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Abundance from Abroad: Migrant Income and Long-Run Economic Development[†]

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We study how international migrant income prospects affect long-run development in origin areas. We leverage the 1997 Asian Financial Crisis exchange rate shocks in a shift-share identification strategy across Philippine provinces. Initial migrant income shocks are magnified six-fold over time, increasing domestic income, education levels, migrant skills, and high-skilled migration. Remarkably, 74.9 percent of long-run income gains come from domestic rather than migrant income. Trade driven impacts of exchange rate shocks are orthogonal to effects via migrant income. A structural model reveals that 19.7 percent of long-run income gains stem from educational investments. International migration fosters broad economic development in origin communities. (*JEL* F22, F31, G01, J24, J82, O15, O16)

Moving from a developing to a developed country for work generates income gains larger than those from any known economic development program (Clemens, Montenegro, and Pritchett 2019; Pritchett and Hani 2020). While international migration clearly raises incomes for migrants, evidence is scarce on how migrant income affects broader development in migrant-origin *areas*. Positive shocks to migrant income could loosen liquidity constraints on human capital and entrepreneurial investments. In addition, higher *potential* income in the international market

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could raise migration rates, and returns to education, as education facilitates overseas employment and earnings. Such investments should foster long-run growth. Evidence of these impacts would suggest that migration policy could play a larger role in global poverty reduction (Nunn 2019).

We ask how persistent increases in international migrant income prospects affect long-run economic development in migrant-origin areas. We exploit a large-scale natural experiment: persistent changes in migrant income prospects across Philippine provinces driven by exchange rate changes due to the 1997 Asian Financial Crisis. Philippine provinces differed in the pre-crisis distribution of migrant earnings across destination countries. When exchange rates shifted in 1997, overseas incomes of migrants from different provinces experienced exogenous, heterogeneous shocks that persisted. We obtained unusual Philippine government administrative data on all migrant worker contracts, with information on migrant incomes, origins, and overseas destinations. Combining the natural experiment and these unique data, we use a shift-share strategy to examine aggregate impacts of the shock on Philippine provinces up to two decades later.

Our empirical analyses implement recent advances for identification and inference in shift-share designs, following Goldsmith-Pinkham, Sorkin, and Swift (2020). The "shares" are each province's "exposure weights": pre-shock migrant income per capita from each destination, which varies greatly across provinces. For example, in 1995 migrant income per capita from Japan was 10.7 times higher in Bulacan province (3,540 Philippine pesos (PhP) per capita) than in Leyte (PhP 332).[1] Japan's exchange rate shock should, therefore, have a greater impact in Bulacan than in Leyte.

Each destination's "shift" is its exchange rate shock. Supplemental Appendix Table A1 shows shocks for the top destinations in 1997–1998, ranging from a 4 percent depreciation against the PhP (Korea) to a 57 percent appreciation (Libya). Other major destinations such as Japan and Saudi Arabia fall in between, with appreciations of 32 percent and 52 percent, respectively. These movements persisted for the next two decades. The shift-share variable is the shock to migrant income per provincial resident. We estimate its impacts on long-run provincial outcomes, and provide tests for the underlying identification assumptions discussed in the literature (Goldsmith-Pinkham et al. 2020).

We find, first, that each unit short-run shock (1997–1998) to migrant income prospects is magnified more than sixfold in the long run (through 2009–2015). A one-standard-deviation shock raises long-run migrant income by 13.9 percent, driven by both higher migration rates and higher earnings per migrant. We explore the mechanisms behind this substantial magnification with a structural model. Second, improved migrant income prospects substantially increase *domestic* Philippine income per capita (excluding migrant income or remittances) in origin provinces. Long-run domestic income rises by 6.5 percent for a one-standard-deviation increase in the migrant income shock. Reflecting broader local development, the increased domestic income is accompanied by structural change: The gain is concentrated on nonagricultural sources, and labor shares in primary sectors fall.

[1] All Philippine peso (PhP) amounts in this paper are in real 2010 pesos (PPP exchange rate 17.8 PhP/USD).

A province's "global income" per capita is the sum of its domestic and (international) migrant income per capita. Of the long-run global income increase, 74.9 percent comes from domestic income and 25.1 percent from migrant income. Household expenditure per capita rises accordingly. These gains emerge gradually over two decades after the 1997 shocks, reflecting persistence in both exchange rate changes and migrant income sources. The magnitude of the gains is nontrivial. A one-standard-deviation shock raises global income per capita 12–18 years later by PhP 2,265 (0.2 standard deviations).

We carefully examine threats to causal identification, particularly whether our shift-share variable captures effects on international trade flows rather than migrant income. Exchange rate shocks from the 1997 Crisis could affect imports and exports, which in turn might influence provincial outcomes. We investigate whether impacts of our migrant-income shift-share variable operate via impacts on international trade. We construct additional shift-share variables capturing the exposure of provinces to exchange rate shocks affecting imports and exports. The trade shift-share variables exploit (pre-1997) variation in exchange rate shocks in trading partners, in combination with province-level employment shares in import and export industries. Our results are robust to controlling for these trade shift-share variables, which suggests that our estimates primarily reflect impacts due to changes in potential migrant income.

We also show that province-level exports are unresponsive to migrant income shocks, local price changes are unlikely to bias results, findings are robust to various controls, and foreign direct investment (FDI) is not a relevant channel. Together, these results confirm that the shocks operate through migrant income rather than alternative mechanisms.

Throughout, we provide two additional categories of tests of the credibility of our causal claims. First, we test whether changes in the pre-shock period ("pre-trends") correlate with future values of the shift-share variable. We find no evidence of pre-trends, ameliorating concerns of differential trends in development outcomes. Second, we consider potential omitted variables. Our estimates are not sensitive to controls for ongoing trends or heterogeneity in exposure to the Asian Financial Crisis tied to baseline characteristics such as industrial structure and development status.

We provide further insights into mechanisms and effect magnitudes with the help of a simple structural model. We use the model to quantify the contribution of various channels, and rationalize the magnification of the income gains. We augment a gravity model of migration (Llull 2018; Bryan and Morten 2019; Lagakos, Mobarak, and Waugh 2023) to allow workers to make educational investments and enter skilled occupations. Persistent positive migrant income shocks alleviate constraints on such investments, and increase the return to migration.

Given the central role of skill, we estimate impacts on education. We find large positive effects: A one-standard-deviation migrant income shock increases the college-educated share by 0.42 percentage points (0.11 standard deviation). These skill increases are accompanied by a larger share of college-educated migrants, new high-skilled emigration, and higher migrant salaries.

Educational investments account for 19.7 percent of the increase in global income per capita. The model explains 89 percent of the six-fold magnification of

the migrant income effects, derived from higher educational investments, rising skill levels, and changing migration patterns. We also provide a framework to understand the plausibility of our estimated effects on domestic income. A reasonable set of assumptions on the share of migrant income remitted to origin economies, the multiplier on remittances, and the return on entrepreneurial investments can yield the observed long-run increase in domestic income.

Our study is made possible by two unusual elements. First, heterogeneous provincial exposure to the 1997 Asian Financial Crisis generates the persistent variation central to our shift-share identification strategy.[2] Second, we obtained unusual Philippine government administrative data on migrant worker contracts. Without these data, provincial exposure weights ("shares" in the shift-share) would be unobservable, making the shift-share strategy impossible.

We contribute to research on the economic impacts of international migration opportunities on developing-country populations, in particular impacts on the origin *areas* of migrants. Prior research establishes impacts of migrant economic conditions or opportunities on migrants' origin *households*.[3] We contribute most directly to recent research on impacts of international migration on migrant-origin *areas*, emphasizing causal identification. Related work studies the Philippines (Theoharides 2020; Godlonton and Theoharides 2024), South Africa (Dinkelman and Mariotti 2016; Dinkelman, Kumchulesi, and Mariotti forthcoming), Mexico (Caballero, Cadena, and Kovak 2023; Bucheli and Fontenla 2025), and Europe (Giesing and Laurentsyeva 2018; Anelli et al. 2023; Dustmann, Frattini, and Rosso 2015; Elsner 2013).[4]

A key feature of our paper is its focus on formal, legal migrant labor. Government-regulated migration is highly relevant to policy, with many developing-country governments actively promoting it (see Section I). Evidence on how such flows affect origin-area development is therefore of direct interest to policymakers.

This paper has several distinguishing features, compared to prior research. First, we examine long-run impacts, up to two decades after the initial shock. Dinkelman and Mariotti (2016) and Dinkelman, Kumchulesi, and Mariotti (forthcoming) also study long-run effects, but their causal factor is a brief historical episode of migrant work that did not persist. By contrast, we study changes to migrant income and migrant flows with long-run persistence. This allows us to examine how resulting investments in education initiate a virtuous cycle of migration, enabling high-skilled future migration, and subsequent increases in future migrant income. Indeed, by exploiting persistent exogenous variation in migrant income opportunities, we answer a fundamental question in the economics of migration: Do origin areas with persistent access to high-income migration opportunities develop faster than origin areas with less attractive migration opportunities?

[2] Prior studies have exploited international migrants' exchange rate shocks to study impacts on migrants and their origin households (Yang 2006, 2008a; Kirdar 2009; Nekoei 2013; Abarcar 2017; Dustmann, Ku, and Surovtseva 2024).

[3] Such prior works include Dustmann and Kirchkamp (2002); Yang (2008b); Gibson, McKenzie, and Stillman (2010, 2011); Mendola (2012); Gibson and McKenzie (2014); Clemens and Tiongson (2017); Gröger (2019); Cuadros-Menaca and Gaduh (2020); Mobarak, Sharif, and Shrestha (2023); and Bossavie et al. (2021).

[4] There are also related studies of *internal* (within-country) migration impacts on origin areas (Kinnan, Wang, and Wang 2018; Akram, Chowdhury, and Mobarak 2017; Buller and Kleemans 2025; Zheng et al. 2022).

In addition, our work is distinct in simultaneously examining impacts on migrant, domestic, and global income, due to our novel data. We find that the vast majority of long-run gains are from increases in domestic income. Finally, we contribute by complementing our reduced-form estimates with a structural approach. The model clarifies mechanisms, quantifies the long-run magnification of gains, and helps assess the plausibility of the estimated magnitudes.

Our findings speak to recent work finding positive impacts of asset transfers to catalyze household enterprises (de Mel, McKenzie, and Woodruff 2008; Banerjee et al. 2015; Bandiera et al. 2017; Banerjee, Duflo, and Sharma 2021), and evidence of poverty traps (Balboni et al. 2021; Kaboski et al. 2022). In contrast to short-term, unearned transfers, we leverage persistent increases in migrant income opportunities. The variation we study could have long-run impacts, in part, by enabling escapes from poverty traps. Much of our domestic income gains come from household enterprises, suggesting that migration policy is an effective tool in the antipoverty tool kit.

We also contribute to research on the impacts of migration prospects on skill composition. Our conclusions concord with prior findings that migration leads to "brain gain," stimulating educational investments, and raising skill levels back home (Stark, Helmenstein, and Prskawetz 1997; Mountford 1997).[5] This contrasts with studies finding migration reduces schooling investments (McKenzie and Rapoport 2011; de Brauw and Giles 2017; Tang et al. 2022). We add to this literature by illustrating that increases in education may generate a virtuous cycle, leading to higher-skilled future migration, which in turn raises incomes and education levels.

I. Context: International Labor Migration and the Crisis

In 2019, 210 million individuals from developing countries were international migrants. The largest source countries of international labor migrants are India, Mexico, and China; Bangladesh, Pakistan, the Philippines, and Indonesia also send substantial numbers abroad (United Nations 2019a). Moving from a developing to developed country for work is associated with substantial income gains for migrants (Clemens, Montenegro, and Pritchett 2019). Gibson et al. (2018); Mobarak, Sharif, and Shrestha (2023); and Gaikwad, Hanson, and Tóth (2024) find that random assignment to international migrant work opportunities leads to improved migrant income, and better outcomes for migrants and their origin households. Income gains from increased international migration are orders of magnitude larger than the likely impacts of further liberalization of international trade or capital flows, or of *in situ* efforts to raise domestic incomes in developing countries (Clemens 2011; Pritchett and Hani 2020).

Motivated by these gains, most developing country governments facilitate their citizens' international labor migration. We tabulated data on government policies on outbound international migration collected by United Nations (2019b). Out of

[5] Such studies include Batista, Lacuesta, and Vicente (2012); Docquier and Rapoport (2012); Clemens and Tiongson (2017); Shrestha (2017); Theoharides (2018); Chand and Clemens (2023); Khanna and Morales (2023); Abarcar and Theoharides (2024); and Fernández Sánchez (forthcoming). See Batista et al. (2025) for a review.

the 70 developing countries with populations exceeding 1 million, 94 percent have a dedicated government agency implementing migration policy; 88 percent have a dedicated government agency for overseas employment, citizens abroad, or diaspora engagement; and 78 percent have policies promoting migrant remittances.

In the Philippines, two government agencies facilitate international labor migration during our study period. The Philippine Overseas Employment Administration (POEA) regulates migrant recruitment, issuing operating licenses to recruitment agencies and reviewing and approving migrant work contracts. The Overseas Workers Welfare Administration (OWWA) works to ensure the well-being of overseas Filipino workers (OFWs) and their families. It intercedes (via Philippine consulates worldwide) for workers experiencing abuse or contract violations, repatriates workers in conflict zones, assists migrant families in hardship, and facilitates the return and "reintegration" of migrant workers to the Philippines. POEA and OWWA are the sources of the contract data we use.[6]

In recent decades, increasing shares of the Philippine population have migrated, had a household member migrate, or had overseas income. From 1990 to 2015, the fraction of the population currently overseas rose from 0.7 percent to 2.2 percent, and the fraction of households with an overseas migrant member rose from 3.2 percent to 7.5 percent. The share of households with overseas income rose from 16.6 percent in 1991 to 29.7 percent in 2018.[7] The vast majority of migration outflows from the Philippines is migration for temporary, legal work by workers who expect to return to their origin areas after one or more labor contracts. Approximately 60 percent of contract migrants are female, and migrants work in a wide range of destination countries across Asia and the Middle East, as well as in Canada and Europe (see Table A1).

Migrant income in the Philippines comes from numerous overseas destinations, and migrant destinations vary substantially across origin provinces. Such origin-destination migration corridors are highly persistent due to migrant networks resulting from both social connections and migrant recruitment agencies. Table A1 shows the top 20 migrant destinations, ranked by mean "exposure weight" across provinces (1995 migrant income per capita, for province-destination dyads). Our empirical approach exploits the fact that, for each destination, there is substantial variation in the exposure weight across provinces.

Asian Financial Crisis: The 1997 Asian Financial Crisis was largely unanticipated by policymakers, international organizations, and financial markets (Radelet and Sachs 2000). The crisis began in Thailand in July 1997 and rapidly spread across East Asia, triggering sharp currency depreciations, capital flight, and economic contractions throughout the region. The Philippines experienced significant economic

[6]There are several prominent examples of government agencies facilitating temporary contract migration in other developing countries. In Pakistan, the Bureau of Emigration and Overseas Employment regulates and licenses recruitment agencies. The Ministry of Labor, Migration, and Employment of the Population in Tajikistan regulates migration and facilitates job matching. Agencies in Bangladesh (the Bureau of Manpower, Employment, and Training and the Welfare Fund for Migrant Workers) and in Indonesia (the National Authority for the Placement and Protection of Indonesian Overseas Workers) play similar roles to the Philippines' migration agencies. Such migration flows differ from the case of migration between, for example, Mexico and the United States, where such temporary visas are largely limited to agricultural work and are small in scope.

[7]Overseas income includes cash received from family members abroad and cash gifts from abroad (97 percent) as well as pensions (2.7 percent) and investment income from abroad (0.57 percent).

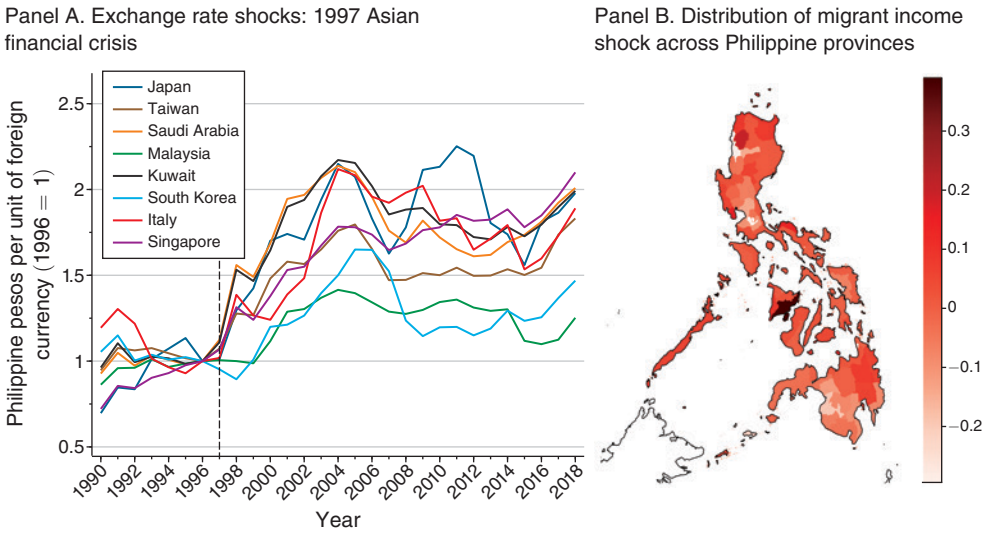

FIGURE 1

Notes: Left panel shows exchange rate changes for selected countries. Data are from World Development Indicators (World Bank 2024), annual average nominal exchange rates in units of foreign currency per Philippine peso, normalized to 1 in 1996, for 8 large sources of international migrant income for Philippine provinces. Vertical dashed line indicates 1997 (year of the Financial Crisis). The right panel shows the spatial variation in province-o shift-share variable (migrant income shock) $Shiftshare_o = MigInc_{o0}\ Rshock_o$ after partialling out weighted average exchange rate shock $Rshock_o$ and pre-shock migrant income per capita $MigInc_{o0}$, for 74 Philippine provinces. See Section IV and Supplemental Appendix Section C.2 for details.

disruption, with GDP contracting by 0.6 percent in 1998, inflation rising sharply, and the peso depreciating by approximately 40 percent against the US dollar (Park and Lee 2002). However, the Philippines was less severely affected than neighboring countries like Thailand, Indonesia, and South Korea, in part due to more conservative banking practices and lower levels of short-term foreign debt. While the real economic effects of the crisis were relatively short-lived—with most affected countries experiencing rapid recovery by 1999–2000—the exchange rate changes proved highly persistent.[8] Figure 1, panel A shows nominal exchange rates (foreign currency units per PhP, normalized to 1 in 1996) for eight major destinations. These exchange rate movements have a clear persistence over the next two decades, as discussed further in Supplemental Appendix Section B.3. The unanticipated nature of the initial shocks, combined with the province-level exposure, generates spatial variation in the shift-share variable across provinces, as we show in Figure 1, panel B. This provides the foundation for our identification strategy.

[8] During the crisis, the various country central banks, and the Asian Development Bank (Rana 1998) acknowledged that their currencies were pegged either "too high" or "too low." Allowing the exchange rates to correct and to float was the suggested solution, which later reports claim helped the speedy recovery (Park and Lee 2002). There was a short-term change in capital flows from various countries. While the real economies recovered rapidly, the exchange rates stayed persistently at their new level.

II. Data and Measurement

We summarize data sources here; details are in Supplemental Appendix A. We examine outcomes of 74 Philippine provinces.[9]

A. *Migrant Contract Data for Construction of Exposure Shares*

Our shift-share research design requires data on migrant income per capita of each Philippine province (indexed o) from every migrant overseas destination (d), prior to the 1997 crisis. These data constitute the exposure shares (a.k.a., exposure weights ω_{do0}) in the shift-share variable $Shiftshare_o$ (defined in Section IIIA below). A key challenge is that these data are not available in any Philippine censuses or surveys. In general, data on migrant income flows from the full set of overseas migrant destinations to specific subnational areas (e.g., Philippine provinces) are very rare in any context worldwide. Our access to data for measuring these exposure shares for Philippine provinces is one of the key innovations of our paper, making possible our shift-share research design.

We estimate exposure weights ω_{do0} using two administrative datasets we obtained from Philippine government agencies, OWWA and POEA (POEA2009; OWWA 2012). The OWWA dataset contains the Philippine home address of individuals departing on overseas work contracts. The POEA dataset provides data on migrant income and occupation. Both the OWWA and POEA data include name, date of birth, destination, and gender. The two datasets were matched to determine migrant-origin province in the POEA database (Theoharides 2018a,b), allowing us to estimate ω_{do0}.

B. *Exchange Rate Data*

Data for the exchange rate shock $\tilde{\Delta}R_d$ in $Shiftshare_o$ comes from Bloomberg LP (Bloomberg 1990–2002). As we discuss in Subsection IIIA, our shift-share variable uses only the immediate, short-run change in exchange rates. We calculate the short-run exchange rate change, $\tilde{\Delta}R_d$, as the proportional change in the average exchange rate (foreign currency per PhP) from immediately before (mean from July 1996–June 1997) to immediately after (mean from September 1997–October 1998) the shock (e.g., a 10 percent appreciation of the foreign currency against the Philippine peso is 0.1).

C. *Outcome Data*

Provincial mean household income and expenditure per capita are available from the Family Income and Expenditure Survey (FIES), conducted every three years by the Philippine Statistics Authority (PSA) (PSA 1985–2018). Each triennial FIES round samples roughly 40,000 households nationwide. We use up to twelve rounds of the FIES from 1985 to 2018 (inclusive), covering up to four pre-shock

[9] To deal with changes in provincial definitions and borders, we combine geographic areas and work with a consistent definition of 74 provinces with borders as they were defined in 1990.

observations (prior to 1997), the "partially treated" 1997 observation, and up to seven post-shock observations for each province.

Key outcomes include migrant income, domestic income, and (their sum) global income per capita. We analyze these outcomes at the same triennial frequency as the FIES, the data source for domestic income. The POEA/OWWA contract data (POEA 2009; 2012; OWWA 2017) are available for fewer years, and also have missing data on migrant origin address in the early-to-mid 2000s (details in Supplemental Appendix A), preventing us from calculating migrant income in 2000, 2003, and 2006. It is also not available after 2016. Analyses of migrant, domestic, and global income therefore involve the following triennial periods: 1994, 1997, 2009, 2012, and 2015. Also in triennial periods, we examine secondary outcomes such as average migrant salaries, migrant contracts as a share of province population (by occupation), and domestic income subcomponents (wage, entrepreneurial, other). Income and expenditure outcomes are in 2010 real Philippine pesos (17.8 PhP/US$ PPP).

We also examine impacts on provincial educational attainment and migrant worker share in population from six rounds of the Philippine Census of Population (1990, 1995, 2000, 2007, 2010, and 2015) (NSO 1990; NSO 1995; NSO 2000; NSO 2007; NSO 2010; PSA 2015). Further, we examine share of the workforce in different sectors from four rounds of the census where this information is available (1990, 1995, 2000, 2010).

III. Empirical Approach

Our goal is to estimate the impact of migrant income on development outcomes in Philippine provinces. As is well known, simply regressing (say) provincial domestic income per capita on migrant income per capita in a panel regression with province and year fixed effects would not yield a credible estimate of the causal effect of migrant income. First, there may be reverse causation: Higher domestic income may lead to more migrant income. Omitted variable bias is also a concern. For example, provinces with more college graduates may have both higher domestic income and higher migrant income, but this does not mean that more migrant income causes higher domestic income.

To alleviate such concerns, it is important to identify a source of exogenous variation in migrant income. We take an "exogenous shares" shift-share approach to causal identification, following Goldsmith-Pinkham, Sorkin, and Swift (2020). We first derive our regression equation. We then discuss causal identification, and the temporal persistence of the shock measured by our shift-share variable.

A. *Regression Equation*

Our independent (right-hand-side) variable of interest measures the shock to migrant income prospects in the province. The measure takes into account that migrants and their income are unevenly spread across overseas destinations, exchange rate shocks varied across the overseas destinations, and provinces varied in their baseline (pre-shock) share of migrant income in overall province income.

First, we define the average exchange rate shock affecting a province's overall migrant income, $Rshock_o$, as the weighted average exchange rate shock in province o, where the weights are pre-shock shares of migrant income from each destination d:

$$(1) \qquad Rshock_o = \frac{\sum_d \omega_{do0} \tilde{\Delta} R_d}{\sum_d \omega_{do0}}.$$

$\tilde{\Delta} R_d$ is the fractional change in the destination-d exchange rate from before to after the crisis (e.g., a 10 percent appreciation against the Philippine peso is 0.1).[10]

ω_{do0} is province o's pre-shock aggregate migrant income from destination d, divided by province population to yield a per capita measure. The sum (across destinations d) of the ω_{do0} terms gives province o's migrant income per capita from all destinations; dividing by this term makes $Rshock_o$ a weighted average of the $\tilde{\Delta} R_d$ terms.

$Rshock_o$ measures the weighted-average exchange rate shock experienced by a province (with weights reflecting the distribution of the province's migrant income across destinations). However, provinces vary in the magnitude of their aggregate migrant income per capita. The larger a province's migrant income per capita, the larger the likely impact of the exchange rate shock $Rshock_o$ on the dependent variable (e.g., expenditure per capita). A regression equation that captures this difference in exposure would include an interaction term between $Rshock_o$ and pre-shock migrant income per capita (from all destinations), $MigInc_{o0}$. $MigInc_{o0}$ is defined as simply the sum of the ω_{do0} terms across destinations d for each province o:

$$(2) \qquad MigInc_{o0} = \sum_d \omega_{do0}.$$

The interaction of $Rshock_o$ and $MigInc_{o0}$ is our right-hand-side variable of interest. The interaction term $Rshock_o \times MigInc_{o0}$ can also be interpreted as a "shift-share" variable, $Shiftshare_o$:

$$(3) \; Shiftshare_o = Rshock_o \times MigInc_{o0} = \frac{\sum_d \omega_{do0} \tilde{\Delta} R_d}{\sum_d \omega_{do0}} \times \sum_d \omega_{do0} = \sum_d \omega_{do0} \tilde{\Delta} R_d.$$

In this shift-share interpretation of the interaction term, the "shifts" in the shift-share are the destination-d exchange rate shocks $\tilde{\Delta} R_d$. Exchange rate shocks $\tilde{\Delta} R_d$ affect a province-o resident in proportion to the magnitude of migrant income per capita coming from destination d prior to the crisis.

The ω_{do0} term serves as the "share" in the shift-share and captures the average extent to which a province-o resident is exposed to a destination-d exchange rate shock. We refer to the ω_{do0} terms as "exposure weights".[11]

[10] In practice, we define this as the fractional change between the mean exchange rate during the pre-shock period, July 1996 to June 1997, and the mean exchange rate during the post-shock period, October 1997 to September 1998.

[11] Borusyak, Hull, and Jaravel (2022) call these terms "exposure shares", but we also interchangeably refer to them as "exposure weights" since they are not shares in our application. Because the sum of our ω_{do0} across destinations (within origins) is not one, we are in the "incomplete shares" case.

$Shiftshare_o$ is the predicted change in province-o migrant income per capita due to the 1997 exchange rate shocks. In this formulation, each destination-d exchange rate shock $\tilde{\Delta}R_d$ is multiplied by the corresponding exposure weight ω_{do0}, and then summed across destinations d.

$Shiftshare_o$ (equivalent to the interaction term $Rshock_o \times MigInc_{o0}$) will be our right-hand-side (causal) variable of interest. In Supplemental Appendix C.2, we derive this shift-share variable from a simple theoretical model of migration, which we then use to quantify mechanisms and gauge the plausibility of effect magnitudes.

We estimate the following two-way fixed effects regression equation:

$$y_{ot} = \alpha_o + \gamma_t + \beta_1 Shiftshare_o \times Post_t + \boldsymbol{\lambda}' MigInc_{o0} \times \mathbf{D}_t + \boldsymbol{\phi}' Rshock_o \times \mathbf{D}_t + \boldsymbol{\delta}' \mathbf{X}_{o0} \times Post_t + \varepsilon_{ot}. \tag{4}$$

y_{ot} is a dependent variable of interest (such as domestic income per capita) for province-o in period-t. Province fixed effects α_o capture time-invariant characteristics of provinces that affect the dependent variable. Period fixed effects γ_t account for effects common to all provinces in the same time period. We also include $\mathbf{X}_{o0} \times Post_t$, a vector of pre-shock province-level characteristics interacted with the post-shock indicator; this captures any post-shock effects that are predictable by a province's pre-shock (baseline) characteristics.

$Shiftshare_o$ is interacted with $Post_t$, an indicator for periods after 1997, because the exchange rate shocks embodied in $Rshock_o$ occurred in 1997. This is the key independent variable of interest. It measures the predicted change in a province's migrant income per capita due to the 1997 Asian Financial Crisis exchange rate shocks.

As is standard practice (Brambor, Clark, and Golder 2006; Angrist and Pischke 2009), changes over time associated with the interaction term components ($Rshock_o$ and $MigInc_{o0}$) must also be controlled for in the regression to ensure proper interpretation of the interaction term coefficient (reflecting the additional interaction effect over and above any direct effects). We flexibly account for time effects associated with $MigInc_{o0}$ and $Rshock_o$ by interacting each with the full vector of period fixed effects $\mathbf{D}_t$. (This set of terms absorbs interactions of $Rshock_o$ and $MigInc_{o0}$ with $Post_t$).[12] Inclusion in the regression of $MigInc_{o0} \times \mathbf{D}_t$ and $Rshock_o \times \mathbf{D}_t$ accounts for changes from before to after the shock related to $MigInc_{o0}$ and $Rshock_o$. Identification of β_1 therefore derives solely from the interaction between $MigInc_{o0}$ and $Rshock_o$ embodied in $Shiftshare_o \times Post_t$.

[12] It is essential to interact the sum of exposure weights ("sum of exposure shares" in Borusyak, Hull, and Jaravel 2022) $MigInc_{o0}$ with period indicators in shift-share designs with incomplete shares and panel data. Time period fixed effects (the vector $\mathbf{D}_t$) alone will not isolate variation in the shock within periods. $MigInc_{o0} \times \mathbf{D}_t$ accounts for any time-period effects that vary according to $MigInc_{o0}$. We do the same with $Rshock_o$, interacting it with each time period fixed effect.

B. *Causal Identification*

In taking this shift-share analytical approach, we follow the frontier of the relevant econometric literature, in particular the "exogenous shares" shift-share framework of Goldsmith-Pinkham, Sorkin, and Swift (2020).

Identifying Variation.—Our identification strategy relies on the exogeneity of pre-1997 provincial migrant destination exposure shares (ω_{do0}, a.k.a. exposure weights). These shares determine each province's exposure to destination-specific exchange rate shocks during the Asian Financial Crisis. In our panel data context, exogeneity of the exposure shares involves a parallel trend assumption analogous to one common in difference-in-difference analyses (Borusyak, Hull, and Jaravel 2024): If not for the 1997 exchange rate shocks, changes over time in dependent variables would have been similar for provinces with different levels of ω_{do0} and consequently $Shiftshare_o$.

Several features of our empirical setting support the exogeneity of these exposure shares. First, unlike "generic" shares such as industrial composition, which could capture exposure to numerous economic forces beyond our treatment of interest, our migration shares are specifically "tailored" to migrant income shocks, making them suitable for gaining identifying variation.

Second, we empirically assess parallel trends. For key domestic outcomes, we have many years of panel data with which to conduct tests of parallel trends in the pre-shock period, up to 12 years prior to 1997. These tests (detailed in Section IV below) consistently find no worrying pre-trends in the pre-shock period, providing support for the parallel trend assumption.

Third, we measure the shares using 1995 data, two years before the crisis. Lagging the shares ameliorates concerns about reverse causation. As we discuss in Section I, the Asian Financial Crisis was very much unanticipated. Therefore, decisions to migrate and earn income in particular destinations in the pre-shock period—and thus the shares (exposure weights) ω_{do0}—would not plausibly have reflected anticipation of future 1997 exchange rate shocks. Our estimates are unlikely to be clouded by households, firms, or officials in Philippine provinces anticipating the shocks. Lagging of the shares, therefore, further supports characterization of the shares as "tailored" to the research question.

Fourth, separately from empirical support provided by pre-trend tests, the parallel-trend assumption in our context is also reasonable on an *a priori* basis. The exposure shares capture preexisting migration networks that formed over many years prior to the Asian Financial Crisis. These networks reflect historical patterns of labor demand in different overseas destinations combined with migration costs that vary by origin-destination pairs due to geographic, linguistic, and cultural proximity. For example, areas in the Philippines with historical ties to Japan developed migration networks that lowered the costs for subsequent migrants to follow similar pathways, leading to persistent patterns in migration destinations across provinces. These previously established migration patterns would not plausibly have anticipated the future 1997 exchange rate shocks.

We thus consider the set of exposure shares to be "as-good-as-randomly" assigned to provinces, conditional on the set of controls. We make the parallel trend

assumption: If not for the exchange rate shocks, changes over time in dependent variables would have been similar for provinces with different values of $Shiftshare_o$. We also assume that, conditional on all our controls (e.g., trade exposure), $Shiftshare_o$ only affects outcomes via changing migrant income prospects.

Key Control Variables.—Even with our tailored exposure shares, share exogeneity requires careful consideration of potential confounders that might be correlated with both initial migration patterns and provincial economic trajectories. We thus sequentially include a comprehensive set of controls designed to isolate variation in the composition of migrant income across destinations from other provincial characteristics.

Most importantly, to reiterate, it is crucial to control for total migrant income per capita in province o at baseline, $MigInc_{o0}$, which is the sum of the ω_{do0} terms across destinations d for each province. When controlling for $MigInc_{o0}$, our shift-share only leverages variation in the *composition* of migrant overseas income sources across provinces, avoiding comparisons between provinces with high and low total migrant income. Because we conduct panel analyses, we interact $MigInc_{o0}$ with time period fixed effects to account flexibly for time effects associated with provinces' baseline total migrant income per capita.

In panel research designs like ours, we also want to account for time-varying effects associated with baseline characteristics of the units of analysis. We therefore include in regression equation (4) a vector of controls for a variety of baseline provincial characteristics, interacted with an indicator for the post-shock period ($\mathbf{X}_{o0} \times Post_t$). These terms capture any differential changes (from before to after 1997) associated with these provincial characteristics.

We organize these province-level control variables into four groups and add them sequentially to demonstrate the robustness of our key coefficient estimate (β_1 on $Shiftshare_o \times Post_t$) to increasingly stringent identification assumptions.

The first group of controls captures characteristics of the province's migrant flow (measured in 1995). Controlling for these factors helps ensure that our estimates do not reflect differential trends among provinces with more migrants in high-income versus low-income destinations, or provinces with more highly skilled migrants. To account for the broad regional mix of migrant destinations, we include the province's share of migrants going to the Middle East and North Africa, going to East Asia, and going to OECD countries. In addition, we control for a province's migrant-destination-country characteristics.[13] The destination-country migrant characteristics are as follows. Mean annual income per Philippine migrant in the destination accounts for the skill level of migrants. We capture occupational-sector mix with the share of Philippine migrants to the destination working in professional occupations (the highest-skilled occupation group), and separately, the share of Philippine migrants to the destination working in manufacturing occupations (the intermediate-skilled group). In addition, we include the share of all Philippine migrants going to the destination; this accounts for differences related to the aggregate size of the country as a migration destination. Finally, we control for the 1995 per capita real GDP of destination country (World Bank 2024).

[13] These destination characteristics are aggregated to the province level using the province-specific exposure weights ω_{do0}, following Borusyak, Hull, and Jaravel (2022).

The second set of control variables captures pre-shock province development status: share of households that are rural, household asset index, domestic income per capita, and expenditure per capita. These variables account for the possibility that initially more-developed provinces both had different migration patterns and were on different economic trajectories, regardless of migration.

The third set of controls pertains to baseline province industrial structure (from the 1990 census): share of workforce separately in the primary, the manufacturing, and the service sector, and the share of workforce in financial and business services. These variables address concerns that industrial composition could influence both migration patterns and economic growth trajectories.

Finally, the fourth set of controls comprises analogous shift-share variables related to imports and exports, to account for any exchange rate shocks operating via international goods trade. We discuss these variables in Section IIIC.

Shares that Matter Most for Estimates.—Following Goldsmith-Pinkham, Sorkin, and Swift (2020), we compute Rotemberg weights to characterize which shares matter most for our estimates. These weights reveal which destination-specific shifts are driving our results and provide guidance on which shares should be the focus of balance tests (tests of pre-trends). Five destinations collectively account for 77 percent of the weights: Saudi Arabia (0.23), Japan (0.19), the United States (0.16), Hong Kong (0.10), and Taiwan (0.09). See Supplemental Appendix Section B.1 for additional details.

C. *Additional Threats to Identification*

Impacts through Trade.—A potential omitted-variable concern is that exchange rate shocks can also affect trade. If migrant income shocks are correlated with trade shocks, β_1 would be jointly capturing the impacts of trade shocks and migrant income shocks, complicating the interpretation of β_1. We therefore construct import and export shift-share exposure measures to assess the stability of our results to their inclusion.

The import and export shift-share variables are in the same spirit as our migrant income shift-share variable. They exploit variation in exchange rate shocks in import and export partners, in combination with baseline import and export values in different industries, and province-level employment shares in import and export industries. Our goal is to measure the labor market exposure to changes in import and export competition due to relative exchange rate changes between the Philippines and its trade partners.

First, we compute the baseline (1990–1996) value of imports and exports between the Philippines and each partner country (destination) for each Standard International Trade Classification (SITC) good using COMTRADE data (UN Comtrade 1990–1996). We aggregate the SITC goods to 36 ISIC industries to compute industry-level imports and exports between the Philippines and each partner country (destination).[14]

[14] We match COMTRADE SITC data with ISIC revision 2 data using a crosswalk from the World Integrated Trade Solution by the World Bank (WITS 2023). Because the crosswalk is not complete, we manually match all remaining SITC products.

We multiply the baseline industry-level trade values with the relative exchange rate shock of the trading partner to measure the industry-destination specific shock. Then, using the 1990 population census, we apportion the total industry-destination level import and export shocks to each province according to that province's share of national industry employment. Summing up across industries yields the province-destination level import/export shock. We divide this measure by province population to get a proxy for per capita import/export shock exposure. Finally, we add up over all trading partners to get province-level measures. Formally,

$$Shiftshare_o^m = \sum_d \frac{1}{Pop_o} \sum_j \frac{L_{jo}}{L_j} M_{jd}^m \tilde{\Delta} R_d, \tag{5}$$

where $m \in \{import, export\}$ specifies the trade shock, o is province, d is destination (partner) country, and j is industry. M_{jd}^m is the total baseline value of industry j imports or exports between the Philippines and country d. L is the number of workers and Pop denotes population. $\tilde{\Delta} R_d$ is the exchange rate shock as before.

To build intuition, suppose the Philippines imports a high value of electronics from country j at baseline. This suggests that M_{jd}^{import} will be high. If the country d's currency appreciates, provinces with larger baseline employment shares in electronics can face lower import competition than before, changing the income potential of the region. Our measure is intended to approximate exactly this shock to (in this example) import competition by apportioning each baseline shock to industry-country imports ($M_{jd}^{import} \times \Delta R_d$) to Philippine provinces using share of national sector employment at baseline. We then simply add up this measure across all industries and trading partners to get a province-level export and import shock measure. This is conceptually parallel to the "China shock" measure of Autor, Dorn, and Hanson (2013), but summed up across all baseline trading partners and separately calculated for both imports and exports.

We demonstrate the stability of our β_1 estimates to the inclusion of these import and export shift-share variables in the control vector $\mathbf{X}_{o0}$ in panel D of all regression result tables. Supplemental Appendix Table A5 demonstrates that this stability is plausible. The import and export shift-share variables are not correlated with the migrant income shock after controlling for the baseline control variables included in the main analyses (i.e., the variation relevant to our estimation). This suggests that we should not expect that inclusion of the import and export shift-share variables would affect coefficient estimates on the migrant income shift-share variable. We formally test this in panel D of our regression tables.

We provide additional evidence in Section IVD that manufacturing exports and FDI do not respond to the shocks, and do not appear to be relevant mechanisms.

SUTVA Violations and Internal Migration.—We consider potential violations of the Stable Unit Treatment Value Assumption (SUTVA), which requires that treatment of one unit does not affect outcomes in other units. In our context, SUTVA could be violated if migrant income shocks in one province spill over to affect outcomes in neighboring provinces through trade linkages, factor mobility, or other economic channels.

One concern is that migrant income shocks could trigger internal migration flows, which would confound our province-level estimates by changing population composition. We examine the relationship between $Shiftshare_o$ and internal migration rates. Results are in Supplemental Appendix Table A6. We find no large or statistically significant impact on net internal migration. There is a small negative effect on outmigration of young adults (aged 16–24), that cannot account for the impacts we document in our analyses. The limited internal migration response suggests that labor mobility between provinces is not a major source of SUTVA violations.

More generally, the Philippines' relatively fragmented internal market structure (with over 7,000 islands) likely limits other forms of inter-provincial economic spillovers. To the extent that spillovers do occur, they would likely be positive—provinces experiencing migrant income gains would generate increased demand for goods and services from neighboring provinces, raising incomes in those areas as well. Such positive spillovers would cause our estimates to be attenuated toward zero, making them conservative estimates of the true causal effects. We test for such general spatial spillovers in Section IVE, where we show that our main estimates are robust to controlling for the $Shiftshare_o$ value in neighboring provinces (specifically, the inverse distance-weighted average migrant income shock in other provinces). While we cannot fully rule out all potential SUTVA violations, the likely direction of spillovers suggests that our estimates are lower bounds of the true impacts.

D. *Persistence of Shock*

We study the impact of changes in migrant income on long-run provincial outcomes, exploiting an exogenous shock measured by our shift-share variable. A key interpretive question is whether the shock is transitory or persistent.

In analyses detailed in Supplemental Appendix Section B.3, we show that the shift-share variable's components—in equation (5), the exchange rate shocks $\tilde{\Delta}R_d$ (the "shifts") and the exposure weights ω_{do0} (the "shares")—exhibit persistence over two decades post-1997. Because both these components of the shift-share variable show persistence in the long run, the shock to migrant income is also persistent.

Persistence in the exchange rate changes $\tilde{\Delta}R_d$ is an empirical fact, reflecting that exchange rates were previously misaligned. Persistence in exposure weights ω_{dot} can stem from dyad-specific migration costs (equation A7 of our model). While migrants did adjust their post-1997 migration destinations in response to exchange rate changes, adjustment was partial, due to networks facilitating migration (Munshi 2003; Kleemans and Magruder 2019; Mahajan and Yang 2020), and (relatedly) information frictions and high fixed costs for recruitment agencies in the international labor market (Shrestha and Yang 2019; Shrestha 2020; Fernando and Singh 2021; Bazzi et al. 2021).

In sum, destination-level exchange rate shocks and dyadic migrant income per capita are highly persistent over two decades. The long-run impacts that we find result from an exogenous shock to migrant income (measured by the shift-share variable $Shiftshare_o$) that exhibits substantial persistence over time.

IV. Empirical Results

We estimate impacts of the migrant income shift-share shock (β_1 in equation (4)) on a range of primary and secondary outcomes.

A. *Domestic Income and Expenditure*

We first examine impacts on key primary outcomes: province-level means of annual domestic income and expenditure per capita. "Domestic income" includes income from wages, entrepreneurial activity, and other sources, such as dividends, interest, and the imputed rental value of owned housing. We intend this outcome to capture household earnings in the *domestic* Philippine economy. This variable, therefore, does *not* include international migrant income (which in any case is not recorded in the survey), remittances, or other international income. We calculate international migrant income using the migrant contract data and examine it in the next subsection.[15] To avoid double-counting of earnings in the population, our measure of domestic income also excludes transfers from domestic sources and gifts from other households. For expenditure per capita, we use the Philippine Statistical Authority's definition of "family expenditures": expenses or disbursements purely for personal consumption. This includes food, clothing, education, transport, communications, health, and utilities; consumption from own production; and money payments made during the annual reference period for durable goods, furniture, and household repairs and maintenance.

Results are in Table 1, columns 1–2. Each cell displays the coefficient β_1 on $Shiftshare_o \times Post_t$. We present estimates from regressions with different pre-shock controls interacted with $Post_t$: destination controls only (panel A), with additional province development status controls (panel B), with additional province industrial structure controls (panel C), and with additional import and export shift-share controls (panel D). All regression results tables have this structure.

The shock has positive effects on both domestic income and expenditure per capita. Coefficient estimates on both the domestic income (column 1) and consumption (column 2) regressions are stable across panels, and in panel D the coefficients are statistically significantly different from zero at the 1 percent level.

The effects are meaningful in magnitude. A one-standard-deviation shock (0.093) increases domestic income per capita by PhP 1,204 (0.13 standard deviation), and expenditure per capita by PhP 1,147 (0.13 standard deviation).

We also present event study diagrams illustrating the dynamics of impacts, and testing for pre-trends. We estimate a modified equation (4), which includes the partially treated year 1997 in the sample, and interacts $Shiftshare_o$ with indicators for each time period. The 1994 interaction term is omitted as the reference point. We plot point estimates and 95 percent confidence intervals on $Shiftshare_o$ interacted

[15] By excluding international income sources from "domestic income," we are also excluding migrant remittances (which are included in "overseas income"). Migrant remittances may be under-reported in the FIES, because of the rise in electronic banking. Since 2000, international migrants have been increasingly depositing earnings directly into origin-household bank accounts. A comparison of remittance data from the World Bank, the Philippine Central Bank, and the FIES suggests that households responding to the FIES may not consider such deposits as remittances (Ducanes 2010).

Table 1—Effects of Migrant Income Shock on Global Income, Domestic Income, Migrant Income, and Expenditure per Capita

	Triennial: 1985–2018		1994, 2009, 2012, and 2015			
	Domestic income per capita (1)	Expenditure per capita (2)	Global income per capita (3)	Domestic income per capita (4)	Migrant income per capita (5)	Expenditure per capita (6)
Panel A. Destination controls only						
$Shiftshare_o \times$ Post	12.913	10.877	30.732	24.509	6.222	19.058
	(8.687)	(7.925)	(9.531)	(8.591)	(2.058)	(8.907)
Panel B. Additional province development status controls						
$Shiftshare_o \times$ Post	9.562	9.779	24.241	18.173	6.068	13.302
	(6.148)	(5.055)	(6.264)	(6.128)	(1.683)	(5.188)
Panel C. Additional province industrial structure controls						
$Shiftshare_o \times$ Post	13.154	12.442	24.499	18.348	6.151	13.859
	(4.887)	(4.638)	(6.149)	(6.033)	(1.612)	(5.386)
Panel D. Additional import and export shift-share variables						
$Shiftshare_o \times$ Post	12.947	12.332	24.351	18.235	6.117	13.798
	(4.066)	(3.891)	(5.770)	(5.668)	(1.685)	(4.640)
Observations	813	813	296	296	296	296
Baseline DV mean	26.102	24.497	30.189	26.102	4.087	24.497
Baseline DV SD	9.406	8.734	11.400	9.406	2.993	8.734

Note: Unit of observation is the province-year. Domestic income and expenditure per capita are from Family Income and Expenditure Survey (FIES). Migrant income per capita is calculated from POEA/OWWA and Philippine census data. Global income per capita is migrant income per capita plus domestic income per capita. Income and expenditure are in thousands of real 2010 Philippine pesos (PhP17.8 per PPP US$ in 2010). The year 1997 is dropped from the analysis as the exchange rate shock takes place in 1997. Outcome data are not available for one province (Rizal) in 1988 due to a fire that destroyed survey records. Destination pre-shock controls are (all for 1995): GDP per capita of the destination; mean annual income per Philippine migrant in the destination; share of Philippine migrants to the destination working in professional occupations (highest-skilled general occupational category); share of Philippine migrants to the destination working in manufacturing occupations (intermediate-skilled general occupational category; the lowest-skilled general occupational category, services, is the omitted category); share of all Philippine migrants going to the destination; share of baseline migrant from province going to Middle East and North Africa; share of baseline migrant from province going to East Asia; share of baseline migrant from province going to Middle East and OECD countries. Destination country-level controls are aggregated to the province level using Borusyak, Hull, and Jaravel (2022) weights (province's pre-shock aggregate migrant income in the destination). Province development status pre-shock controls are as follows: share of households that are rural and household asset index (from 1990 census); domestic income per capita and expenditure per capita (average across 1988/1991/1994 FIES). Province industrial structure pre-shock controls are as follows: share of workforce in primary sector, share of workforce in manufacturing, share of workforce in service sector, share of workforce in financial and business services (from 1990 census). Baseline dependent variable mean and standard deviation calculated based on data from the pre-shock year nearest to the crisis. All regressions include province and year fixed effects. Standard errors are clustered at the province level.

with each period indicator. Results are presented in Figure 2, panel A for expenditure and Figure 2, panel B for domestic income. We do not observe differential positive pre-trends: For expenditure, pre-1997 coefficients are small and show no obvious trajectory. For domestic income, there is a statistically insignificant negative trend from 1985–1991 and no trend in 1991–1994. There is also no large or statistically significant effect in 1997 for either outcome. For both outcomes, coefficients are positive and increase in magnitude over time after 1997. This increase in the post-shock period is consistent with the gradual accumulation of human and physical capital over time, resulting in increases in domestic income per capita.

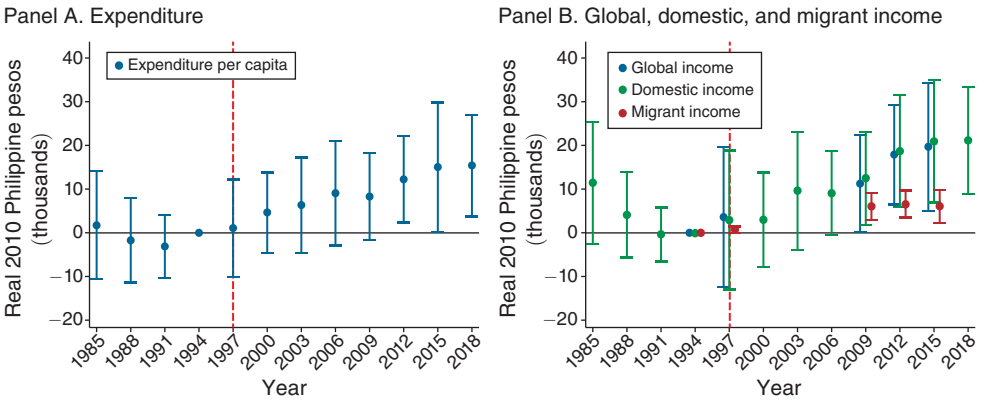

FIGURE 2. EVENT STUDIES FOR EXPENDITURE AND INCOME PER CAPITA

Notes: Regressions modify equation (4) to include interactions between $Shiftshare_o$ and indicator variables for each pre- and post-shock year. The 1994 interaction term is omitted as reference point. Specification corresponds to that of Table 1, panel D (including province fixed effects, year fixed effects, and controls for differential trends with respect to pre-shock province characteristics, destination characteristics, and province import and export shift-share variables). Expenditure per capita includes food, education, durable goods, and housing, among other categories. Domestic income per capita includes earned income from wage and entrepreneurial activities, along with income from all other sources excluding transfers from abroad and domestic sources. Migrant income per capita is the sum of all income earned outside the Philippines by a province's migrants. Global income per capita is the sum of domestic and migrant income per capita. Outcomes are in real 2010 Philippine pesos (PhP17.8/US$ PPP). Observations are at the province-period level, and include each triennial period between 1985 and 2018 inclusive (when available); unlike in Table 1, we now include partially treated year 1997 in the sample. 95 percent confidence intervals shown. Standard errors are clustered at the province level.

We confirm the absence of pre-trends with "placebo" regressions estimating equation (4), but for data in the pre-period (1985–1997). We replace the indicator for the post-period, $Post_t$, with an indicator for a placebo post-period, 1994 and 1997. The placebo pre-period is 1985, 1988, and 1991. Results are in the top panel of Supplemental Appendix Table A4, columns 1 and 2. The coefficients on $Shiftshare_o \times Post_t$ are small in magnitude, and none are statistically different from zero.

B. *Global, Domestic, and Migrant Income per Capita*

We examine impacts on migrant income alongside impacts on domestic income. Migrant income is the sum of all income earned outside the Philippines by a province's international migrants. Domestic income is defined as in the above analysis; importantly, it excludes income from international sources. We also define "global income" as the sum of migrant income and domestic income.

Our focus on migrant *income*, rather than remittances (or, relatedly, migrant overseas savings which may eventually be repatriated) deserves a brief discussion. Remittances or overseas savings, of course, are derived from migrant income. Focusing on migrant income is conceptually attractive as it represents the full amount of resources that migrants gain access to when they go overseas for work, and captures their income and material well-being. Migrants make decisions about how much to consume overseas, send home as remittances, save, and invest. In our view, migration decisions should be thought of as motivated by the prospects for

earning the full amount of migrant income, not just the amounts they may then remit (or save overseas). In other words, migrant income prospects may also be attractive to individuals due to their potential use for personal consumption or other purposes separate from remittances or other savings or investments for their families.

Regression results for global, domestic, and migrant income per capita are in columns 3–5 of Table 1. Within each panel, the coefficient in column 3 is the sum of the corresponding coefficients in columns 4 and 5 (since global income is the sum of domestic and migrant income). The shock has positive and statistically significant effects on global, domestic, and migrant income per capita. Coefficient estimates are stable across regressions in panels A, B, C, and D.

Impacts are large in magnitude. The coefficient estimate in column 3, panel D, indicates that each one-standard-deviation shock increases global income per capita by 2,265 pesos in 2009–2015 (0.2 standard deviation, or 7.5 percent of the baseline mean). Corresponding effect sizes for domestic income and migrant income per capita are 1,696 (0.18 standard deviations, or 6.5 percent of the baseline mean) and 569 pesos (0.19 standard deviations, or 13.9 percent of the baseline mean).

The coefficient estimate on migrant income (6.117) indicates that the initial shock to migrant income is magnified over time: For each unit migrant income per capita shock (measured by our shift-share variable), migrant income per capita is over six units higher by 2009–2015.[16] We will shortly turn to the mechanisms behind this magnification of the migrant income shock, examining the role of increases in migration rates, educational investments, and migrant skill levels.

To show the robustness of impacts on expenditure per capita, we also present regression estimates for this outcome in the restricted set of periods (1994, 2009, 2012, and 2015), in column 6. Point estimates and significance levels are very similar to the estimates of column 2 (which uses data from 1985–2018).

Figure 2, panel B shows event study diagrams for migrant and global income per capita. There are no apparent pre-trends in 1994–1997. The effects are positive in the 2009–2015 post-periods; point estimates for migrant income are stable, while global income point estimates are increasing. Tests showing absence of pre-trends are in the bottom panel of Supplemental Appendix Table A4, columns 1 and 2. Pre-trend coefficients are small in magnitude and statistically insignificant.

C. *Diagnostics for Exogenous Shares Identification*

Having established our main income and consumption results, following Goldsmith-Pinkham, Sorkin, and Swift (2020) we conduct diagnostics focused on high-Rotemberg-weight destination shares. First, we examine whether these shares exhibit any pre-trends in our key domestic outcomes prior to the 1997 shock. Second, we present estimates using these shares individually as instruments for $Shiftshare_o$ to assess drivers of our identifying variation. Further, to test the sensitivity of our results to different combinations of exposure shares. We examine specifications using only the top 5, 10, 15, or 20 destinations by Rotemberg weight in constructing our shocks. The results are reassuring, supporting the parallel trend

[16] To be sure, there is some uncertainty around this estimate: Its 95 percent confidence interval ranges from 2.81 to 9.42 (with the lower bound being less than half as large as the point estimate).

assumption and our interpretation of the coefficient on $Shiftshare_o$ as causal. For details, see Supplemental Appendix Section B.2.

D. *Ruling Out Trade and FDI as Confounders*

The stability of our estimates with the inclusion of import and export shift-share variables strongly suggests that the coefficient β_1 does not reflect the impacts of changes in trade flows. Here, we provide additional evidence that suggests trade is not driving the impacts we document. Further, we examine another potential mechanism, foreign direct investment (FDI), by testing whether aggregate FDI flows are affected by the same exchange rate shocks.

Lack of Correlation between Shocks: First, we show in Supplemental Appendix Table A5 that the migrant income shock is not correlated with the import and export shift-share variables. This lack of association suggests trade is unlikely to drive our estimated impact of the migrant income shock.

Lack of Impact on Manufacturing Exports: We estimate impacts of $Shiftshare_o$ on trade outcomes, starting with manufactured exports per capita.[17] We estimate equation (4) where the dependent variable is in thousands of pesos (PhP) per capita. We examine samples including all years (column 1), as well as a restricted set of periods for "long run" results corresponding to our global income analysis period (1994–1996 versus 2009–2015, column 2). Results are in Supplemental Appendix Table A7. We find no large or statistically significant impact on manufactured exports.

Note that even if we found impacts on manufactured exports, this would not necessarily mean our estimates are confounded by the impacts of exchange rate shocks on trade flows. An increase in origin development due to migrant income shocks can, in principle, lead to increased exports. However, the lack of an impact strongly suggests that shocks to exports are not a first-order driver of our results. We further discuss potential reasons behind this lack of impact on manufacturing exports in Section IVF, where we discuss sector-specific local effects.

Lack of Impact on Agricultural Income: It is also of interest to examine agricultural exports, but no corresponding data exists for this outcome. Instead, we examine agricultural income per capita, which should encompass any increase in agricultural exports. In Section IVF below (on structural change), we present regression estimates of equation (4) where the dependent variables are agricultural income per capita at the province-year level. There is no statistically discernible impact on agricultural income and domestic income impacts are effectively entirely driven by nonagricultural income. This indicates that increases in agricultural export income are unlikely to be driving the effects on domestic income.

[17] We construct this outcome variable at the province-year level by aggregating firm survey microdata. These data are available in 1994, 1996, 1998, 1999, 2006, 2009, 2010, 2012, 2013, 2014, and 2015 (see Supplemental Appendix A.8).

Imports and Local Prices: Another trade-related point is that regions that consume more imports can face changing prices in their consumption basket due to the exchange rate shock. If this exposure through imports is correlated with the shock to migrant income opportunities, our expenditure results may need to be reinterpreted in real terms. While we lack the data to study where imports are consumed, we acquired data on province-year level consumer price index from 1994–2017 (PSA 1994–2017). If imports are a meaningful share of the consumption basket and import prices are changing, this would be reflected in the CPI. Supplemental Appendix Table A9 columns 1 and 2 show results from estimating equation (4) with CPI as the outcome. Column 3 regresses the CPI inflation on the migrant income shock. In all specifications, there is no evidence for a positive or significant relationship. For example, column 2 suggests each one-standard-deviation shock leads to a 3.7 decrease (p-value $= 0.3$) in CPI by 2015, when the average CPI is 245. More broadly, this finding highlights that our domestic income and consumption results reflect real changes and not just changes in local price levels.

FDI Is Not Responsive to Exchange Rate Shocks: Finally, we examine foreign direct investment (FDI) as a potential mechanism. Data on inward FDI from specific countries are not available at the province level, only at the national (Philippine) level by year. We therefore run panel regressions where the outcome variable is annual FDI flows to the Philippines from a particular country in a given year (PSA 1996–2010; PSA 2011–2016).

The right-hand-side variable of interest is the exchange rate shock, $\tilde{\Delta}R_d$, interacted with a dummy for the post-shock period. The regression includes year and country fixed effects. We examine the full set of years (1996–2018, column 1), the "long run" (comparing 1996 with 2009–2015, column 2), as well as robustness to controls for overseas country characteristics (the same included in Table 1) in panels A and B. We test whether the overseas-country-specific exchange rate shocks affect FDI flows to the Philippines *as a whole*. If no such relationship exists, it would be unlikely that FDI flows to specific provinces are related to the migrant income shift-share. Results in Supplemental Appendix Table A8 show no large or statistically significant relationship between FDI flows and the exchange rate shocks.[18]

Robustness to Baseline Trade-Related Controls: We further provide evidence for the stability of our results when we control for baseline exposure to either tradable sectors or manufacturing exports directly (interacted with time fixed effects). First, we control for baseline manufacturing exports to allow for differential trends based on baseline manufacturing. We control for both per capita and total manufacturing exports, along with the IHS transformations, to allow for some flexibility on the functional form. Second, we control for the time-varying versions of these manufacturing export variables. Third, we jointly control for the 1995 baseline share of the population working in 12 disaggregated tradable manufacturing industries. Fourth, we jointly control for the 1995 baseline share of the population working in 11 disaggregated

[18] The standard deviation of the exchange rate shock, $\tilde{\Delta}R_d$, is 0.040. Supplemental Appendix Table A8's coefficients indicate that a shock of this magnitude would have very small effects relative to the mean or standard deviation of the outcome variable.

primary sectors. Even under the demanding cases where we include over 10 additional controls, our results do not meaningfully change, which suggests that trends or shocks correlated to baseline manufacturing exports or tradable industry structure are not driving our results. These results are presented in Supplemental Appendix Figure A3, discussed further in Section IVE.

Overall, these analyses provide no indication that trade or FDI are important mechanisms driving the causal effects emphasized in this paper.

E. *Additional Robustness*

Supplemental Appendix Figure A3 presents additional robustness checks for our main income and consumption results. Details of additional control variables are in Supplemental Appendix Section A.7.3. The robustness checks can be grouped as:

Standard Errors: We present results with (i) "exposure-robust" standard errors (Borusyak, Hull, and Jaravel 2022) that account for correlations between destinations exposed to similar destination countries and (ii) spatially clustered standard errors following Conley(1999), allowing for up to 200 kilometers around the centroid of the province and for auto correlation of order 10 years. The precision of our estimates does not meaningfully change.

Outliers: Among top migrant destinations, Malaysia and South Korea have outlier exchange rate shocks, as is apparent in Table A1. We present results in which our migrant income shock measure excludes Malaysia and South Korea, by setting their "shares" to zero. Regression estimates when excluding Malaysia and South Korea in this way are nearly identical to our main results. We also show that no individual province drives our results by excluding provinces one at a time, as shown in Supplemental Appendix Figure A4.

Additional Trade Related Controls: The four sets of trade-related controls were introduced and discussed at the end of Section IVD on trade confounders.

Geographic Spillovers: To assess bias due to geographical spillovers from nearby provinces, we generate the inverse distance weighted average migrant income shock to all other provinces. Controlling for the inverse distance weighted shock (interacted with year fixed effects) does not impact our estimates.

Tourism Controls: We also show robustness to controlling for the baseline share of workers employed in "tourism" industries (as defined by the Philippine Statistical Authority), interacted with year fixed effects. The estimates are stable, suggesting that income from tourism is not confounding our estimates.

F. *Mechanisms*

We now examine potential mechanisms through which these substantial increases in income take place: education, migration rates, migrant skill levels and occupations, domestic wage and entrepreneurial income, and structural change.

Table 2—Effects of Migrant Income Shock on Education

	Share completed		
	Primary school (1)	Secondary school (2)	College (3)
Panel A. Destination controls only			
$Shiftshare_o \times$ Post	−0.006	0.081	0.037
	(0.029)	(0.033)	(0.016)
Panel B. Additional province development status controls			
$Shiftshare_o \times$ Post	−0.007	0.051	0.051
	(0.036)	(0.029)	(0.018)
Panel C. Additional province industrial structure controls			
$Shiftshare_o \times$ Post	0.004	0.058	0.045
	(0.034)	(0.028)	(0.016)
Panel D. Additional import and export shift-share variables			
$Shiftshare_o \times$ Post	0.005	0.059	0.045
	(0.025)	(0.028)	(0.015)
Observations	444	444	444
Baseline DV mean	0.763	0.419	0.122
Baseline DV standard deviation	0.104	0.114	0.039

Notes: Unit of observation is the province-year. Analysis uses census data; periods are 1990, 1995, 2000, 2007, 2010, and 2015. Dependent variables are share of population (aged 20–64) who have completed primary, secondary (high school), and college education. Primary school, secondary school, and college completion is defined as having completed at least 6, 10, and 14 years of schooling respectively. For list of destination and provincial controls, see Table 1. Baseline dependent variable mean and standard deviation calculated based on data from nearest pre-shock year. All regressions include province and year fixed effects. Standard errors are clustered at the province level.

Education.—Relaxation of household liquidity constraints has been shown to lead to higher educational investments, in the long run (Agte et al. 2022). Positive migrant income shocks could loosen such constraints on educational investments (Yang 2008b; Gibson, McKenzie, and Stillman 2011, Gibson and McKenzie 2014; Clemens and Tiongson 2017; Theoharides 2018), and also change the expected return to education in the broader population.[19]

In Table 2, we present results from estimating regression equation (4) where the dependent variables are the share of the population having reached key threshold levels of education: primary (6 years of completed schooling), secondary (10 years), and college (14 years). Dependent variables are from the Philippine census (pre-shock periods 1990 and 1995; post-shock periods 2000, 2007, 2010, and 2015). The positive shock to migrant income has positive and statistically significant effects on secondary and college (but not primary) completion rates.

Coefficient estimates in columns 2 and 3 indicate that a one-standard-deviation migrant income shock causes 0.55 percentage points higher secondary completion, and 0.42 percentage points higher college completion. Point estimates are relatively

[19] Positive migrant income shocks could raise schooling investments overall if the return to education is perceived to rise (Batista, Lacuesta, and Vicente 2012; Docquier and Rapoport 2012; Clemens and Tiongson 2017; Shrestha 2017; Theoharides 2018; Chand and Clemens 2023; Khanna and Morales 2023; Abarcar and Theoharides 2024), but could reduce schooling investments if returns to education are seen to fall (McKenzie and Rapoport 2011; de Brauw and Giles 2017; Tang et al. 2022).

stable across sets of controls and statistically significantly different from zero at the 5 percent level and 1 percent level respectively in panel D.[20]

These educational responses are plausible in magnitude. We gauge magnitude plausibility by examining the extent to which increases in education are associated with increases in household income, as loosened financing constraints are likely a key reason behind education increases. Our regression results, comparing panel D of Table 1 (column 3) with Table 2 (column 3) indicate that about PhP 5,411 higher global income is associated with 0.01 higher college completion.[21]

How does this relationship between increased income and increased education compare to relationships seen in cross-sectional data in the pre-period? The cross-sectional relationship between global income and share skilled in the population in the pre-period (1994 for income and 1995 for education) indicates that each 0.01 higher college completion is associated with about 3,800 pesos more in provincial global income per capita. While this is not a causal effect, it is a reasonable point of comparison. The education response we estimate is relatively smaller: PhP 5,411 is "needed" to generate the same increase in college completion.

Migration Rate, *Migrant Salaries*, *and Migrant Skills and Occupations*.—Next, we examine the mechanisms underlying the long-run impact on provincial migrant income per capita. Migrant income can increase for two reasons. First, the provincial migration rate may be higher. We use census data to analyze provincial migration rates. Second, migrants may be earning more, especially given the increase in education rates. We use census data to explore the education levels of migrants, and contract data to study impacts on average salary and occupations in which migrants work.

In column 1 of Table 3, we report results from estimating equation (4), where the dependent variable is the migration rate (the share of individuals in the province aged 20–64 who are international migrant workers). The coefficient is positive, stable, and statistically significantly different from zero at the 1 percent level in all panels. A one-standard-deviation larger shock increases the migration rate by 0.17 percentage points (0.21 standard deviations).

Column 2 presents results from regressions where the dependent variable is the share of international migrants who are skilled, defined as having at least college (14 years) education. These coefficients are also positive, stable, and statistically significantly different from zero at the 1 percent level. A one-standard-deviation higher shock leads to 1.7 percentage points higher share of migrants who are skilled (0.19 standard deviations).[22]

[20] Falsification tests in Supplemental Appendix Table A4 (middle panel, columns 1–3) and event-study graphs of lead and lag coefficients of $Shiftshare_o$ in Supplemental Appendix Figure A11b confirm the absence of positive pre-trends for these outcomes. There is evidence for *negative* pre-trends, particularly for primary and secondary schooling. We note that the trends are most precisely estimated for primary schooling, an outcome for which we do not have positive impacts. If these negative trends had continued in the absence of the migrant shock, our results should be considered biased downward.

[21] Note of course that the increase in education investments due to the shock could also be driven in part by perceived changes in the return to education, not only by loosened financing constraints.

[22] For the outcomes in columns 1–2, there is no evidence of pre-trends in Supplemental Appendix Table A4 (middle panel, columns 4–5) or in Supplemental Appendix Figures A11c and A11d.

Table 3—Effects on Migration Rate, Migrant Skill, and Contract Type

	Census			Contracts per 10,000 working age people			
	Migrant share age 20–64 (1)	Share skilled migrants (2)	Average mig. salary (3)	First qtile education (4)	Second qtile education (5)	Third qtile education (6)	Fourth qtile education (7)
Panel A. Destination controls only							
$Shiftshare_o \times$ Post	0.018	0.176	171.847	57.729	3.810	75.001	52.223
	(0.006)	(0.046)	(159.574)	(74.162)	(6.908)	(30.078)	(35.411)
Panel B. Additional province development status controls							
$Shiftshare_o \times$ Post	0.018	0.214	241.279	38.617	−0.229	56.869	19.017
	(0.007)	(0.061)	(155.849)	(63.775)	(6.243)	(22.641)	(24.129)
Panel C. Additional province industrial structure controls							
$Shiftshare_o \times$ Post	0.018	0.188	254.343	36.237	−0.806	50.785	16.298
	(0.006)	(0.054)	(153.234)	(61.614)	(5.815)	(17.862)	(21.005)
Panel D. Additional import and export shift-share variables							
$Shiftshare_o \times$ Post	0.018	0.187	251.146	35.464	−0.883	50.359	15.933
	(0.006)	(0.055)	(138.529)	(60.839)	(6.260)	(18.142)	(21.611)
Observations	444	444	296	296	296	296	296
Baseline DV mean	0.011	0.300	431.718	52.103	6.468	18.324	18.664
Baseline DV SD	0.008	0.089	145.806	45.834	7.934	28.371	24.710

Notes: Unit of observation is the province-year. Migrant share in the population and share of migrant workers who are skilled is from the census (periods are 1990, 1995, 2000, 2007, 2010, and 2015). Skilled is defined as completing 14 years of education, which corresponds to finishing a college degree. Migrant contract variables are calculated from POEA/OWWA data (periods are 1994, 2009, 2012, and 2015). Outcome variable in column 3 is average annual migrant salary and columns 4–7 are the migrant contracts (per 10,000 working age population) in occupations in the first (lowest) through fourth (highest) quartiles of migrant years of education. Average annual migrant salary is in thousands of real 2010 Philippine pesos (PhP17.8 per PPP US$ in 2010). For list of destination and provincial controls, see Table 1. Baseline dependent variable mean and standard deviation calculated based on data from nearest pre-shock year. All regressions include province and year fixed effects. Standard errors are clustered at the province level.

Is the increase in migrant educational levels associated with higher wages, and working in higher-skilled jobs? We use migrant contract data, so the years in the regression are 1994, 2009, 2012, and 2015 (as in Table 1, columns 3–6).

In column 3, we find positive effects on annual salary per migrant. Coefficients are positive and stable, but somewhat imprecise. In panel D (with all controls added), the coefficient is statistically significant at the 10 percent; the coefficient in that regression indicates that a one standard deviation shock increases average migrant salaries by PhP 23,357, or 0.16 standard deviations.[23]

In columns 4–7, the dependent variables are migrant contracts per 10,000 working-age (ages 20–64) population in different contract categories. We estimate equation (4) for migrant contracts in four quartiles of occupations, ordered from lowest (first quartile) to highest (fourth quartile) education levels.[24] Results are in

[23] There is no evidence of pre-trends for this outcome. See Table A4 (bottom panel, column 3) and Figure A11e.

[24] The fourth (top) quartile (mean 14.4 years of schooling) includes engineers, medical professionals, and teachers. The third quartile (mean 12.9 years of schooling) includes caregivers, restaurant workers, and performing artists. The second quartile (mean 12.7 years of schooling) includes laborers and production workers. The first (bottom) quartile (mean 12.3 years of schooling) includes household workers (maids) and construction workers. We calculate mean years of education in 80 detailed migrant occupations in the 1992–2003 Survey of Overseas

Table 4—Effects of Migrant Income Shock on Components of Domestic Income

	Domestic income components		
	Wage income (1)	Entrepreneurial and rental income (2)	Other income (3)
Panel A. Destination controls only			
$Shiftshare_o \times$ Post	12.949	9.770	1.790
	(5.256)	(4.248)	(1.806)
Panel B. Additional province development status controls			
$Shiftshare_o \times$ Post	10.959	7.398	−0.184
	(4.515)	(3.753)	(2.263)
Panel C. Additional province industrial structure controls			
$Shiftshare_o \times$ Post	10.545	7.273	0.530
	(4.082)	(3.834)	(2.069)
Panel D. Additional import and export shift-share variables			
$Shiftshare_o \times$ Post	10.461	7.266	0.508
	(4.159)	(3.545)	(2.082)
Observations	296	296	296
Baseline DV mean	11.759	9.987	4.355
Baseline DV standard deviation	6.789	3.109	2.002

Notes: Unit of observation is the province-year. Data from the Family Income and Expenditure Survey (FIES); periods are 1994, 2009, 2012, and 2015. For list of destination and provincial controls, see Table 1. Baseline dependent variable mean and standard deviation calculated based on data from nearest pre-shock year. All regressions include province and year fixed effects. Standard errors are clustered at the province level.

columns 4–7 of Table 3. There are positive effects on new international migration in the two highest-education quartiles of occupations, but not for the bottom two quartiles. The coefficient is largest and statistically significant in panel D for the third (second-highest) quartile, while that on the fourth (top) quartile is also positive but not significantly different from zero.

In sum, migrant income shocks increase the migration rate, the share of migrant workers who are skilled, average salary per migrant, and migrant flows in higher-education occupations. A combination of these effects may drive the substantial gains in income we document over the long run.

Entrepreneurial, *Wage*, *and Other Domestic Income Sources*.—We now examine impacts on types of domestic income. Table 4 presents regression results from equation (4) where dependent variables are domestic wage income, entrepreneurial and rental income, and other income per capita. Wage income is compensation (cash or in-kind) from regular or seasonal work. Entrepreneurial and rental income is from any entrepreneurial activity (such as poultry/livestock raising, retail, transportation, and rental of land/property). Other income includes pensions, interest, dividends, and other sources.

Filipinos (SOF). We then assign the mean years of education for the occupation from the SOF to each migrant working in the occupation in the contract data. Then, we calculate mean migrant education within quartiles of the contract data.

The shock led to increases in both wages, and entrepreneurial and rental income. Coefficient estimates for both outcomes are robust to controls, statistically significantly different from zero at conventional levels in panel D, and similar to one another in magnitude. By contrast, there is no robust evidence that "other" income is a major part of the increase in domestic income. The positive impact on wage income and on entrepreneurial and rental income likely reflects higher education levels, and increased enterprise investment (both household and external). We explore this further in Section V.

Sectoral Structural Change.—Finally, we examine impacts on structural change. We do so by studying both income from different sectors (using FIES data) and employment shares (using census data). We are interested in (i) whether there is broad structural change away from primary sectors and (ii) whether the structure of the economy moved towards tradable (primary and manufacturing) or nontradable sectors.[25]

In columns 1–2 of Table 5, we report results from estimating equation (4) where the dependent variables are agricultural and nonagricultural domestic income. The results indicate that the increase in domestic income is almost entirely driven by an increase in nonagricultural income.

While it is not possible to further disaggregate total domestic income to different economic sectors, FIES does allow for entrepreneurial income to be further disaggregated. Accordingly, we broadly group entrepreneurial income into income from primary sectors, manufacturing, and nontradable goods and service sectors.[26] Columns 3–5 of Table 5 show results indicating that entrepreneurial income from service sectors is the biggest contributor to entrepreneurial income. Looking at panel D, about 53 percent of the increase in entrepreneurial income is driven by the service sector. Further, the impact on service sector income is two to three times as large as the impact on manufacturing or primary income per capita (which are both insignificant at 10 percent level).

To assess whether these income patterns indicate broader structural change in the economy, we use census data to analyze the impact of the migrant income shock on employment shares in broad sectors. We can observe employment shares in two census rounds before (1990, 1995) and two after (2000, 2010) the 1997 Asian financial crisis. Columns 6–8 of Table 5 present the results from estimating equation (4) for employment share outcomes. The migrant income shock leads to a fall in primary sector employment shares. Focusing on panel D, a one-standard-deviation higher shock results in a 1.2 percentage point decrease in the share of primary sector employment (0.06 standard deviation). Over 70 percent of the observed decline in primary sector employment is offset by a corresponding increase in nontradable goods and service sector employment. We find a smaller (and marginally statistically insignificant at 10 percent) increase in the manufacturing labor force share.

[25] For each outcome considered in this section, we document the absence of significant pre-trends in Supplemental Appendix Table A4 (top panel columns 6–10 and middle panel columns 5–7) and in Supplemental Appendix Figures A11g and A11h.

[26] Nontradable goods and services include all service sectors along with "Electricity, gas, water and waste management" and "Construction." This sector is titled "Services" in Table 5 for brevity.

Table 5—Effects of Migrant Income Shock on Structural Change

	Overall income (FIES)		Entrepreneurial income (FIES)			Employment share (census)		
	Agricultural (1)	Non agricultural (2)	Primary (3)	Manufacturing (4)	Services (5)	Primary (6)	Manufacturing (7)	Services (8)
Panel A. Destination controls only								
$Shiftshare_o \times$ Post	1.714	22.795	1.637	1.833	5.705	−0.139	0.061	0.078
	(2.847)	(8.402)	(2.835)	(0.918)	(2.557)	(0.045)	(0.028)	(0.048)
Panel B. Additional province development status controls								
$Shiftshare_o \times$ Post	2.534	15.639	1.528	1.490	3.866	−0.133	0.065	0.068
	(3.000)	(5.690)	(3.178)	(0.918)	(1.889)	(0.044)	(0.029)	(0.053)
Panel C. Additional province industrial structure controls								
$Shiftshare_o \times$ Post	2.670	15.678	1.766	1.366	3.630	−0.125	0.034	0.091
	(2.760)	(5.398)	(3.107)	(0.874)	(1.764)	(0.045)	(0.020)	(0.038)
Panel D. Additional import and export shift-share variables								
$Shiftshare_o \times$ Post	2.694	15.540	1.787	1.358	3.609	−0.126	0.034	0.092
	(2.629)	(5.362)	(2.970)	(0.865)	(2.008)	(0.046)	(0.021)	(0.038)
Observations	296	296	296	296	296	296	296	296
Baseline DV mean	7.759	18.343	5.712	0.550	3.561	0.559	0.051	0.390
Baseline DV SD	3.074	10.534	2.826	0.556	2.059	0.185	0.051	0.141

Notes: Unit of observation is the province-year. Data from the Family Income and Expenditure Survey (FIES) and census. FIES analysis includes years 1994, 2009, 2012, and 2015. Census analysis includes years 1990, 1995, 2000, 2010. Services are broadly defined to include the nontradable utilities and construction sectors. For list of destination and provincial controls, see Table 1. Baseline dependent variable mean and standard deviation calculated based on data from nearest pre-shock year. All regressions include province and year fixed effects. Standard errors are clustered at the province level. All regressions include province and year fixed effects.

Overall, the persistent increase in migrant income opportunities facilitated the structural change of labor markets away from primary sectors and mainly towards nontradable goods and service sectors. Beyond its inherent importance in documenting how migrant income can facilitate a process critical to economic development, this has a few important implications for interpreting our results. First, the increase in education documented in Section IVF can in part be driven by changing local returns to education due to structural change of the local economy. Second, the null impacts of our shock on manufacturing exports, documented in Section IVD, are consistent with the shift of local economic activity primarily towards the nontradable service sector, rather than manufacturing. Finally, the concentration of impacts on nontradable sectors suggests that income originating from abroad likely increases demand for locally produced services. Therefore, higher migrant income flowing to a province would stimulate the local economy, consistent with the impacts on province-level domestic income.

V. Model-Based Quantification and Discussion of Magnitudes

We now provide further insight into the mechanisms and magnitudes of the results thus far. First, we outline a theoretical framework to examine long-run effects on global, migrant, and domestic income. We take a simple model-based approach to quantify how educational investments contribute to income gains. The theoretical framework derives changes in skill shares, migration flows, migrant income, and

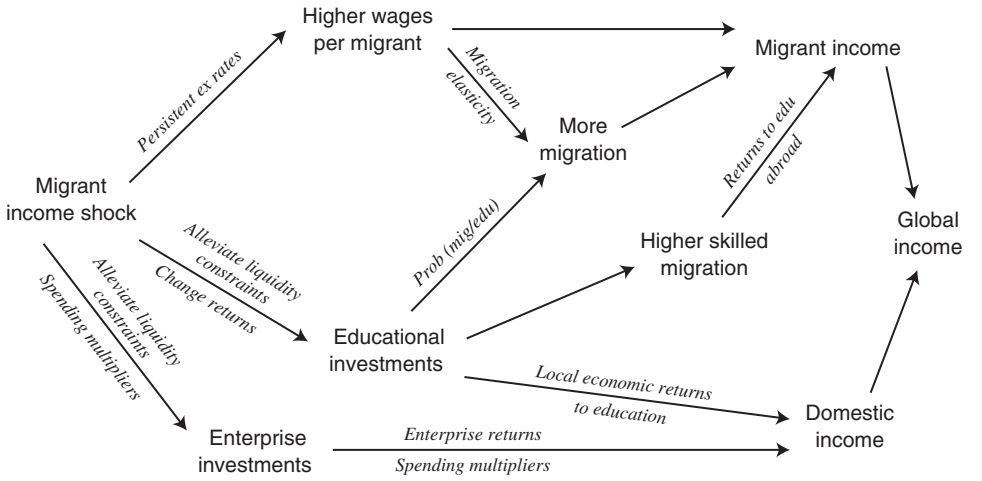

FIGURE 3. STYLIZED OVERVIEW OF POSSIBLE CHANNELS

Notes: Overview of modelled channels via which the migrant income shock affects global income. Details in Supplemental Appendix C.

domestic income as a function of the shift-share variable. The model also reveals whether the magnitude of the effect on migrant income per capita in the long run is explicable. We summarize this model-based quantification here. Supplemental Appendix Section C contains the full details, derivations, and calculations underlying the model. It also presents validation tests that show our tractable framework closely predicts changes in various income sources.

In Figure 3, we present a stylized diagram illustrating channels through which a migrant income shock affects global income. The persistent shock to migrant income prospects raises wages per migrant, potentially increasing migration and migrant income. The initial shock may also be invested in education, leading to more migration (as the skilled are more likely to migrate) in better-paying skilled jobs, again raising migrant income. The investments in education also raise domestic earnings back home. If this overall persistently high migrant income funds domestic enterprises or stimulates local expenditures, it may also raise domestic earnings. We provide details of the model in Supplemental Appendix Section C.

A. *Contribution of the Education Channel*

The long-run impact of improved migrant income prospects may be partly due to increased educational investments. First, skilled workers earn more. Furthermore, better-educated individuals have higher migration rates and work in higher-skilled jobs overseas. We quantify the contribution of educational investments to long-run changes in migrant and domestic income.

The college completion regression in Table 2 estimates the education response to the shock. To assess the contribution of educational investments to the income gains, we first multiply each province's specific value of the shift-share variable by the regression coefficient (0.045) in panel D, column 3 of Table 2 to estimate the change

in the province's population share skilled. Then we estimate how migration (to each destination or remaining at origin) responds to this change in the skill composition, presuming the same pre-shock (1995) dyadic migration probabilities by skill (the probability someone with skill-s migrates from origin-o to destination-d). That is, to estimate the changes in migration flows to each destination, we take the baseline difference between skill groups in the proclivity to migrate to each destination, and scale this by the change in the share skilled.

Then, we calculate how both migrant and domestic income would change in response to such migration changes, assuming the same dyadic skill premium (difference in skilled versus unskilled income, in origin-destination dyads) from the pre-shock period. That is, we take the baseline skill premia, both for domestic and for migrant income, and multiply it by the change in the share of those who are skilled to predict the education-driven change in incomes.

This calculation provides estimates of the change in migrant and domestic income per capita resulting from the education channel in Supplemental Appendix Table A12. The education channel explains 19.1 percent of the increase in migrant income and 19.9 percent of the increase in domestic income. The implied share of global income (the sum of migrant and domestic income) explained by increased education is 19.7 percent. In sum, the increases in education induced by changes in migrant income opportunities account for roughly one-fifth of long-run income gains.

B. *Explaining Impact on Migrant Income*

We also use the model to explain the increase in migrant income (coefficient 6.117 in Table 1's migrant income regression). As discussed above, educational attainment explains 19.1 percent of this increase. We seek to explain the remainder of the migrant income increase. Additional mechanisms include the exchange rate shocks themselves as well as changes in migration flows across destinations.

We first estimate changes in migration flows. Destination exchange rate shocks can alter migration decisions, ultimately leading to changes in long-run migrant income. Our model derives a gravity equation, with a parameter θ that is the elasticity of migrant flows (from origin-o to destination-d) with respect to destination wages. This determines subsequent location choices and migrant income. Higher θ means that migration flows, and thereby migrant income, respond more to exchange rate shocks. We use the exchange rate shocks to estimate θ in Supplemental Appendix C.4 using a Poisson pseudo-maximum likelihood (PPML) estimator (as many origin-destination dyads have zero flows). This yields an estimate of 3.42, which we use along with the actual exchange rate shocks to predict changes in migration in origin-destination dyads.

We then calculate the change in total migrant income resulting from all dyadic (origin-destination) changes in migration flows, by skill, and changes in exchange rates. We hold fixed skill-specific migrant wages (in destination currency) in each destination at pre-shock levels, so changes in migrant income reflect only exchange rate shocks and altered migration flows. We estimate that these factors explain an additional 69.9 percent of the change in migrant income. This is on top of the 19.1 percent attributed to education investments. The modeled components, therefore, explain 89.0 percent of the increase in migrant income.

The persistence of favorable exchange rates is a crucial driver of the "exchange rate channel" in Supplemental Appendix Table A12. Indeed, this differentiates our analysis from studies that focus on one-time cash transfers, or short-run access to higher income. Many parts of the world benefit from persistent access to profitable migrant opportunities, and our variation recreates such an experiment.

In sum, the model accounts for the majority of the magnitude of the effect on migrant income. The six-fold magnification of the initial migrant income shock is mostly explained by the combination of increased education, persistent exchange rate shocks, and changes in migration across destinations.

C. *Explaining Impact on Domestic Income*

We investigate the assumptions needed to explain the magnitude of the impact on domestic income. The coefficient in the domestic income per capita regression of Table 1, panel D, column 4 indicates that a PhP 1 migrant income shock leads to a PhP 18.24 increase in long-run domestic income. 19.9 percent of this increase is attributable to the increases in education investments (see Subsection VA). This leaves PhP 14.6 to be explained. We consider two mechanisms that could explain this: a demand multiplier, and investments in domestic enterprises.

Recent studies have estimated large demand multipliers in low-income contexts. Egger et al.(2022) estimate a multiplier of 2.5 in response to cash transfers in Kenya. The multiplier due to a credit supply shock in India is 2.9 (Breza and Kinnan 2021). Gerard, Naritomi, and Silva (2024) and Mendes et al. (2023) estimate transfer multipliers for Brazil's Bolsa Familia program that range from 2.2 to 7.16 in reduced form and 2.62 under structural assumptions. Multipliers are likely to be larger for relatively closed economies, like Philippine island provinces. Furthermore, as we show in Section IVF, much of the impacts were on nontradable goods and services, with income gains on local entrepreneurial incomes. We consider how much of our effect on domestic income could be explained by such multipliers.

In our context, multipliers operate on the portion of migrant income sent back to origin provinces. The coefficient estimate in the migrant income regression of Table 1, panel D, indicates that the multiplier would operate on the portion of the 6.12 increase in migrant income per capita that is sent back to origin provinces. Assuming 64 percent of the migrant income returns to the local economy, that coefficient and a multiplier of 2.9 implies an increase in domestic income per capita of PhP 13 ($6.12 \times 0.64 \times 2.9$). A simple demand multiplier thus explains 78.1 percent of the remaining (noneducation related) PhP 14.6.[27]

We now consider an additional contributor to the increase in domestic income: Previous migrant income could alleviate constraints on investments and lead to higher capital today. The migrant income shock was not a one-time windfall, but was sustained and grew, and so likely led to sustained increases in capital accumulation. While most work on multipliers focuses on short-term shocks, in our context, the income gains in

[27] There is no comprehensive data on the share of migrant income returned to the Philippines. We estimate $\alpha = 0.64$ indirectly by combining data from KNOMAD/ILO Migrant Cost Surveys (KNOMAD and ILO 2015–2016), Survey on Overseas Filipinos (SOF), and the POEA/OWWA contract data. Details are at the end of Supplemental Appendix Section C.7.1.

previous years may have been invested, leading to higher sustained income gains. It is widely recognized that household enterprises and firms face binding constraints on capital investment (Karlan and Morduch 2010), and that when constraints are loosened, firms have high rates of return on investment. de Mel, McKenzie, and Woodruff (2008) estimate a rate of return to Sri Lankan microenterprise investments from randomly assigned capital investments of 5 percent per month (80 percent per year).[28] Such returns likely explain part of the increases in wage and entrepreneurial incomes seen in Table 4.

We examine whether our domestic income results can be generated in a stylized framework in which a portion of the exogenous increase in migrant income is devoted to capital accumulation, and in which a demand multiplier also operates. We summarize the framework here; details are in Supplemental Appendix Section C.7.1. We trace the dynamics of domestic income per capita following the initial migrant income shift-share shock. Shock-induced migrant income per capita grows over time, reaching the amounts reflected in the event-study coefficients for migrant income per capita in Figure 2. In each post-shock year, a portion of shock-induced higher migrant income returns to origin provinces. Migrant income returned to origin economies generates an aggregate demand multiplier. In every period, households save a portion of shock-induced higher incomes, investing them in enterprises and firms.[29] We assume relatively high initial rates of return on investment (but not as high as the findings of de Mel, McKenzie, and Woodruff 2008), which decline over time as the initial low-hanging investment fruits are exhausted. Higher incomes induced by these capital investments also generate a multiplier.

In Supplemental Appendix Figure A10a, we display the shock-induced domestic income of the model between 1998 and 2015, for three values of the share of migrant income spent at origin, α. With $\alpha = 0.64$, a PhP 1 initial migrant income shock becomes PhP 18.93 of domestic income by the year 2015 (around 25 percent larger than the 14.6 impact we set out to explain). In Supplemental Appendix Figure A10b, we set $\alpha = 0.64$, vary the initial rate of return on investment, and trace the shock-induced domestic income in 2015. Our estimates range from 14.5 for an initial rate of return of 0.05, to 23.5 for an initial return at 0.8 (the estimate of de Mel, McKenzie, and Woodruff 2008).[30]

We view this calculation as a sanity check, demonstrating that a set of reasonable assumptions generates the observed long-run impact on domestic income per capita. The framework is agnostic about the possible channels through which the effect on domestic income may arise. Importantly, we do not model potential escapes from poverty traps (Ghatak 2015; Balboni et al. 2021; Kaboski et al. 2022), or returns to foreign experience for return migrants (Batista et al. 2025). Some of these channels likely contribute to domestic income increases at the origin.

[28] Similarly high returns are found by Banerjee and Duflo (2014); Hussam, Rigol, and Roth (2022); and Cai and Szeidl (2022). In the Philippines, Edmonds and Theoharides (2020) find a rate of return of 27 percent, 18 months after a productive asset transfer (although Karlan and Zinman (2018) find limited savings constraints in the Philippines).

[29] We set the savings rate to 0.35 (or a Keynesian multiplier of 2.86 comparable to 2.9 in Breza and Kinnan 2021).

[30] If we were to ignore the investment channel, our estimates would suggest a multiplier of about $14.6/(0.64 \times 6.117) = 3.7$, which is also within the range of multipliers found in the literature.

VI. Conclusion

We study the long-run consequences of persistent increases in international migrant income prospects for migrant-origin regions. We find that the vast majority of income gains are from *domestic* (origin-area) sources. Gains in international migrant income also increase substantially and play a crucial role in driving overall gains. Model-based estimates suggest that about one-fifth of the income gains (both domestic and international) are due to increased educational investments.

Our findings suggest that migration policy should be an important part of the development policy toolkit. Our results shed light on the impacts of policies—in both origin and destination countries—that affect current international migrant income as well as opportunities to earn such income in the future. Origin-country policies include efforts to facilitate international labor migration, regulate the market power of intermediaries, and educational investments that raise skills and make citizens more competitive for international jobs. Destination country policies include those related to legal immigration opportunities as well as enforcement against undocumented immigrants.

There are also implications for how we think about overseas development assistance (foreign aid). We find that improvements in migrant income have substantial positive impacts on the development of the *domestic* economy of migrant *origin* areas. Development agencies could consider supplementing traditional foreign aid with programs that facilitate international labor migration (Clemens 2010; Clemens and Pritchett 2013; World Bank 2018; Nunn 2019).

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