\)](#) for a detailed discussion) and keeps a detailed database of all wages paid to overseas migrants. Both the OWWA and POEA data include name, date of birth, destination, and gender, and so match the two datasets using probabilistic matching in order to determine the municipality of origin for all migrants in the POEA database.¹⁹ As such, we can calculate the sum total of migrant earnings from each municipality. We then divide by the municipality's population (from the 1995 Census) to obtain per capita migrant earnings.

of the 13-year (1997- 2010) and one-year exchange rates, showing that the shocks appear to persist through 2010.

¹⁸We use data from 1993 to determine migrant shares. We use 1993 because it has the fewest missing values for municipality in the OWWA data (86% non-missing) of all pre-crisis years (1992-1996).

¹⁹See data appendix in [Theoharides \(forthcoming\)](#) for more details on this matching process.

4.2 Census Data

We analyze a panel dataset of municipalities, with outcomes derived from Philippine Census data in 1990, 1995, 2000, and 2010.²⁰ The exchange rate shocks occurred in 1997, so for each municipality observation we have two pre-shock years and two post-shock years. We show summary statistics for these outcome variables in Table 2, which include migration rates, employment rates, class of employment, and average years of schooling for various age and gender groupings. Males aged 25 to 64 migrate at a slightly higher rate (2.4%) than females (2.1%), but migration is higher for 16 to 24 year old females than males (1.3% versus 0.7%). Approximately 60% of 25 to 64 year olds are employed, with about half of these individuals employed in enterprises. On average, children aged 7 to 18 have about 5 years of education. We also create pre-shock control variables using the 1990 Census.

The Philippine Census does not contain data on wealth or poverty status of households, and so it is not possible to create an aggregated measure of municipality-level poverty using the Census micro data. However, the Census does contain data on ownership of a number of durable goods, access to utilities, housing quality, and land and home ownership. We construct an index of household assets by taking the first principal component of these binary variables (Filmer and Pritchett 2001).²¹

5 Methodology

We seek to estimate the impact of municipality-level shocks to migrant earnings on municipality-level outcomes. Our regression specification is as follows:

²⁰Data are from IPUMS-International and the Philippine Statistics Authority (PSA).

²¹The loadings on the individual variables are obtained from the principal component analysis for the 1990 data, and the resulting loadings are then used to predict an asset index for 2000 and 2010. It is important to use the loadings in 1990, as the loadings themselves could be affected by the exchange rate shock and the resulting changes in migrant income. We create both an aggregate index, as well as disaggregated indices for subcategories of assets. Specifically, we create a durable goods index, a utilities index, a housing quality index, and a land ownership index. The principal component loadings are shown in Appendix Table X both for the overall index and for the subgroup indices. All loadings are positive except for wood fuel and home ownership.

$$Y_{mt} = \beta_0 + \beta_1 ERshock_m * MigEarn_{m0} * Post_t + \beta_2 ERshock_m * Post_t + \beta_3 MigEarn_{m0} * Post_t + \alpha_m + \gamma_t + X_{m0} * Trend_t + \varepsilon_{mt} \quad (3)$$

where Y_{mt} is the outcome variable of interest for municipality m in year t . $ERshock_m$ is the exchange rate shock for municipality m (equation 2 above). $Post_t$ is a dummy variable equal to 1 in 2000 and 2010 and zero otherwise. α_m are year fixed effects, γ_t year fixed effects, and ε_{mt} is the error term. $MigEarn_{m0}$ is annual migrant earnings per capita for all individuals in the municipality (based on pre-shock earnings and population). Standard errors are clustered at the level of Philippine provinces, resulting in 84 clusters. The inclusion of year and municipality fixed effects are crucial, so that estimates are purged of any association between the shocks and time-invariant locality characteristics or municipality-invariant year characteristics. X_{m0} is a vector of pre-shock (1990) municipality-level control variables,²² interacted with an annual time-trend $Trend_t$ (year of the observation minus 1990); this term captures long-running changes in outcomes that are related with baseline municipality characteristics.

The regression specification also includes $ERshock_m$ and $MigEarn_{m0}$ interacted with the indicator for $Post_t$. This is important, as we are not presuming $ERshock_m$ and $MigEarn_{m0}$ by themselves to be strictly exogenous; the interaction terms with $Post_t$ account for ongoing changes from before to after the shock that are related with municipalities' exchange rate shocks and their pre-shock migrant earnings. In particular, pre-shock migrant earnings are correlated with some important pre-shock municipality characteristics.²³ While the $ERshock_m$ variable itself has a

²²The variables in X_{m0} are all calculated using the 1990 Census, and are: school attendance rate (ages 7-18), female employment rate (ages 25-64), male employment rate (ages 25-64), share of population rural, overall asset index, share of individuals (ages 25-64) working in an enterprise, and the municipality population.

²³We explore correlations between pre-crisis characteristics and the $ERshock_m$ and $ERshock_m * MigEarn_{m0}$ variables in Appendix Table 3. In Column 1, there is not a statistically significant relationship between any of the pre-crisis characteristics and the $ERshock_m$ variable. For $ERshock_m * MigEarn_{m0}$, there is a statistically significant correlation with school attendance, share rural, the overall asset index, and the population. When we control for the baseline level of migrant earnings per capita, the coefficients decline substantially in magnitude, but still are statistically significant.

stronger claim to exogeneity, on its own the term $ERshock_m * Post_t$ is not likely to capture well the true impacts on municipalities, because the shock needs to be interacted with (pre-shock) per capita migrant earnings to represent the actual financial impact on municipalities.

Only the interaction between the municipality's destination-weighted exchange rate shock and its pre-shock per capita migrant earnings is taken to be exogenous. Therefore, our coefficient of interest β_1 on the $ERshock_m * MigEarn_{m0} * Post_t$ term. The identifying assumption is that for municipalities with the same level of per capita migrant earnings, if the exchange rate shock experienced by municipalities had all been the same in magnitude, then changes in outcomes would not have varied systematically across municipalities based on the overseas location of migrants from each municipality. While the municipality fixed effects account for differences in pre-crisis characteristics across municipalities, one potential violation of this identifying assumption might be that municipalities with more favorable shocks to migrant earnings might be trending differentially in their outcomes along certain pre-crisis characteristics from municipalities with less positive shocks to migrant earnings. Concerns of this sort about differential trending in outcomes by size of the migrant earnings shock motivates inclusion of the $X_{m0} * Trend_t$ term in the regression, in which baseline municipality characteristics are interacted with a linear time trend.²⁴

We also conduct a test of pre-shock (1990-1995) trends for a subset of outcome variables that are available in the 1995 Census. Using observations only for 1990 and 1995, we estimate equation 3 where we pretend that the shock occurred between 1990 and 1995 (setting $Post_t = 1$ in 1995 and 0 in 1990). Results are in Appendix Table 4. We find no evidence of economically substantial or statistically significant pre-shock trends in outcome variables related to our key variables of interest.

6 Results

6.1 Earnings and migration (“first stage”)

We first test that the shock variable we construct does have a lasting impact on key variables that would be the first to be affected by the shock. Even though we are

²⁴Our results are robust to inclusion or exclusion of the $X_{m0} * Trend_t$ term from the regression.

not conducting instrumental variables (IV) analyses, these might be considered to “first stage” regressions in the IV context.

First, we examine impacts on the migration rate (share of the population aged 25-64 who are international migrants). Results from estimating regressions in the form of equation 3 are in Table 3, Panel A. The coefficient on $ERshock_m * MigEarn_{m0} * Post_t$ is negative and statistically significant in all specifications for different subgroups (genders pooled, females, and males, for the age 25-64 and 16-24 age groups). The shock to migrant earnings per capita causes the migration rate to decline slightly. Remaining at home (rather than migrating) is likely to be a normal good, and so households appear to be responding to the gains from the positive income shock by doing slightly less international migration.

Given the decline in the migration rate that is induced by the shock, do migrant earnings still increase on net? We investigate this by running a regression equation 3 where the dependent variable is municipality-level migrant earnings per capita. Due to data limitations, this regression only has two observations, one prior to the shock (1993), and one post-shock (the average of 2007, 2008, and 2009 municipality-level migrant earnings).

Results are in Table 3, Panel B. In column 1, migrant earnings per capita is denominated in thousands of Philippine pesos. The coefficient on $ERshock_m * MigEarn_{m0} * Post_t$ is positive and statistically significant at the 5% level, indicating that the shock does lead migrant earnings per capita to increase overall. This shock-induced reduction in migration is not so large to prevent there from being a net increase in migrant earnings per capita overall. The magnitude of this effect is large: the coefficient indicates that each unit (PhP 1000) in earnings shock based on 1993 earnings levels translates into 25.9 units of higher migrant earnings post-shock. This magnitude is somewhat misleading, however, since Philippine migrant earnings exhibited substantial growth over this period.

An alternative approach would be to examine the impact of a one-standard-deviation change in the migrant earning shock in 1993 on standard deviations of migrant earnings in 2007-09. To do this, we norm migrant earnings in the pre-shock year (1993) by the cross-municipality mean and standard deviation in that year (subtracting the mean and dividing by the standard deviation in that year), and

then do the same for variable in the post-shock period (2007-09). This adjustment makes the regression coefficient unaffected by general changes in the scale of the outcome variables that are common across all municipalities.

Results from estimating equation 3 with the normed variables are in column 2 of Panel B. The coefficient on $ERshock_m * MigEarn_{m0} * Post_t$ remains positive and statistically significant at the 5% level. Its magnitude indicates that the shock is very persistent over roughly a decade. Rather than attenuating (which would be indicated by a coefficient less than one), if anything the shock's impact rises in magnitude: a one-standard-deviation increase in the size of the initial shock leads to 1.4-standard-deviations higher migrant earnings in 2007-09.

In column 3 of Panel B we test whether any of this increase in migrant earnings per capita is due to increased earnings *per migrant*. In this regression the dependent variable is total migrant earnings divided by number of migrants (rather than population) in the municipality. The coefficient on $ERshock_m * MigEarn_{m0} * Post_t$ is positive, but is far from statistical significance. The data are too noisy for us to say much about whether average earnings per migrant increases in response to the shock.

6.2 Assets

Having established that the increases in migrant earnings persist for at least a decade after the initial 1997 shock, we now examine changes in average household wealth. We run regressions where the dependent variable in equation 3 is the municipality average household asset index, using asset data from 1990, 2000, and 2010. This measure of assets is perhaps the best overall or summary measure of well-being to which we have access.

Results are in Table 4. The shock has a positive impact on the overall asset index (column 1) that incorporates information on all the asset types available. The coefficient on $ERshock_m * MigEarn_{m0} * Post_t$ is positive and statistically significant at the 1% level. The effect is large in magnitude: a 1-unit increase in the size of the shock (roughly 1.3 standard deviations) leads to a 1.01-unit increase in the asset index (about five-sixths of a standard deviation of the asset index).

We also estimate impacts on asset indices based on subset of assets (columns

2-5). The coefficient on $ERshock_m * MigEarn_{m0} * Post_t$ is positive in regressions for each sub-index, and statistically significant at the 1% level in three out of four, for durable goods, utilities access, and land/home ownership. The exception is the housing quality index, for which the shock variable is not significant.

6.3 Employment and Entrepreneurship

The shock leads to substantial increases in household wealth. Also of great interest is changes in employment and entrepreneurship. Do increases in international migrant earnings lead to increases in entrepreneurship in migrants' origin areas? This question is the subject of much research in the economics of migration. On the one hand, positive impacts might be expected if increases in overseas earnings help overcome financial constraints on funding for fixed costs of household enterprises, as well as providing implicit insurance to help bear entrepreneurial risks. On the other hand, increases in earnings opportunities resources overseas could actually suppress labor force participation and entrepreneurial effort at home (due to income effects and leisure being a normal good).

In Table 5, we estimate regressions where the dependent variable in equation 3 is the share of the adult population employed (in any occupation, Panel A), or employed in different types of occupations (Panel B). Because effects are likely to differ for adults (aged 25-64) and young adults (aged 16-24), we always run regressions for these age groups' outcomes separately. For each outcome, the denominator is always total population in the age group (not just population in the labor force). These outcomes are available in each of the four Census years we work with, 1990, 1995, 2000, and 2010.

In Panel A we examine overall employment rates without differentiating by occupation type. The shock has a positive impact on employment (column 1) for adults, which is driven by positive impacts on females (column 3). In both columns the coefficient on $ERshock_m * MigEarn_{m0} * Post_t$ is positive and statistically significant at the 1% level. The effects for male adults (column 5) and for young adults (columns 2, 4, and 6) are positive but not statistically significant. These results are important, indicating that from the standpoint of overall employment, positive earnings shocks have positive effects. There is no evidence at all that increases in

migrant earnings suppress employment rates in the aggregate economy of migrants' home areas.

In Panel B we turn to examining impacts on employment by type, differentiating between household enterprises and wage work outside the home. There is a positive impact of the shock to migrant earnings on employment in household enterprises, for both adults and young adults: in columns 1 and 2, the coefficient on $ERshock_m * MigEarn_{m0} * Post_t$ is positive and statistically significant at the 1% level.

In the next four columns, we examine subcategories of enterprise employment, differentiating between working as an employee in a household enterprise and being self-employed (the head of the household enterprise, whether as the sole employee or with employees). The positive effects on enterprise work for young adults are driven by being employees in a family enterprise, while for adults the increases in enterprise work are driven by being self-employed. This is a reasonable result, suggesting that adults tend to be the heads of household enterprises, and young adults work as employees in these enterprises.

It appears that these increases in enterprise work partly reflect shifts out of wage work outside the family enterprise. In columns 7 and 8, the dependent variable is working as an employee outside the family enterprise. The coefficient on $ERshock_m * MigEarn_{m0} * Post_t$ is negative and statistically significant at the 1% level for both age groups.

All told, then, the migrant earnings shock leads to overall increases in employment. This increase in employment reflects large increases in household entrepreneurial work, offset partially by a smaller decline in wage work outside the family enterprise.

6.4 Schooling

Another central household investment activity of general interest is in the education of children. In Table 6, we present results from estimating regression equation 3 where the dependent variables are average years of completed schooling, by age group, for all children and for girls and boys separately. These outcomes are available in each of the four Census years we work with, 1990, 1995, 2000, and 2010.

We find a positive effect for all children age 7-18 (column 1), but which is not

statistically significantly different from zero. When we look at narrower age groups (columns 2-4), we find positive and statistically significant effects for primary-school-aged children (age 7-12) and for lower-secondary children (age 13-15); the coefficients on $ERshock_m * MigEarn_{m0} * Post_t$ are positive and statistically significant at the 5% and 10% levels for these age groups, respectively. The coefficient in the regression for upper-secondary (age 16-18) children is actually negative, but not statistically significant. Results are very similar when we conduct the analyses separately for girls (columns 5-7) and boys (columns 8-10).

These positive impacts on the years of completed schooling for primary- and lower-secondary-aged children suggest that educational investments for children are a key priority for households in municipalities experiencing positive shocks to migrant earnings. They assuage concerns that the increases in household entrepreneurship we saw above might increase demand for child labor and lower household willingness to invest in child education.

7 Supplementary analyses

7.1 Dynamics of the effects

Our analyses so far have typically included post-shock observations for 2000 and 2010 (three and thirteen years post-shock), but have estimated average effects on outcomes across these two observations. In reality, the effects of the shock could vary over this decade-long period, so we now turn to examining the dynamics of the treatment effect.

In Table 7, we estimate a modified version of regression equation 3 where we replace the single $ERshock_m * MigEarn_{m0} * Post_t$ term with two terms, $ERshock_m * MigEarn_{m0} * Post2000_t$ and $ERshock_m * MigEarn_{m0} * Post2010_t$. The term $Post2000_t$ is 1 for observations in the year 2000, and 0 otherwise, while $Post2010_t$ is 1 for observations in the year 2010, and 0 otherwise. Coefficients on the terms $ERshock_m * MigEarn_{m0} * Post2000_t$ and $ERshock_m * MigEarn_{m0} * Post2010_t$ therefore represent the impact of the shock in 2000 and 2010, respectively. We present regressions for a selection of dependent variables from the previous tables.

The migrant earnings shock has a positive effect through both 2000 and 2010. Coefficients on each of the terms are positive and statistically significant in each

regression. We also report p-values of F-tests of the equality of the 2000 and 2010 coefficients. For the adult employment rate and the overall asset index, the coefficients are similar across the two time periods, and we cannot reject the hypothesis that they are equal at conventional statistical significance levels.

For the remaining three outcomes, we can reject at conventional levels that the 2000 and 2010 coefficients are equal to one another, but the patterns go in different directions. For adult employment in enterprises (column 2), the effect in 2010, while still statistically significant on its own, is smaller in magnitude than in 2000, suggesting an attenuation of the effect over time. For years of schooling for age 7-12 and 13-15 (columns 3 and 4), the impact is larger in 2010 than in 2000, a magnification over time.

The key takeaway is that the effects of the shock on key outcomes persists into the longer-run period (2010, thirteen years post-shock), but with heterogeneity across outcomes in whether effects are stable, attenuated, or magnified over time compared to the effects in 2000.

7.2 Internal migration

Given all these positive impacts of the shock that we observe, an important question of interpretation arises: to what extent do these impacts reflect changes in the composition of the population, driven by selective migration into and out of the shock-affected areas? This type of question is sometimes raised in the context of concerns about selection bias. However, it is also appropriate to view potential compositional changes in the population as a legitimate and interesting channel through which municipalities are changed when shocks to migrant earnings occur. Either way, it is important to understand whether municipalities receiving positive migrant earnings shocks are appear “better off” due to improvements on the part of people who never move, or due to selected in- or out-migration, or both.

As a first step in this inquiry, we examine internal migration rates. The Philippine Census includes a question on which municipality the individual lived in five years before. We use this question to construct municipality-level rates of immigration, outmigration, and net migration (outmigration minus immigration), in different age groups, and estimate regression equation 3 with these outcome variables.

Results are in Table 8. The shock clearly causes internal population movements. Most prominently, immigration results in areas receiving more positive shocks, presumably among individuals attracted by improvements in economic conditions. This immigration occurs in all age groups, from adults down to primary-school age children (Panel A, columns 1-4); coefficients on the shock variable are all statistically significant at the 5% level or better.

At the same time, there are increases in outmigration as well (columns 5-8), and coefficients are statistically significantly different from zero (at 5% level or better) for adults (aged 25-64) and school aged children (7-12 and 13-15), but not for young adults (16-24). This may reflect that the positive shock leads households to be better able to bear the fixed cost of utility-improving internal migration to another municipality, such as for economic opportunities or schooling. The positive income shock could also make households more willing to bear any risks associated with internal migration (Bryan et al. (2014)).

When it comes to net migration, the fact that both immigration and outmigration increase means that for most age groups, there is a small and statistically insignificant impact on net migration (with the exception of 16-24 year olds, who see a decline in net migration).

A key question is whether the internal population flows in response to international migrant earnings shocks are selected in some way that might affect our interpretation of the results in previous tables. For example, if immigration to municipalities experiencing more positive shocks is positively selected (e.g., among the wealthier, more entrepreneurial, or better educated), and outmigration from those same municipalities is negatively selected, then impacts in the previous tables could at least in part be due to changes in the composition of the population, rather than due solely to changes among those who have not internally migrated.

We are currently at work on investigations along these lines. The approach we are taking is to construct alternative measures of our key outcome variables that takes advantage of the Census information on location five years before. We will assign individuals to their locations 5 years prior to the year of observation (rather than to their current locations) before constructing municipality-level aggregates of our key outcomes. Whether regression estimates change, and the direction of

the change, can shed light on positive or negative selection resulting from internal migration.

8 Conclusion

How do earnings by international migrants affect development in migrant origin areas? We examine the impacts of shocks to international migrant earnings on economic outcomes across Philippine municipalities over two decades. We exploit exogenous variation in migrant earnings driven by persistent exchange rate shocks across Filipino migrant destinations due to the 1997 Asian Financial Crisis. These shocks have heterogeneous effects across municipalities on migrant earnings per capita, depending on pre-shock migrant earnings and the distribution of migrants across overseas destinations. Positive municipality-level shocks to migrant earnings lead to increases in household assets, child schooling, and entrepreneurship. These results are consistent with binding credit constraints on household investment, which are loosened as international migrant earnings opportunities improve.

Future work building on our findings would examine more deeply the mechanisms through which these positive effects on migrant-origin locations are occurring. To what extent are the impacts working via alleviation of liquidity or financing constraints, as opposed to increasing willingness to take on entrepreneurial risk due to improved informal insurance provided by international migrants? Even if on the whole employment and entrepreneurship rise in response to the migrant earnings shocks, do some subsets of the population (such as the elderly, or certain skill groups) reduce their labor supply in response? To what extent do pecuniary externalities such as demand-induced increases in nontradable (e.g., property, private schooling) prices offset the overall gains? We believe exploring such questions would be profitable avenues for future research.

References

- Abarcar, Paolo**, “The Return Motivations of Legal Permanent Migrants: Evidence from Exchange Rate Shocks and Immigrants in Australia,” *Journal of Economic Behavior and Organization*, forthcoming.
- **and Caroline Theoharides**, “The International Migration of Healthcare Professionals and the Supply of Educated Individuals Left Behind,” *Working Paper*, 2017.
- Acosta, Pablo, Cesar Calderon, Pablo Fajnzylber, and Humberto Lopez**, “What is the Impact of International Remittances on Poverty and Inequality in Latin America,” *World Development*, 2008, 36.
- Adams, R.H. and John Page**, “Do International Migration and Remittances Reduce Poverty in Developing Countries?,” *World Development*, 2005, 33.
- Ambler, K., D. Aycinena, and D. Yang**, “Channeling Remittances to Education: A Field Experiment among Migrants from El Salvador,” *Amer. Econ. J.: App. Econ.*, 2015, 7 (2), 207–232.
- Ambler, Kate**, “Don’t Tell on Me: Experimental Evidence of Asymmetric Information in Transnational Households,” *J. Development Economics*, 2015, 113.
- Antman, Francisca**, “The intergenerational effects of paternal migration on schooling and work,” *Journal of Development Economics*, 2011.
- Ashraf, N., D. Aycinena, C. Martinez, and D. Yang**, “Savings in Transnational Households: A Field Experiment among Migrants from El Salvador,” *Rev. Econ. Stat.*, 2015, 97 (2), 332–351.
- Banerjee, Abhijit**, “The Two Poverties,” *Nordic Journal of Political Economy*, 2000, 26, 129–141.
- **and Andrew Newman**, “Occupational Choice and the Process of Development,” *Journal of Political Economy*, 1993, 101, 274–298.
- Bank, The World**, *Global Economic Prospects 2006: Economic Implications of Remittances and Migration*, World Bank, 2006.
- , *Close to Home: The Development Impact of Remittances in Latin America*, World Bank, 2007.
- , “Migration and Remittances: Recent Developments and Outlook,” *Migration and Development Brief*, 2016, 26.

- Barham, Brad and Stephen Boucher**, “Migration, Remittances, and Inequality: Estimating the Net Effects of Migration on Income Distribution,” *Journal of Development Economics*, 1998, 55.
- Batista, C., A. Lacuesta, and P. Vicente**, “Testing the brain gain hypothesis: micro evidence from Cape Verde,” *Journal of Development Economics*, 2012.
- Batista, Catia and Gaia Narciso**, “Migrant Remittances and Information Flows: Evidence from a Field Experiment,” *World Bank Economic Review*, 2016.
- , **Dan Silverman, and Dean Yang**, “Directed Giving: Evidence from an Inter-Household Transfer Experiment in Mozambique,” *Journal of Economic Behavior and Organization*, 2015, 118, 2–21.
- Becker, Gary**, “A Theory of the Allocation of Time,” *Economic Journal*, September 1965, 75, 493–517.
- Beine, M., F. Docquier, and H. Rapoport**, “Brain drain and human capital formation in developing countries: winners and losers,” *Economic Journal*, 2008.
- Benjamin, Dwayne**, “Household Composition, Labor Markets, and Labor Demand: Testing for Separation in Agricultural Household Models,” *Econometrica*, 1992, 60 (2).
- Borraz, Fernando**, “Assessing the Impact of Remittances on Schooling: The Mexican Experience,” *Global Economy Journal*, 2005, 5.
- Bryan, Gharad, Shyamal Chowdhury, and Ahmed Mushfiq Mobarak**, “Underinvestment in a profitable technology: The case of seasonal migration in Bangladesh,” *Econometrica*, 2014, 82 (5), 1671–1748.
- Card, David**, “Immigrant Inflows, Native Outflows, and the Local Labor Market Impacts of Higher Immigration,” *Journal of Labor Economics*, 2001, 19 (1), pp. 22–64.
- Center, The Pew Hispanic**, *Billions in Motion: Latino Immigrants, Remittances, and Banking*, Washington DC: Pew Hispanic Center and Multilateral Investment Fund, 2002.
- Chand, S. and M. Clemens**, “Skilled emigration and skill creation: a quasi experiment,” *Working Paper*, 2008.
- Clemens, Michael A, Claudio E Montenegro, and Lant Pritchett**, “Bounding the price equivalent of migration barriers,” 2016.

- Cox-Edwards, A. and E. Rodriguez-Oreggia**, “Remittances and Labor Force Participation in Mexico: An Analysis Using Propensity Score Matching,” *World Development*, 2009, 37.
- DeArcangelis, G., M. Joxhe, D. McKenzie, E. Tiongson, and D. Yang**, “Directing Remittances to Education with Soft and Hard Commitments: Evidence from a Lab-in-the-field Experiment and New Product Take-up among Filipino Migrants in Rome,” *Journal of Economic Behavior and Organization*, 2015, 111.
- Dinkelman, T. and M. Mariotti**, “The Long Run Effect of Labor Migration on Human Capital Formation in Communities of Origin,” *American Economic Journal: Applied Economics*, 2016.
- Docquier, F. and H. Rapoport**, “Globalization, brain drain, and development,” *Journal of Economic Literature*, 2012.
- , **O. Faye, and P. Pestieau**, “Is migration a good substitute for education subsidies?,” *Journal of Development Economics*, 2008.
- Eckel, Catherine, David Herberich, and Jonathan Meer**, “A Field Experiment on Directed Giving at a Public University,” *Journal of Behavioral and Experimental Economics*, 2017, 66, 66–71.
- Fajnzylber, Pablo and J. Humberto Lopez**, *Close to Home: The Development Impact of Remittances in Latin America*, World Bank, 2007.
- Galor, O. and J. Zeira**, “Income Distribution and Macroeconomics,” *Review of Economic Studies*, 1993, 60, 35–52.
- Gibson, J. and D. McKenzie**, “Eight questions about brain drain,” *Journal of Economic Perspectives*, 2011.
- **and** – , “The economic consequences of brain drain of the best and brightest: Microeconomic evidence from five countries,” *Economic Journal*, 2012.
- **and D. McKenzie and S. Stillman**, “The Development Impact of a Best Practice Seasonal Migration Policy,” *Review of Economics and Statistics*, 2014.
- Gibson, John, David McKenzie, and Halahingano Rohorua**, “Development impacts of seasonal and temporary migration: A review of evidence from the Pacific and Southeast Asia,” *Asia & the Pacific Policy Studies*, 2014, 1 (1), 18–32.

- Gine, Xavier and Robert Townsend**, “Evaluation of Financial Liberalization: A General Equilibrium Model with Constrained Occupation Choice,” *Journal of Development Economics*, August 2004, 74 (2), 269–304.
- Greenwood, Jeremy and Boyan Jovanovic**, “Financial Development, Growth, and the Distribution of Income,” *Journal of Political Economy*, 1990, 98, 1076–1107.
- Groger, Andre**, “Easy Come, Easy Go? Economic Shocks, Labor Migration and the Family Left Behind,” *Working Paper*, 2017.
- Hanson, Gordon**, “Emigration, Remittances, and Labor Force Participation in Mexico,” *Integration and Trade Journal*, 2007, 27, 73–103.
- Hurst, E. and A. Lusardi**, “Liquidity Constraints, Household Wealth, and Entrepreneurship,” *Journal of Political Economy*, 2004, 112 (2), 319–47.
- Kaboski, Joseph and Robert Townsend**, “Policies and Impact: An Analysis of Village-Level Microfinance Institutions,” *Journal of the European Economic Association*, March 2005, 3 (1), 1–50.
- Kinnan, Cynthia, Shing-Yi Wang, and Yongxiang Wang**, “Access to Migration for Rural Households,” *Working Paper*, 2017.
- Lloyd-Ellis, Huw and Dan Bernhardt**, “Enterprise, Inequality, and Economic Development,” *Review of Economic Studies*, 2000, 67, 147–168.
- Llull, Joan**, “Understanding international migration: evidence from a new dataset of bilateral stocks (1960-2000),” *SERIES - Journal of the Spanish Economic Association*, 2016, 7 (2), 221–255.
- Lopez-Cordoba, Ernesto**, “Globalization, Migration, and Development: The Role of Mexican Migrant Remittances,” *Economia*, 2005, 6 (1).
- McKenzie, David and Hillel Rapoport**, “Self-selection patterns in Mexico-US migration: the role of migration networks,” *The Review of Economics and Statistics*, 2010, 92 (4), 811–821.
- , **Caroline Theoharides, and Dean Yang**, “Distortions in the international migrant labor market: evidence from Filipino migration and wage responses to destination country economic shocks,” *American Economic Journal: Applied Economics*, 2014, 6 (2), 49–75.

- Mishra, P.**, “Emigration and wages in source countries: Evidence from Mexico,” *Journal of Development Economics*, 2007.
- Mountford, A.**, “Can a brain drain be good for growth in the source country?,” *Journal of Development Economics*, 1997.
- Nations, The United**, *Trends in International Migrant Stock: The 2015 Revision*, UN Population Division, 2015.
- Orrenius, Pia, Madeline Zavodny, Jesus Canas, and Roberto Coronado**, “Do Remittances Boost Economic Development? Evidence from Mexican States,” *Federal Reserve Bank of Dallas Working Paper Series*, 2010, (1007).
- Ozden, C. and D. Phillips**, “What really is brain drain? Location of birth, education, and migration dynamics of African doctors,” *KNOMAD Working Paper*, 2015, (4).
- Seshan, G. and R. Zubrickas**, “Asymmetric information about migrant earnings and remittance flows,” *World Bank Economic Review*, 2015.
- Shrestha, Slesh**, “No Man Left Behind: Effects of Emigration Prospects on Educational and Labor Outcomes of Non-migrants,” *Economic Journal*, 2017.
- Stark, O., C. Helmenstein, and A. Prskawetz**, “A Brain Gain with a Brain Drain,” *Economic Letters*, 1997.
- Terry, Donald and Steven Wilson**, *Beyond Small Change: Making Migrant Remittances Count*, Inter-American Development Bank, 2005.
- Theoharides, Caroline**, “Manila to Malaysia, Quezon to Qatar: International Migration and the Effects on Origin-Country Human Capital,” *Journal of Human Resources*, forthcoming.
- Townsend, Robert and Kenichi Ueda**, “Financial Deepening, Inequality, and Growth: A Model-Based Quantitative Evaluation,” *Review of Economic Studies*, January 2006, 73 (1), 251–293.
- Viceisza, A. and M. Torero**, “To remit or not to remit, that is the question: A remittance field experiment,” *Journal of Economic Behavior and Organization*, 2015.
- Wang, S., T. Joseph, and Y. Nyarko**, “Asymmetric Information and Remittances: Evidence from Matched Administrative Data,” *American Economic Journal: Applied Economics*, forthcoming.

- Yang, Dean**, “Why do migrants return to poor countries? Evidence from Philippine migrants’ responses to exchange rate shocks,” *The Review of Economics and Statistics*, 2006, 88 (4), 715–735.
- , “Coping with Disaster: The Impact of Hurricanes on International Financial Flows, 1970-2002,” *B.E. Journal of Economic Analysis and Policy (Advances)*, 2008, 8 (1).
- , “International Migration, Remittances, and Household Investment: Evidence from Philippine Migrants’ Exchange Rate Shocks,” *Economic Journal*, 2008, 118, 591–630.
- , “Migrant Remittances,” *Journal of Economic Perspectives*, Summer 2011.
- **and HwaJung Choi**, “Are Remittances Insurance? Evidence from Rainfall Shocks in the Philippines,” *World Bank Econ. Rev.*, 2007, 21 (2), 219–248.

Figure 1: Exchange Rate Shocks Due to Asian Financial Crisis

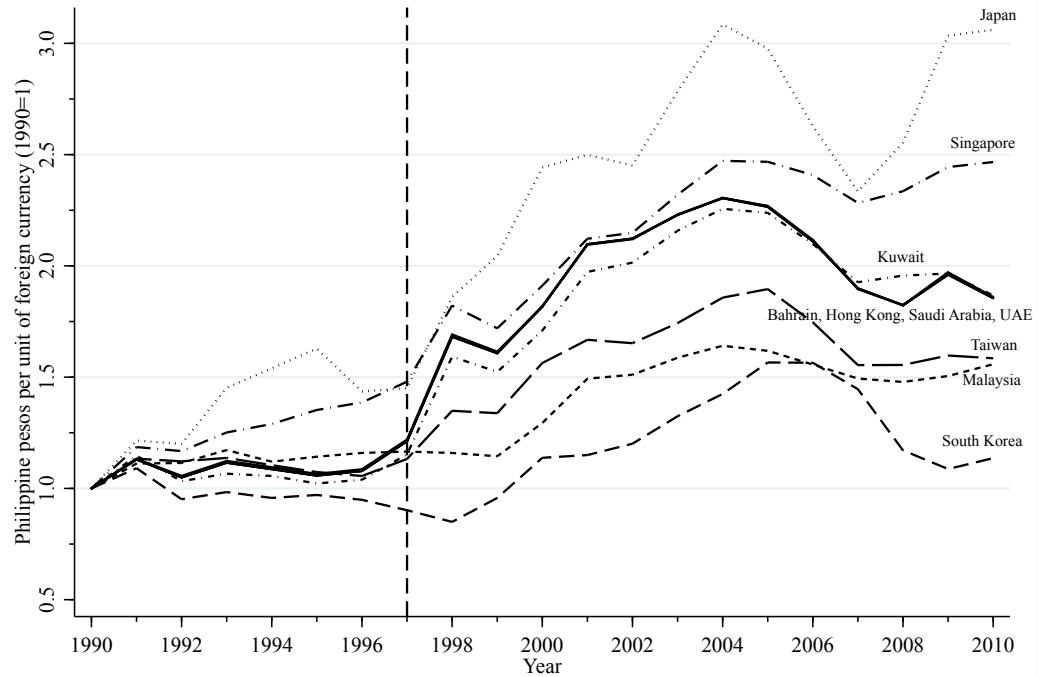


Table 1. Top 20 Locations of Filipino Migrants Prior to Asian Financial Crisis

Destination	Number of Migrants	% of Total	Average Annual			
			Earnings (Thousands of Philippine Pesos)	Exchange Rate Shock (June 1997-Oct 1998)	Exchange Rate Shock: 2000	Exchange Rate Shock: 2010
Saudi Arabia	112,402	41.85	114.38	0.52	0.69	0.72
Japan	43,202	16.09	544.95	0.32	0.70	1.13
Taiwan	22,683	8.45	159.64	0.26	0.48	0.50
Hong Kong	19,641	7.31	142.06	0.52	0.67	0.71
United Arab Emirates	15,201	5.66	92.34	0.52	0.69	0.72
Malaysia	9,949	3.70	80.83	-0.01	0.12	0.34
Singapore	6,131	2.28	91.12	0.29	0.38	0.78
Italy	5,253	1.96	185.82	0.38	0.24	0.82
Qatar	4,980	1.85	81.40	0.52	0.69	0.72
Brunei Darussalam	4,595	1.71	101.68	0.30	0.38	0.78
Kuwait	3,329	1.24	137.06	0.50	0.65	0.80
United States	3,220	1.20	711.67	0.52	0.69	0.72
Bahrain	3,130	1.17	103.06	0.52	0.69	0.72
Northern Mariana Islands	2,985	1.11	111.71	0.52	0.69	0.72
Libya	2,916	1.09	197.34	0.57	0.44	-0.41
Oman	1,325	0.49	99.86	0.52	0.69	0.72
Lebanon	921	0.34	66.45	0.55	0.76	0.79
Guam	860	0.32	489.50	0.52	0.69	0.72
South Korea	477	0.26	204.40	-0.04	0.20	0.20
India	296	0.11	142.14	0.35	0.33	0.33
Other	6,494	2.41	181.12	0.34	0.16	0.24
Total	269,990	100.00				

Notes: Number of migrants and average annual salary are calculated using data from POEA and OWWA in 1993. Other includes all migrant destinations outside the top 20, or 142 destinations. The exchange rate shock is the change in Philippine pesos per local currency unit prior to the Asian Financial Crisis. The change is defined as the percent change between July 1996 to July 1997 and October 1997 and September 1998. A 10% increase is 0.1. The exchange rate shock in 2000 and 2010 are defined as the percent change in the exchange rate between 2000 and 1997 and 2010 and 1997 respectively.

Table 2. Summary Statistics

Variable	Mean	Std. Dev.	Min	Max
Shock*Per Capita Migrant Earnings	0.698	0.740	0.018	13.718
Exchange Rate Shock	0.427	0.050	0.171	0.529
Per Capita Migrant Earnings	1.659	1.953	0.051	42.522
Migration Variables				
Total Migration Rate, age 25-64	0.023	0.019	0.000	0.242
Total Migration Rate, age 16-24	0.010	0.009	0.000	0.105
Female Migration Rate, age 25-64	0.021	0.021	0.000	0.232
Female Migration Rate, age 16-24	0.013	0.012	0.000	0.108
Male Migration Rate, age 25-64	0.024	0.023	0.000	0.252
Male Migration Rate, age 16-24	0.007	0.007	0.000	0.119
Employment Variables				
Employment Rate, age 25-64	0.604	0.112	0.086	0.993
Employment Rate, age 16-24	0.330	0.128	0.031	0.991
Female Employment Rate, age 25-64	0.339	0.162	0.033	0.990
Female Employment Rate, age 16-24	0.219	0.133	0.022	0.982
Male Employment Rate, age 25-64	0.862	0.103	0.112	1.000
Male Employment Rate, age 16-24	0.434	0.143	0.033	1.000
Self-employed, age 25-64	0.254	0.108	0.041	0.790
Employed in family work, age 25-64	0.061	0.071	0.000	0.439
Enterprise, age 25-64	0.315	0.152	0.057	0.924
Employed, not family, age 25-64	0.203	0.105	0.000	0.519
Self-employed, age 16-24	0.067	0.040	0.003	0.455
Employed in family work, age 16-24	0.079	0.116	0.000	0.791
Enterprise, age 16-24	0.146	0.133	0.003	0.900
Employed, not family, age 16-24	0.126	0.070	0.000	0.489
Years of Schooling				
Years of Schooling, age 7-18	4.944	0.630	1.457	6.371
Years of Schooling, age 7-12	2.827	0.371	0.886	3.730
Years of Schooling, age 13-15	6.488	0.692	2.113	7.866
Years of Schooling, age 16-18	8.287	1.104	2.239	11.141
Years of Schooling, Female, age 7-12	2.920	0.373	0.900	3.672
Years of Schooling, Female, age 13-15	6.733	0.674	2.217	8.193
Years of Schooling, Female, age 16-18	8.711	1.199	2.544	12.797
Years of Schooling, Male, age 7-12	2.739	0.385	0.889	3.791
Years of Schooling, Male, age 13-15	6.255	0.738	2.048	7.814
Years of Schooling, Male, age 16-18	7.891	1.187	1.908	11.786
Asset Indices				
Overall	-0.567	1.209	-3.511	3.653
Durables	-0.245	0.573	-1.883	1.881
Utilities	-0.490	0.958	-2.904	3.023
Housing Quality	-0.151	0.578	-1.857	1.441
Land Ownership	0.134	0.308	-1.041	1.050
Controls (1990)				
School Attendance Rate, 7-18	0.758	0.089	0.256	0.924
Female Employment Rate, age 25-64	0.249	0.101	0.033	0.774
Male Employment Rate, age 25-64	0.802	0.143	0.112	0.997
Share Rural	0.657	0.273	0.000	1.000
Overall Asset Index	-0.632	1.147	-2.302	3.653
Enterprise Employment	0.215	0.117	0.051	0.610
Population (in 1000s)	53.326	95.616	11.383	1662.956

Notes: All observations are at the municipality-year level. There are 945 municipalities in the sample. Age specific variables are out of the municipality population in that age group. For example, the "total migration rate, age 25-64" is defined as the number of migrants age 25-64 divided by the municipality population age 25-64.

Source: POEA, OWWA, and Census.

Table 3. First Stage Results: Effect of Migrant Earnings Shock on Earnings and Migration

<i>Panel A. Migration Rate</i>	Total		Female		Male	
	Age 25-64 (1)	Age 16-24 (2)	Age 25-64 (3)	Age 16-24 (4)	Age 25-64 (5)	Age 16-24 (6)
Shock*Per Capita Migrant Earnings*Post	-0.016*** (0.005)	-0.016*** (0.005)	-0.015** (0.007)	-0.026*** (0.009)	-0.019*** (0.005)	-0.008*** (0.002)
Shock*Post	-0.025** (0.009)	-0.003 (0.007)	-0.020 (0.015)	-0.007 (0.011)	-0.030*** (0.009)	0.000 (0.005)
Per Capita Migrant Earnings*Post	0.005*** (0.002)	0.005*** (0.002)	0.005** (0.002)	0.008*** (0.003)	0.006*** (0.002)	0.002*** (0.001)
N	3780	3780	3780	3780	3780	3780
R2	0.901	0.764	0.903	0.784	0.893	0.695
Mean Dependent Variable	0.023	0.010	0.021	0.013	0.024	0.007

<i>Panel B. Earnings</i>	Migrant Earnings Per Capita	Normed Migrant Earnings Per Capita	Average Migrant Earnings
	(1)	(2)	(3)
Shock*Per Capita Migrant Earnings*Post	25.914** (11.310)	1.424** (0.618)	426.372 (304.440)
Shock*Post	22.333* (13.184)	-0.111*** (0.040)	553.632 (404.882)
Per Capita Migrant Earnings*Post	-9.201** (3.731)	-2.176*** (0.540)	-149.967 (101.323)
N	3741	3741	3741
R2	0.343	0.516	0.284
Mean Dependent Variable	4.746	0.008	292.954

Notes: All regressions include municipality and year fixed effects, as well as baseline controls interacted with a linear time trend. Baseline controls include the school attendance rate (ages 7-18), female employment rate (ages 25-64), male employment rate (ages 25-64), share rural, overall asset index, share of individuals working in an enterprise and the municipality population (in 1000s), and are calculated using the 1990 Census. Post equals 1 in 2000 and 2010, and 0 in 1990 and 1995. Rates are calculated as the share of migrants within a given age group out of the total population within the same age group. Robust standard errors are clustered at the province level. *** indicates significance at the 1% level. ** indicates significance at the 5% level * indicates significance at the 10% level.

Source: POEA, OWWA, and Census.

Table 4. Effect of Migrant Earnings Shock on Asset Ownership

	Overall (1)	Durables (2)	Utilities (3)	Housing Quality (4)	Land/Home Ownership (5)
Shock*Per Capita Migrant Earnings*Post	1.013*** (0.134)	0.413*** (0.109)	1.104*** (0.125)	0.046 (0.097)	0.179*** (0.066)
Shock*Post	0.273 (0.452)	0.144 (0.240)	0.788** (0.369)	-0.842** (0.334)	-0.053 (0.197)
Per Capita Migrant Earnings*Post	-0.345*** (0.044)	-0.135*** (0.039)	-0.374*** (0.041)	-0.024 (0.033)	-0.065*** (0.022)
N	2835	2835	2835	2835	2835
R2	0.974	0.957	0.965	0.960	0.851
Mean Dependent Variable	-0.567	-0.245	-0.490	-0.151	0.134

Notes: All regressions include municipality and year fixed effects. All baseline controls interacted with a linear time trend included in Table 3 are included. Post equals 1 in 2000 and 2010, and 0 in 1990. Robust standard errors are clustered at the province level. Asset indices are calculated using a principal component analysis. *** indicates significance at the 1% level. ** indicates significance at the 5% level * indicates significance at the 10% level.

Source: POEA, OWWA, and Census.

Table 5. Effect of Migrant Earnings Shock on Employment and Entrepreneurship

<i>Panel A. Employment</i>	Total Employment		Female Employment		Male Employment	
	Age 25-64	Age 16-24	Age 25-64	Age 16-24	Age 25-64	Age 16-24
	(1)	(2)	(3)	(4)	(5)	(6)
Shock*Per Capita Migrant Earnings*Post	0.092*** (0.023)	0.055 (0.042)	0.148*** (0.043)	0.067 (0.045)	0.024 (0.029)	0.046 (0.044)
Shock*Post	-0.064 (0.076)	0.074 (0.089)	0.077 (0.102)	0.113 (0.095)	-0.178** (0.082)	0.043 (0.108)
Per Capita Migrant Earnings*Post	-0.034*** (0.007)	-0.020 (0.013)	-0.051*** (0.014)	-0.024* (0.014)	-0.014 (0.009)	-0.017 (0.014)
N	3780	3780	3780	3780	3780	3780
R2	0.704	0.575	0.682	0.567	0.682	0.619
Mean Dependent Variable	0.604	0.330	0.339	0.219	0.862	0.434

<i>Panel B. Type of Employment</i>	Enterprise (Self-employed + Employee, family enterprise)		Employee, family enterprise		Self-employed		Employee, not family enterprise	
	Age 25-64	Age 16-24	Age 25-64	Age 16-24	Age 25-64	Age 16-24	Age 25-64	Age 16-24
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Shock*Per Capita Migrant Earnings*Post	0.224*** (0.051)	0.160*** (0.057)	0.012 (0.019)	0.122** (0.051)	0.212*** (0.043)	0.038** (0.015)	-0.123*** (0.039)	-0.107*** (0.030)
Shock*Post	0.107 (0.108)	0.192 (0.146)	0.128** (0.061)	0.240* (0.137)	-0.021 (0.086)	-0.048 (0.037)	-0.094 (0.068)	-0.069 (0.051)
Per Capita Migrant Earnings*Post	-0.074*** (0.017)	-0.051*** (0.018)	-0.005 (0.006)	-0.038** (0.016)	-0.070*** (0.014)	-0.013** (0.005)	0.037*** (0.013)	0.034*** (0.010)
N	2835	2835	2835	2835	2835	2835	2835	2835
R2	0.867	0.804	0.789	0.772	0.803	0.664	0.881	0.794
Mean Dependent Variable	0.315	0.146	0.061	0.079	0.254	0.067	0.203	0.126

Notes: All regressions include municipality and year fixed effects. All baseline controls interacted with a linear time trend included in Table 3 are included. Post equals 1 in 2000 and 2010, and 0 in 1990 and 1995. Robust standard errors are clustered at the province level. *** indicates significance at the 1% level. ** indicates significance at the 5% level * indicates significance at the 10% level.

Source: POEA, OWWA, and Census.

Table 6. Effect of Migrant Earnings Shock on Years of Schooling, By Age

	Total				Female			Male		
	Age 7-18 (1)	Age 7-12 (2)	Age 13-15 (3)	Age 16-18 (4)	Age 7-12 (5)	Age 13-15 (6)	Age 16-18 (7)	Age 7-12 (8)	Age 13-15 (9)	Age 16-18 (10)
Shock*Per Capita Migrant Earnings*Post	0.080 (0.082)	0.188** (0.073)	0.162* (0.084)	-0.106 (0.160)	0.180** (0.083)	0.166** (0.083)	-0.048 (0.191)	0.193*** (0.070)	0.178* (0.101)	-0.227 (0.197)
Shock*Post	-0.478** (0.236)	-0.058 (0.184)	0.005 (0.169)	-0.633 (0.519)	-0.042 (0.195)	0.108 (0.172)	-0.916 (0.571)	-0.043 (0.196)	-0.048 (0.227)	-0.388 (0.634)
Per Capita Migrant Earnings*Post	-0.037 (0.026)	-0.068*** (0.023)	-0.061** (0.027)	0.029 (0.055)	-0.066** (0.027)	-0.064** (0.027)	-0.002 (0.066)	-0.069*** (0.023)	-0.065* (0.033)	0.086 (0.067)
N	3780	3780	3780	3780	3780	3780	3780	3780	3780	3780
R2	0.939	0.883	0.935	0.856	0.858	0.913	0.776	0.868	0.920	0.775
Mean Dependent Variable	4.944	2.827	6.488	8.287	2.920	6.733	8.711	2.739	6.255	7.891

Notes: All regressions include municipality and year fixed effects. All baseline controls interacted with a linear time trend included in Table 3 are included. Years of schooling variables are calculated as the average years of schooling in the province for individuals within the specified age group. Post equals 1 in 2000 and 2010, and 0 in 1990 and 1995. Robust standard errors are clustered at the province level. *** indicates significance at the 1% level. ** indicates significance at the 5% level * indicates significance at the 10% level.

Source: POEA, OWWA, and Census.

Table 7. Effects of Migrant Earnings Shock Over Time

	Employment Rate, Age 25-64 (1)	Employment in enterprise, age 25-64 (2)	Years of Schooling, age 7-12 (3)	Years of Schooling, age 13-15 (4)	Overall Asset Index (5)
Shock*Per Capita Migrant Earnings*Post 2000	0.097*** (0.026)	0.277*** (0.050)	0.167** (0.068)	0.091 (0.083)	0.984*** (0.136)
Shock*Per Capita Migrant Earnings*Post 2010	0.120*** (0.033)	0.055** (0.026)	0.274*** (0.098)	0.367*** (0.122)	0.830*** (0.206)
p-value on test of equality	0.512	0.000	0.087	0.001	0.437
N	3780	2835	3780	3780	2835
R2	0.706	0.872	0.883	0.936	0.974
Mean Dependent Variable	0.604	0.315	2.827	6.488	-0.567

Notes: All regressions include municipality and year fixed effects. All baseline controls interacted with a linear time trend included in Table 3 are included. Post2000 equals 1 in 2000 and while Post2010 equals 1 in 2010. Robust standard errors are clustered at the province level. *** indicates significance at the 1% level. ** indicates significance at the 5% level * indicates significance at the 10% level.

Source: POEA, OWWA, and Census.

Table 8. Effect of Migrant Earnings Shock on Internal Migration

<i>Panel A: Immigration and Outmigration</i>	<u>Immigration rate</u>				<u>Outmigration rate</u>			
	Age 25-64	Age 16-24	Age 7-12	Age 13-15	Age 25-64	Age 16-24	Age 7-12	Age 13-15
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Shock*Per Capita Migrant Earnings*Post	0.031** (0.012)	0.038*** (0.012)	0.028** (0.011)	0.029*** (0.011)	0.014** (0.007)	0.001 (0.006)	0.017*** (0.006)	0.014** (0.006)
Shock*Post	0.059** (0.025)	0.072*** (0.026)	0.046** (0.021)	0.054** (0.021)	0.029** (0.014)	0.024 (0.017)	0.037*** (0.013)	0.048*** (0.014)
Per Capita Migrant Earnings*Post	-0.010** (0.004)	-0.012*** (0.004)	-0.009** (0.004)	-0.010** (0.004)	-0.004* (0.002)	0.000 (0.002)	-0.005** (0.002)	-0.004** (0.002)
N	2562	2562	2562	2562	2562	2562	2561	2561
R2	0.763	0.805	0.715	0.735	0.850	0.862	0.832	0.812
Mean Dependent Variable	0.036	0.042	0.028	0.027	0.033	0.050	0.023	0.025

<i>Panel B: Net outmigration</i>	<u>Net migration rate</u>			
	Age 25-64	Age 16-24	Age 7-12	Age 13-15
	(1)	(2)	(3)	(4)
Shock*Per Capita Migrant Earnings*Post	-0.017 (0.012)	-0.037*** (0.012)	-0.011 (0.011)	-0.016 (0.011)
Shock*Post	-0.030 (0.026)	-0.048 (0.032)	-0.010 (0.021)	-0.007 (0.023)
Per Capita Migrant Earnings*Post	0.006 (0.004)	0.012*** (0.004)	0.004 (0.004)	0.006 (0.004)
N	2562	2562	2561	2561
R2	0.678	0.787	0.617	0.634
Mean Dependent Variable	-0.004	0.008	-0.005	-0.002

Notes: All regressions include municipality and year fixed effects. All baseline controls interacted with a linear time trend included in Table 3 are included. Post equals 1 in 2000 and 2010, and 0 in 1990. Robust standard errors are clustered at the province level. *** indicates significance at the 1% level. ** indicates significance at the 5% level * indicates significance at the 10% level.

Source: POEA, OWWA, and Census.

Appendix Table 1. Persistence of Exchange Rate Shock

	2000 Exchange Rate Shock			2010 Exchange Rate Shock		
	All destinations	Destinations with >1000 migrants	Destinations with >5000 migrants	All destinations	Destinations with >1000 migrants	Destinations with >5000 migrants
	(1)	(2)	(3)	(4)	(5)	(6)
1998 Exchange Rate Shock	1.194*** (0.068)	1.310*** (0.169)	0.840*** (0.117)	1.191*** (0.103)	1.034*** (0.316)	0.511*** (0.179)
N	163	41	25	163	41	25
R2	0.746	0.642	0.593	0.319	0.192	0.088

Notes: This table regresses the exchange rate shock in 2000 or 2010 on the 1998 exchange rate shock to measure persistence of the shocks. Reported coefficients are the coefficient on the 1998 exchange rate shock variable. Exchange rate shocks are defined as Philippine pesos per local currency unit exchange rate in a given year, divided by the 1997 exchange rate minus 1. Robust standard errors are in parentheses. *** indicates significance at the 1% level. ** indicates significance at the 5% level. * indicates significance at the 10% level.

Source: POEA, OWWA, and Census.

Appendix Table 2a. Persistence of Total OFW Rate

	2000 Migration Rate (1)	2010 Migration Rate (2)	2010 Migration Rate (3)	2010 Migration Rate (4)
1995 Migration Rate	0.811*** (0.044)	0.968*** (0.064)		0.631*** (0.085)
2000 Migration Rate			0.871*** (0.066)	0.415*** (0.086)
N	945	945	945	945
R2	0.586	0.690	0.627	0.749

Notes: The unit of observation is the municipality. Migration rates are the number of migrants in municipality j out of the total population in municipality j. Outcome variables are reported in the column headings. Robust standard errors are in parentheses. *** indicates significance at the 1% level. ** indicates significance at the 5% level * indicates significance at the 10% level.

Source: POEA, OWWA, and Census.

Appendix Table 2b. Persistence of Migrant Shares Over Time

Bahrain	0.386*** (0.143)
Brunei Darussalam	0.044* (0.026)
Guam	1.169*** (0.153)
Hong Kong	0.682*** (0.087)
India	-0.033*** (0.008)
Italy	0.297*** (0.060)
Japan	0.008 (0.006)
Kuwait	1.648*** (0.630)
Lebanon	-0.000 (0.000)
Libya	0.480*** (0.138)
Malaysia	0.024*** (0.008)
Northern Mariana Islands	0.010** (0.004)
Oman	0.139** (0.071)
Qatar	0.904** (0.432)
Saudi Arabia	0.279 (0.189)
Singapore	0.161 (0.140)
South Korea	0.028*** (0.007)
Taiwan	0.329** (0.127)
United Arab Emirates	1.319*** (0.471)
United States	0.007 (0.006)
p-values from SUR	0.000

Notes: The unit of observation is the municipality. N=945. Reported coefficients are from regressions of the number of migrants from locality j going to a given destination in 2009 divided by the population in locality j regressed on the the number of migrants from locality j going to a given destination in 1995 divided by the population in locality j. Results are reported for the 20 top migrant destinations in 1993. Robust standard errors are in parentheses. The bottom row of the table reports the p-value on a test of joint significance of the migrant shares in 1995 from a seemingly unrelated regression (SUR) model. *** indicates significance at the 1% level. ** indicates significance at the 5% level * indicates significance at the 10% level.

Source: POEA, OWWA, and Census.

Appendix Table 3. Correlates with shock variables

	Exchange Rate Shock (1)	Exchange Rate Shock times Migrant Earnings Per Capita (2)	Exchange Rate Shock times Migrant Earnings Per Capita
School attendance rate (ages 7-18)	-0.075 (0.052)	0.994*** (0.314)	0.234*** (0.075)
Female employment rate (ages 25-64)	-0.022 (0.028)	0.339 (0.313)	-0.024 (0.047)
Male employment rate (ages 25-64)	0.027 (0.026)	-0.470* (0.250)	-0.034 (0.032)
Share rural	-0.005 (0.010)	0.493*** (0.124)	0.077** (0.030)
Overall asset index	0.001 (0.004)	0.427*** (0.043)	0.078*** (0.022)
Rate of employment in enterprises	-0.030 (0.038)	0.043 (0.181)	0.006 (0.051)
Population (1000's)	-0.000 (0.000)	-0.000** (0.000)	-0.000** (0.000)
Migrant Earnings Per Capita			0.354*** (0.020)
N	945	945	945
R2	0.020	0.387	0.985
p-value on test of joint significance	0.302	0.000	0.024
Mean Dependent Variable	0.427	0.427	0.427

Notes: The outcome variables are indicated in the column headers, and are regressed on control variables in 1990. Robust standard errors are clustered at the province level. *** indicates significance at the 1% level. ** indicates significance at the 5% level * indicates significance at the 10% level.

Source: POEA, OWWA, and Census.

Appendix Table 4. Check for Pre-trends

	Total		Female		Male				
	Age 25-64	Age 16-24	Age 25-64	Age 16-24	Age 25-64	Age 16-24			
<i>Panel B. OFW Rate</i>									
Shock*Per Capita Migrant Earnings*Post	0.015 (0.010)	-0.002 (0.004)	0.003 (0.007)	0.027*** (0.010)	0.004 (0.014)	-0.006* (0.003)			
Shock*Post	0.018 (0.014)	0.002 (0.007)	0.004 (0.012)	0.026* (0.014)	0.010 (0.021)	0.001 (0.006)			
Per Capita Migrant Earnings*Post	-0.002 (0.003)	0.003** (0.001)	0.001 (0.002)	-0.007** (0.003)	0.003 (0.005)	0.004*** (0.001)			
N	1890	1890	1890	1890	1890	1890			
R2	0.970	0.949	0.945	0.965	0.958	0.919			
Mean Dependent Variable	0.018	0.009	0.011	0.016	0.019	0.006			
<i>Panel C. Employment Rate</i>									
	Total Employment		Female Employment		Male Employment				
	Age 25-64	Age 16-24	Age 25-64	Age 16-24	Age 25-64	Age 16-24			
Shock*Post	-0.017 (0.041)	0.072 (0.061)	0.019 (0.066)	0.071 (0.058)	-0.060** (0.024)	0.071 (0.072)			
Shock*Per Capita OFW Wages*Post	-0.138** (0.061)	-0.074 (0.130)	-0.248** (0.101)	-0.142 (0.149)	-0.068 (0.048)	0.002 (0.128)			
Per Capita OFW Wages*Post	0.006 (0.013)	-0.025 (0.019)	-0.006 (0.022)	-0.025 (0.018)	0.019** (0.008)	-0.023 (0.023)			
N	1890	1890	1890	1890	1890	1890			
R2	0.963	0.907	0.946	0.913	0.978	0.893			
Mean Dependent Variable	0.616	0.369	0.376	0.260	0.851	0.472			
<i>Panel D. Years of Schooling</i>									
	Total			Female			Male		
	Age 7-12	Age 13-15	Age 16-18	Age 7-12	Age 13-15	Age 16-18	Age 7-12	Age 13-15	Age 16-18
Shock*Per Capita Migrant Earnings*Post	0.100 (0.133)	0.276 (0.178)	-0.371 (0.416)	0.061 (0.129)	0.122 (0.200)	-0.441 (0.585)	0.138 (0.161)	0.462** (0.206)	-0.293 (0.501)
Shock*Post	0.266 (0.284)	0.410 (0.383)	-1.307 (1.013)	0.236 (0.325)	0.247 (0.451)	-0.892 (1.393)	0.317 (0.288)	0.536 (0.430)	-1.917 (1.176)
Per Capita Migrant Earnings*Post	-0.041 (0.045)	-0.092 (0.058)	0.182 (0.138)	-0.026 (0.044)	-0.034 (0.067)	0.212 (0.196)	-0.055 (0.054)	-0.160** (0.067)	0.150 (0.164)
N	1890	1890	1890	1890	1890	1890	1890	1890	1890
R2	0.888	0.952	0.890	0.858	0.929	0.823	0.878	0.941	0.836
	2.629	6.251	7.957	2.715	6.486	8.350	2.548	6.026	7.588

Notes: All regressions include municipality and year fixed effects. All baseline controls interacted with a linear time trend included in Table 3 are included. To conduct the check for pre-trends, post equals 1 in 1995 and 0 in 1990. Robust standard errors are clustered at the province level. *** indicates significance at the 1% level. ** indicates significance at the 5% level * indicates significance at the 10% level. Source: POEA, OWWA, and Census.