Remittances, Economic Development, and Education Investment

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Abstract

Remittances, or money sent by overseas migrants, have great potential to spur development in the locations to which they are sent. States, however, may react to remittance flows by reducing public investments in the areas that receive remittances. I use the interaction between local outmigration patterns and country-specific exchange rate shocks to identify the effects of remittances on development indicators and education investments in Indonesian districts. I find that remittances increase household consumption, reduce poverty, and stimulate growth. Remittance recipients are able to send more children to school, thereby prompting district governments to increase public schools at the primary and junior secondary levels. The state also increases provisions of other public goods that complement household investments. These responses to remittances are not driven by electoral concern or the capture of economic gain through taxation, but rather pre-existing policy commitments and changes in government accountability.

JEL Classifications: F22, F24, H41, I25, O15
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1. Introduction

Remittances—money that migrants send to their home countries—are an important resource for many developing countries. In fact, remittances bring in more resources than oil in Nigeria (The Economist, 2019), revenues from the Suez Canal in Egypt, and IT services exported from India (Ratha et al., 2016). Estimated total remittances to low and middle-income countries reached US$554 billion in 2019, surpassing the flow of foreign aid (Ratha et al., 2020). For many small nations, remittances comprise significant portions of their GDP. This is the case for countries as diverse as Tonga (39%), Tajikistan (27%), and El Salvador (24%) (World Bank, 2020). The sheer magnitude of the remittance flow holds great potential for development in developing countries (World Bank, 2006, 2017).

Migrant remittances may influence how the state provides public goods. For example, since remittances can finance various household investments, including substitutes for public services, the state may respond by reducing public investments, leading to a "remittance curse." On the other hand, if remittances increase the demand for public services, the state may make complementary investments. The state's investments through the provision of public goods can subsequently indicate how it responds to the remittance windfall. The link between remittances and the state's response is, however, not well understood.

Empirically, it is challenging to analyze the impact of remittances on public goods and local development for several reasons. First, a positive correlation between remittances and local development could result from the fact that places with good outcomes facilitate higher remittances. Second, because only migrants remit, changes in migration policies potentially impact migration and remittance flow simultaneously. Remittances may influence the area of origin independent of migration, but the inextricable link between migration and remittances makes it difficult to study both independently. Third, comprehensive data is rare. Migration and remittance data are often only available as country-level estimates, limiting their use to cross-country regressions. Causal analyses typically rely on instrumental variables that lack validity or have low statistical power (Clemens & McKenzie, 2018).

In this paper, I address these issues by investigating the effect of remittances on both households and districts in Indonesia. I identify the effects of remittances by combining three sources of variation: the share of migration in different regions, the destination countries, and shifts in currency exchange rates over time. The latter provide unanticipated shocks to the size of remittances that households receive, and variations in the magnitude of the shock depend on the migration destination. Since the share of migration differs by region, this difference induces variation in the remittance shocks at the district level. I build on a similar strategy employed by Yang (2008) and Khanna et al. (2022) in the Philippines by estimating the reduced form effects of exchange rate shocks on outcomes in Indonesian districts. While a two-stage least squares estimation (2SLS) of the effects of remittances on outcomes is also of interest to my study, this approach requires data on actual remittances flow at the sub-national level, which is scarcely available, making it impossible for me to make such estimations.

Indonesia provides an excellent setting to study the impact of remittances on public goods

provision because nearly one million Indonesians migrate abroad annually. As such, Indonesia is the 14th largest remittance receiver in the world (World Bank, 2019). Indonesia also provides reliable subnational data, making it possible to exploit variations in destination and the scale of migration across hundreds of districts to overcome endogeneity challenges. The districts across Indonesia operate similarly under the same code of law, providing the opportunity to overcome the limitations of cross-country regressions, where unobserved variables may correlate with remittances and public goods provision.

I begin my analyses by showing that positive exchange rate changes increase the size of remittances migrants received by their households of origin. I use a migrant household panel (Doi et al., 2014) to conduct an out-of-sample analysis of the impact of exchange rates on remittances, and I find that origin households receive higher remittances when the Indonesian rupiah (IDR) depreciates against the migrants' host country's currency. This first stage result allows me to build a proxy measure for remittances through migrants' destination and corresponding exchange rate fluctuations.

Next, I leverage a unique dataset to construct a remittance proxy at the district level. Specifically, I obtained an administrative record of more than one million migrant returnees and use their destination and origin addresses to measure the district-level exposure to foreign currency shocks between 2005-2011. During this period, the global financial crisis led to sharp changes in currency exchange rates against the Indonesian rupiah (IDR) at varying magnitudes. For example, the US dollar (USD) and Saudi riyal (SAR) exchange rates to the IDR both rose by 23% between 2007-2009. In contrast, the value of the Korean won (KRW) decreased by 9%.[1] I construct a remittance proxy using the interaction of migration intensity and currency fluctuations. Districts with many migrants to countries with strongly appreciating currencies experience a positive remittance shock, while districts with few migrants whose destinations have weak currencies receive a negative remittance shock. I subsequently combine this measure with rich data from household surveys, school registries, and regional budget reports to estimate the effect of remittances.

I find that remittances improve development indicators. Specifically, they increase household expenditures, especially at the bottom quintile of the expenditure distribution. An increase in the remittance proxy by one standard deviation (SD), which corresponds to a back-of-the-envelope windfall of USD 260,000 to the economy in the given district, raises poor households' consumption by USD 2 per month (a 10 percent increase). Households also report a higher asset index, reflecting acquisitions of various durable assets such as motorcycles, refrigerators, and cooking gas canisters. Remittances also reduce the share of households living below the poverty line, the poverty gap, and inequality as measured by the Gini coefficient. Using regional GDP per capita as an indicator of development, I find a one SD shock is associated with 0.09 log points higher total GDP per capita. This magnitude corresponds to a ∼USD 55 increase at the mean.

[1]The monthly average exchange rates changed from IDR 8,827 (June 2007) to IDR 10,900 (January 2009) per USD. The Saudi riyal (SAR) is pegged to the USD at a rate of SAR 3.75 per USD. Within the same period, the KRW exchange rate changed from IDR 9.51 to 8.65 per KRW (Refinitiv Datastream, 2021).

Households can use remittances to invest in education, and remittances enable households to send more of their children to school. A one SD shock raises the enrollment rate by 3.7 percentage points (p.p.) for children aged 6-18 years in primary and secondary school. At each level, remittances raise enrollment by 3 p.p., 4 p.p., and 7 p.p. for primary (grades 1-6), junior secondary (grades 7-9), and senior secondary (grades 10-12) levels, respectively. Cohort-specific analysis shows children ages 6, 13, and 16 drive increased enrollment; this finding is important because each of these are the crucial ages when children begin each level. These effects represent a meaningful improvement in achieving universal basic education, particularly in a context where secondary level enrollments have lagged behind the near-universal primary enrollment.

As households invest in education, the state has responded accordingly. After the Soeharto regime fell, the Indonesian central government devolved responsibility for providing education services to district-level governments. In response to a one SD shock in remittances and subsequent increased enrollment, districts opened 0.87 more public primary schools and 0.27 more public junior high schools per 10,000 population one year after the shock. The coefficient for public senior secondary schools is positive but not statistically different from zero. To provide junior secondary schools, district governments expand existing primary schools, which allows new schools to be established rapidly with fewer classrooms and teachers. Because of the expansion, the increased enrollment reported by households may include the effect of relaxing the constraint on the school supply. Like the provision of education, the provision of other public goods under district governments' purview demonstrates a consistent pattern: the state expands access to services that complement household investments.

What drives this supply-side response to remittances? I consider two institutional contexts. First, districts are mandated by the constitution to allocate at least 20% of their budget for education expenditures. Education expenditure rose from 27% on average in 2006 to 41% in 2012. Second, the number of district governments increased from 440 to 514 in my study period due to the creation of smaller districts ("splitting") from existing district boundaries. Because split districts are smaller, the district center becomes closer to the average citizen (Bazzi & Gudgeon, 2021), which could play a role making the government more accountable in providing public service.

I find that remittances influence the provision of local public goods in two ways: by complementing the state's existing policy commitments and strengthening its accountability. When the remittance shocks occur after the district government allocates a higher share of its budget for education expenditures, I observe increased expansion of public schools. In this way, remittances complement commitments toward education, leading to increases in education investments. I also observe a positive interaction between remittances and an indicator of whether a district has split, which suggests that remittances play an important role in districts where accountability channels have strengthened.

On the other hand, my findings support neither taxation nor election-driven responses. Suppose that the state captures part of the economic boom through taxes; it could use these

funds to finance more public goods. Remittances are not taxed, but the government collects income and property taxes. Part of the revenues collected in the district by the central tax authority is apportioned back to the district budget. Districts also collect local taxes, such as hotel and vehicle taxes. Using budget reports from the Ministry of Finance, I find remittances did not lead to increased tax revenues for the district. It also appears that electoral concerns do not drive the response. There are no systematic differences in the provision of public goods during district election years when local politicians might build schools to win votes.

To address threats to causal identification, I consider potential violations of the identification assumption. First, I test the relationship between pre-period outcomes with subsequent remittances, and I find that future remittances do not predict past outcomes. Second, I account for differential trends by interacting year fixed effects with a set of indicators for island groups or baseline outcomes. The relationship between remittances and outcomes is robust to this check. Third, I construct a proxy for trade windfall from oil and gas and palm oil, Indonesia's primary export commodities. The coefficients for remittances did not change meaningfully with the inclusion of trade variables, indicating that commodity trade is unlikely to be the main driver of the observed results.

Literature. I contribute to the literature on the impact of international migration and remittances. Research on these topics has continued to grow, reflecting increased interest among policymakers. While the existing literature has established the positive effect of remittances on household income and consumption using cross-country analysis, it has come to diverging conclusions on economic growth.[2] Yang (2008) and Khanna et al. (2022) take advantage of a natural experiment based on the 1997 exchange rate shock in the Philippines to provide compelling evidence on the short- and long-term effects of remittances on migrant households and origin areas. I use a similar strategy in Indonesia, a new setting, to show that remittances increase household consumption, reduce poverty, and stimulate growth.

My paper provides two distinct contributions to the existing studies. First, I estimate the effects of remittances on public goods. Researchers have used cross-country data to link remittances to various governance outcomes. Abdih et al. (2012) and Ahmed (2012, 2013) proposed theoretical models arguing for the existence of a remittance curse, where remittances increase corruption and reduce political turnover. Others, however, have argued that the remittance curse model does not hold for political competition and that remittances are more likely to increase government spending on education in democracies (Desierto, 2018; Easton & Montinola, 2017). These conflicting results may be due to the difficulty of disentangling the endogenous link between state failure as indicated by corruption, the outmovement of migrants, and its subsequent remittance flow (Mosley & Singer, 2015). Variations in governance structure across countries may also further hinder analysis of how governments provide public goods. To overcome these obstacles, I study a setting where local governments provide public goods

[2]The cross-country regression literature has shown evidence for opposing views of the effects of remittances on growth. Giuliano & Ruiz-Arranz (2009) and Catrinescu et al. (2009) show positive effects, while Chami et al. (2008) and Le (2009) demonstrate negative effects. The cross-country analyses concur more with regard to the effects of remittances on poverty (Adams & Page, 2005; Gupta et al., 2009). For reviews of recent empirical evidence, see Yang (2011), Brown & Jimenez-Soto (2015), and Alpaslan et al. (2021).

according to a common governance structure, thereby allowing me to study the state's response to the remittance windfall.

Second, I utilize rich data from Indonesia to investigate the mechanisms through which the state responds to remittances. My datasets enable me to investigate the role of taxation, policy commitments, decentralization, and election in shaping the state's response to remittances and the patterns of public goods provision. Asatryan et al. (2017) find that remittances increase the likelihood of introducing the VAT. Decentralization-led district splitting could also influence public goods provision (Lewis, 2017; Cassidy & Velayudhan, 2022). Banerjee et al. (2007) highlight cases in India and elsewhere where top-down interventions financed by public budgets have been central to public goods expansion. Pierskalla & Sacks (2018, 2020) have documented that government spending and hiring in Indonesia are influenced by election cycles. Marx (2018) shows that elections incentivized African leaders to complete visible development projects. My findings, on the other hand, suggest that the state responds to remittances not through taxation or election but through policy commitments and increased accountability.

My work also contributes to the literature on human capital and migration. Recent studies have evaluated interventions designed to stimulate remittances for investment in education among Salvadoran and Philippine migrants (Ambler et al., 2015; de Arcangelis et al., 2015). These studies build on the literature that points to the positive effect of remittances on school enrollment (Edwards & Ureta, 2003; Yang, 2008; Amuedo-Dorantez & Pozo, 2010; Salas, 2014). Other studies have also linked migration opportunities to human capital investment (Dinkelman & Mariotti, 2016; Theoharides, 2018; Abarcar & Theoharides, 2021; Khanna & Morales, 2021). These studies focus on the response to education demand. Abarcar & Theoharides (2021) is a notable exception that also measures effects on the supply side and shows that expanding US visas for nurses led to the creation of new nursing programs at existing private tertiary institutions. Similarly, I measure changes in both the demand for and supply of education while focusing on the effects of remittances from low-skill migrants. My results contribute to the brain drain debate by providing evidence that low-skilled migration can induce brain gain.

2. The Indonesian Context: Migrants, Remittances, and Public Administration

2.1. Migrant Remittances

According to the Indonesian Central Bank, approximately four million Indonesians worked abroad between 2005-2012 (BI, 2022). The international migrants, known locally as TKI (*Tenaga Kerja Indonesia*), are mainly women with low education. Placement statistics from the agency for the placement and protection of Indonesian workers (BNP2TKI) indicate that about half of these women only completed primary education, and even fewer have completed secondary or post-secondary education (BNP2TKI, 2014).

Although the Indonesian government had intended to raise the educational requirement

to work abroad (Law 39/2004 on Migrant Placement), the Constitutional Court deemed the requirement unconstitutional. The current ruling upholds that six years of education in primary schools is sufficient for Indonesians to seek work placement abroad. Correspondingly, most of Indonesian migrants work in low-skilled jobs as housekeepers (61 percent), plantation workers (10 percent), or fisherman (5 percent, BNP2TKI, 2014).

The main countries to which Indonesians migrate include the following: Saudi Arabia and other Gulf countries, Malaysia, Taiwan, and Singapore (Appendix Table A.2, see also BI, 2022). Village census data reveals that a village's ethnicity and religious composition strongly influence the destination country. Migrants from a village are more likely to go to Arab countries rather than Malaysia or Singapore as the share of ethnic Arabs in the village increases, while the likelihood of migration to Hong Kong and Taiwan increases as the share of ethnic Chinese in the village grows (Bazzi, 2012). With respect to religion, the greater number of Christians living in the village correlates negatively with the likelihood migrants from the village working in Arab countries. Another key factor that influences a migrant worker's destination is the interaction with recruiters/"sponsors" in the village. These recruiters connect prospective migrants with a placement agency, and they are frequently the prospective migrant's first point of contact in starting their migration journey (Bazzi et al., 2021).

With their low education backgrounds and foreign working environment, Indonesian workers are especially vulnerable to exploitation. The Indonesian government recognized this vulnerability and established an agency for the placement and protection of Indonesian workers (BNP2TKI, Law 39/2004). The agency's responsibilities included the creation of a TKI service post at debarkation points–commonly referred to as the "migrant terminal" in Indonesian airports–where they recorded returning migrants' details and provided other relevant services. The administrative record from this terminal is a key component in the empirical analysis (subsection 3.3).

Indonesian migrants typically work under a fixed-term contract of 2-3 years (Bazzi, 2012). Prior to their departure, the migrants sign a contract with an agency that is then responsible for their training and preparation (Bazzi et al., 2021). The contract stipulates the worker's salary in the destination country's currency (Bazzi et al., 2021), and the salary remains fixed for the duration of the contract. Nevertheless, because the Indonesian rupiah (IDR) uses a floating rate, the migrant's salary in IDR fluctuates based on the exchange rate between the destination country's currency to IDR.

Indonesian migrant workers remitted more than USD 11 billion in 2018, making Indonesia the 7th largest remittance receiver in Asia and the 14th largest in the world (World Bank, 2019). A survey of migrants in four Asian countries documented that Indonesian workers send remittances multiple times a year: workers in Hong Kong on average remit monthly, while workers in Singapore send money on average every four months (ADB, 2006). Former female migrants surveyed in Bazzi et al. (2021) report remitting, on average, USD 183 to their families per month. A summary of survey-based remittance estimates in the literature is listed in Appendix Table A.3. Remittance recipients rank education expenses as one of the top three

expenditures to which they allocate the funds that they receive (ADB, 2006). This suggests that remittances may influence education-seeking behavior at home.

Nearly all remittance recipients in the ADB study reported receiving remittances money through banking institutions (2006). Banks and Money Transfer Operators (MTOs) report transaction statistics to the Central Bank, which publishes national aggregate remittance data. While disaggregated data by region are not publicly available, news reports covering important milestones in remittance transactions exist. For example, the post office in Cirebon reported that remittances within the district had reached USD 40 million in 2013 (Tribun News, 2013).

Although the Indonesian government is aware of remittance flow into the country, the government does not tax remittances. Government officials have observed that the remittance flow into Indonesia exceeds the revenues from tax amnesty (Media Indonesia, 2017). At the same time, the state's capacity to enforce taxation is weak: out of a population of 255 million, fewer than one million people pay their taxes (Bloomberg, 2016). Furthermore, Government officials have also spoken of remitting workers as "foreign currency heroes" (Media Indonesia, 2017).

2.2. Local Public Administration

After the Soeharto regime fell in 1998, the Indonesian central government devolved its responsibility for frontline service provision to district-level governments. This policy environment underlies the selection of my outcomes of interest to analyze the state's responses to remittances and focus on key services managed by local governments.

In Indonesia, education is a key service that local governments are responsible for providing. Public schools comprise 76 percent of all schools under the purview of the Ministry of Education, and 83 percent of students are enrolled in public schools (Bazzi et al., 2022). Students progress through three levels of education: primary (grades 1-6, for children ages 6-12 years), junior secondary (grades 7-9, for children ages 13-15 years), and senior secondary (grades 10-12, for children ages 16-18 years). The primary and junior secondary levels are compulsory. Although enrollment is nearly 100 percent at the primary level, this number drops to 67 percent at the junior secondary level and 42 percent at senior secondary level due to attrition. In this way, the junior secondary levels present the next bottleneck in ensuring education access for all.

Local governments must also provide other types of public goods, including piped water, electricity, and roads. Piped water is a public investment in clean water managed by district government-owned enterprises. Piped water stands in contrast to other safe drinking water sources such as bottled water, protected wells, or boreholes, which households access through private investments. Districts also provide electricity through a state-owned enterprise, and grid capacity commonly constrains households from accessing this service. Residents are required to pay a complementary private fee to connect to both electricity and piped water. The local government also manages roads. High quality roads in Indonesia are paved with asphalt, but roads in some villages may be paved only with gravel or dirt. In some cases, improvements in

village roads are often funded partly by informal taxes that the villagers pay in form of labor or goods (Olken & Singhal, 2011).

District mayors play an important role in the local delivery of public services. Since 2005, mayors in Indonesian districts have been elected by popular vote every five years. Citizens directly vote for mayoral candidates in district elections, which are held at a different time than the presidential and legislative elections. Election timing varies across districts for two reasons: (1) the terms of mayors who were appointed by Soeharto began at different times, a practice which carried over even after the direct election system was introduced, and (2) massive decentralization reform that has taken place since 2000 has led to the creation of new districts (splitting), which require the election of new mayors; needless to say, these elections occurred as needed, thereby perpetuating the already idiosyncratic election cycle (Martinez-Bravo et al., 2019; Pierskalla & Sacks, 2018, 2020).

The reform process has led to decentralization and the creation of new, smaller districts within existing district boundaries, a process known as "district splits" (Bazzi & Gudgeon, 2021; Cassidy & Velayudhan, 2022). Between 2004-2012, 57 districts were split into 131 smaller districts, which make up roughly a quarter of the total districts in my sample. Overall, the division of existing districts increased the number of districts from 440 to 514. Most splits occurred outside Java, where the average district area is greater, and the land is less densely populated. Nevertheless, eight new smaller districts were also created in Java during the same period. Proponents of district splits argue that the closer proximity between district centers and citizens can improve governance.

To provide services, district governments follow a budget proposed by mayors and approved by the district parliament. The operations are financed through several sources of revenue: general grants (DAU, 61 percent), central tax revenue share (8 percent), special allocation grants (DAK, 7 percent), local taxes (6.5 percent), and natural resource revenue share (6 percent). The DAU grants are formulaic transfers that depend on the district's mostly fixed characteristics, e.g., its land area and population size (Brodjonegoro & Martinez-Vasquez 2005).

The central government collects income taxes, property taxes, and tobacco excise and then returns a portion of the revenue to district governments based on the following predetermined formula: 12 percent of total collected income tax and 9 percent of total collected property tax. This revenue is reported as a Tax Revenue Share (DBH). The DAK grants are conditional, matching transfers provided by the central government on a discretionary basis. Districts need to match at least 10 percent of the funds provided by the central government. Funds are earmarked for the construction of education facilities and other types of infrastructure (see Cassidy 2021). Revenues from local taxes are classified as Own Source Revenue (PAD) and based on local taxes and fees imposed by the district governments (i.e., vehicle and hotel taxes).

Districts are mandated by the constitution to spend 20 percent of their budgets on education. Government regulations require that district expenditures on education cover teachers' salaries and benefits, asset purchases for education facilities, and social assistance/education

scholarships (PMK 84/2009). Despite the mandate, the share for expenditures varies between districts, and the average district spends 35 percent of its budget on education.

3. Data and Methodology

3.1. Data

To analyze the effects of remittances, I combine district-level data that includes a collection of official statistics, household surveys, and administrative records. I also use several household-level panels as auxiliary datasets to perform out-of-sample analysis and investigate the channels by which remittances induce effects on the outcomes of interest.

Migration datasets. My analysis draws from two main migration data sources: village survey data and administrative records of migrant arrivals. The Village Potential (Podes) surveys collect data from village heads every 2–3 years. This data includes the number of migrants from each village. The survey covers the universe of Indonesian villages, and I aggregate the village-level information to the district level. This granular data collection allows me to conduct a complete estimation of the intensity of migration from each district.

I use administrative records of migrant departures and arrivals to obtain information on migration destinations. These records come from the "migrant terminal" at the Soekarno-Hatta International Airport. Located about 20 km from Indonesia's capital, it is the primary point of departure for migrants leaving the country to work abroad. For returning migrants, officials at the migrant terminal record the migrant's gender, date of departure, date of return, country of work, and origin district. From March 2008-2011, the terminal recorded 1,006,241 migrants from 366 districts returning from 116 countries. I use the departure and arrival dates to measure the monthly destination mix for each district and create a district-month-country level dataset.

I merge the aforementioned administrative records with exchange rates of various currencies to IDR using Refinitiv Datastream (2021). I also utilized supplementary sources described in the Appendix for currencies without direct information on exchange rate to IDR. Exchange rate observations are recorded monthly and expressed as relative changes to the exchange rates in June 2007, one year before the exchange rate upheaval of the Global Financial Crisis of 2008 (see Figure 1).

Outcomes. Indicators on district development come from the Indo-Dapoer database compiled by the World Bank. Indo-Dapoer compiles regional gross domestic product (GDP) data, poverty indicators, and district government budgets from official statistics. It also compiles district-level averages of household expenditures as well as district infrastructure from representative household surveys and the Podes village survey.

I measure school enrollment and asset ownership directly from the 2005-2012 National Socio-Economic Surveys (Susenas). Both measures capture household investment: durable assets can indicate improved living conditions, while school enrollment reflects migrants' oft-cited motivation to provide a better future for their families through education. The Susenas

surveys are repeated cross-section household surveys with representative samples at the district level. The details of individual household members allow disaggregation of education statistics by gender and age. Susenas also provides household housing information, including the source of drinking water and various durable assets. Some questions are only available for a subset of years; for example, information on whether a household member is working overseas is only available until 2007, while asset questions are only available from 2010.

I use school availability as the primary measure of the provision of public goods, which interacts with household investments. As the state is the dominant provider, I draw from the Dapodik school registry maintained by the Ministry of Education. Dapodik registry includes all operating primary, junior secondary, and senior secondary schools under the ministry's purview. It records each school's location, amenities, year of establishment, and an indicator of whether the school is public or private. I describe these datasets in more detail in the Data Appendix.

Supplementary datasets. I use other datasets in the form of household or village surveys designed for other studies to supplement my district-level analysis. While these surveys are more limited in their geographic or temporal coverages, they provide more detailed information on migration, remittances, or other variables relevant to my outcomes of interest.

In order to test the effect of exchange rates on remittances, I use migrant data from Doi et al. (2014), which includes a panel of 400 East Java households with a member migrating to work in other Asian countries. Households are selected into the sample based on their eligibility to receive pre-departure financial literacy training. Respondents were followed over the course of three waves that took place between 2011-2012. At each wave, information on remittances received by the household at home was collected. While this data provides rarely collected panel information on remittances receipt, its geographical and temporal scope is limited.

I also use SPKP survey data, which was collected to evaluate the impact of a conditional cash transfer program and a community block grant program (Alatas, 2011; Olken et al., 2014; Cahyadi et al., 2020). This rich data includes household participation in community activities and governance at the grassroots level. Respondents were drawn from five provinces, and their coverage varied between survey waves from 2007-2014. Similar to the migrant panel data, the SPKP collected detailed information in a limited sample.

3.2. Remittances and Exchange Rate Shocks

The remittance flow between countries is estimated based on the share of migrants in a given country and the host country's characteristics (IMF, 2009; KNOMAD, 2017; Ratha & Shaw, 2007). These characteristics include changes in the host country's exchange rate, although the effects are ex-ante ambiguous. When the currency of the migrant's host country appreciates relative to the country of origin, transfers of a fixed amount in the host country's currency will increase the size of remittances (Yang, 2008). If, however, migrants want their families to receive a fixed sum, then exchange rate fluctuations will have no effect on the remittances received.

Using an auxiliary out-of-sample dataset, I first test the effect of currency fluctuations on the size of remittances received by households of origin. I construct the exchange rate change measure for each migrant following Yang (2006, 2008) and other studies that examine the effect of remittances in the Philippines in the aftermath of the Asian financial crisis (Yang & Martinez, 2005; Khanna et al., 2022) using the following equation:

$$XRshock_{it} = \frac{\text{FX rate to IDR}_{ict}}{\text{FX rate to IDR}^{o}_{ic}} \tag{1}$$

I define the exchange rate shock as the appreciation or depreciation of migrant i's host country's currency c to Indonesian Rupiah (IDR) at time t, relative to reference period o. The exchange rate to IDR fluctuates whenever each migrant sends remittances home.

The panel data of migrant households from Doi et al. (2014) allows me to add migrant fixed effects, thereby addressing self-selection bias in typical cross-sectional estimation of remittances (Funkhouser, 2012). In this regard, I estimate the following equation:

$$Remittances_{it} = \alpha + \beta XRshock_{it} + \gamma X_{it} + \theta_i + \phi_t + +\varepsilon_{it}. \tag{2}$$

where $Remittances_{it}$ is the amount received by migrant i's household of origin at time t. The coefficient of interest is β, which expresses changes in remittances due to fluctuations in the relative exchange rate to IDR, $XRShock$. Both $Remittances$ and $XRShock$ are standardized to have a mean of zero and a standard deviation of one. The migrant fixed effect term, θ_i, adjusts for time-invariant characteristics of the household of origin and the household member who migrates. Effects from the migrant's unobserved invariant characteristics are also absorbed by the migrant fixed effects. The survey wave fixed effect term ϕ_t controls for time effects common to all respondents in each survey wave. The X_{it} vector adjusts for other time-varying characteristics. Standard errors are clustered at the household level.

I argue that the exchange rate shock that each migrant experiences is plausibly exogenous conditional on the included control variables. Migrants take the exchange rate as given: they transfer remittances in small amounts relative to the economy and thus are unlikely to alter the exchange rate, ruling out reverse causality. Furthermore, migrant families cannot anticipate changes in the exchange rate.[3]

I also include the following control variables that could drive variations in remittances: migrant's duration abroad and amount of time to the next religious holiday (Eid al-Fitr). Duration abroad proxies for the migrant's experience, which may help the individual find a

[3]Two descriptive statistics lend support to this argument. First, 60% of remitters in the Doi et al. (2014) survey stated at baseline that they have either never heard of the term "exchange rate" or they do not understand the meaning of the term. Second, a survey of 5,564 former migrants from Bazzi et al. (2021) shows that only 2% of respondents have their contracts state their salaries in IDR. For the majority, on the other hand, their salaries are denominated in dollars, dinars, or riyals in their contracts. Consequently, if they were to send a fixed portion of their salaries, then their remittances would be subject to currency rate fluctuations. In a different setting—namely, a survey of Tongan migrants in New Zealand— 39% of respondents send a constant amount of NZD each month (Gibson et al., 2006). In contrast, only 14% of remitters attempted to send a constant amount of Tongan pa'anga each month. The majority of respondents (48%) sent remittances only for special occasions (Gibson et al., 2006).

better currency conversion and transfer service with a cheaper fee or a better exchange rate. Migrants may also be more likely to send money to family on the occasion of a religious holiday. For Muslims, who comprise the majority of the Indonesian population, Eid al-Fitr is the biggest annual religious holiday. Overseas migrants facing costly travels are less likely to return home, especially if they work in non-Muslim countries. In such cases, migrants might send more remittances to their families for a religious holiday in order to help defray the cost of the festivities.

I reanalyze the Doi et al. (2014) data and focus on a subsample of migrant households of origin that receive remittances. This definition leaves 418 observations in my sample, which includes 183 households with migrants working in Taiwan, Hong Kong, Malaysia, or Singapore (see Appendix for details). The Doi et al. follow-up surveys were administered in three waves between 2011-2012. In each follow-up, households were asked the IDR amount of remittances that they received from their migrant family member. They reported having received an average of IDR 9.5 million (USD 1,119) total remittances since their family member migrated. With an average transfer frequency of 4.5, this corresponds to an average of ∼USD250 per transfer.[4]

Because the survey phrased the remittance question as the total remittances received since the migrant's departure, I use total remittances in the first follow-up and the difference from the previous response in subsequent follow-ups as the measure of remittances for each period. I transform this measure with natural logarithm and standardize it in the regression of equation (2). Migrants in the panel comprise the evaluation sample of a financial literacy RCT where treatment was randomized at the household level so that the intervention's effects are absorbed by the migrant fixed effect.[5] I use the monthly average exchange rate for the follow-up survey month as the observed exchange rate. I fix the reference period to March 2011, the month of the first follow-up survey after the respondents began working abroad. The time to the next Eid al-Fitr is calculated based on the 2011 and 2012 dates.

Workers in Hong Kong observed an average exchange rate of IDR 1,123 per Hong Kong dollar (HKD) in March 2011, and by January 2012, the rate had appreciated by 3.8 percent (Figure A.1; Refinitiv Datastream (2021)). At the same time, the exchange rate to Taiwan Dollar (TWD) appreciated by only 1.6 percent (IDR 296.7/TWD to IDR 301.7/TWD). In these two examples, the raw measure of exchange rate shock for HKD and TWD are 1.038 and 1.016, respectively. Overall, the average raw exchange rate shock for migrants in my sample is 0.995 in the second follow-up and 1.029 in the last follow-up. Table 1 (Panel A) presents the summary statistics of the main outcome and the regressor variables for my estimation sample.

Results. Migrant households of origin receive more remittances when the currency of the migrant's host country appreciates against the IDR. Table 2 presents the estimation results of

[4]Gibson and McKenzie (2017) surveyed pairs of Tongan immigrants to New Zealand and their households of origin in Tonga, and they found that the survey responses produce reliable estimates (i.e., remitters and receivers consistently reported sending and receiving the same transactions, respectively).

[5]The original analysis showed that none of the treatment arms have significant effects on the likelihood of receiving remittances, the frequency of remittances, or the amount received (Doi et al., 2014).

equation (2), with the progressive addition of control variables from Columns 1-4. OLS correlation of remittances and exchange rate shocks is positive, and with the inclusion of migrant and survey wave fixed effects, the estimated coefficient for a one standard deviation exchange rate shock rose to a 0.38 standard deviation of remittances (Column 2). The magnitude is in line with the responses reported by Philippines migrants' households of origin to the 1998 exchange rate shocks (0.6, see Yang, 2008). This relationship is robust to two additional variables that may influence the amount of money remitted: duration abroad and amount of time to the next religious holiday (Columns 3-4).

These findings present one of the first systematic investigations to link remittance responses to exchange rate fluctuations using household panel data. Prior research has used cross-section and aggregate data to argue that the resilience of remittances during the 2008 Financial Crisis is due to the depreciation of South Asian currencies against Gulf countries' currencies (Sirkeci et al., 2012). Remittances to Nepal rose by 28% in Quarter 1 of 2009 (Riester, 2012; Mohapatra et al., 2012), and 94% of migrant households in South Asia reported regularly receiving remittances during that period (Rajan & Narayana, 2012). Researchers have argued that migrants are willing to absorb negative shocks in order to continue sending remittances; to this end, unskilled migrants in the Gulf reported sharing accommodations and reducing their food consumption to save money to send home (Sirkeci et al., 2012).[6] In estimating remittances from pre-World War I migration out of Europe, Esteves & Khoudour-Casteras (2010) write that "migrants often waited for the most favorable exchange rates before sending money [to Europe]." The panel structure of the data that I use provides a way to mitigate self-selection bias among migrants and remitters in cross-sectional data (Funkhouser, 2012). Furthermore, the Doi et al. (2014) survey explicitly collected information on remittances to migrant households, which is rarely captured in general purpose household surveys conducted in developing countries.[7]

It is unlikely that my results are due to Indonesian migrants responding to exchange rate changes by changing jobs or industries because every instance of migration is based on a fixed-term contract that a migrant signs prior to departure, making it difficult (if not impossible) for migrants to change employment while abroad. For my analysis sample, the positive relationship could be driven by an increased frequency of sending remittances. Appendix Table A.4 suggests remittance transactions increased with positive exchange rate shocks. If remittance transactions are costless/free, then the total remittances received at home will increase mechanically with the full amount of the additional transfer. However, migrant households of origin do not receive the full amount because each transaction is subject to bank and MTO fees.

[6] Using analysis of single country time series or cross-country regressions, researchers have also argued that currency depreciation causes increases in remittances. Studies with single-country time series have used aggregate data from countries with a high ratio of remittances to GDP, such as Samoa (Chamon et al., 2005), Tonga (Lin, 2001), and Nepal (Pant & Budha, 2016). Effect sizes range from 1.17 in Nepal to 4.67 for remittances to non-profit organizations in Tonga.

[7] Only 47 of 10,992 households in the Indonesia Family Life Survey (IFLS) panel reported receiving international remittances (Cuecuecha and Adams, 2016). It is important to note, however, that the IFLS was not designed as a remittance survey.

3.3. Constructing A Proxy Measure for District-Level Remittances and Regression Specification

Analyzing the effects of remittances on the area of origin necessitates sub-national remittance data, which is scarcely available.[8] In the absence of direct observations, I construct a proxy for remittance flow.

To construct the district-level proxy, I follow an approach analogous to the construction of bilateral remittance flow estimates (KNOMAD, 2017; Ratha & Shaw, 2007)—namely, I use exchange rate shocks and variations in migration intensity as the determinants of the proxy. The exchange rate shock for each district is defined as follows:

$$XRshock_{dt} = \frac{1}{mig_{dt}} \sum_{c} mig_{dct} \frac{\text{FX rate to IDR}_{ct}}{\text{FX rate to IDR}_{c}^{o}} \tag{3}$$

where d indexes districts, c indexes destination countries, and t indexes years. The mig_{dct} is thus the number of migrants from a district d who are abroad in country c in year t. The latter denotes the relative appreciation or depreciation of the host country's currency relative to a reference period o. This shock variable essentially averages the foreign exchange rate shocks its migrants face due to their locations, using the share of its migrants in each destination as the weight. In this way, the $XRshock_{dt}$ variable represents the variation in remittance flow a district will receive due to currency rate fluctuation from its destination mix in a given year.

I complement the above calculations with a measure of the district's migration intensity at baseline, which I define as the natural log of the proportion of its migrant workers per a population of one million inhabitants.

$$MigShare_{d}^{0} = \log(\frac{migrant_{d}}{pop_{d}}). \tag{4}$$

The remittance proxy is the interaction between the exchange rate shock and migration intensity, which I use in the following regression:

$$Y_{dt} = \alpha + \beta MigShare_{d}^{0} \times XRshock_{dt-1} + \gamma XRshock_{dt-1} + \theta_t + \theta_d + \varepsilon_{dt} \tag{5}$$

where Y_{dt} is the outcome of interest. In this case, we are interested in the β coefficient for the interaction term of migration intensity and exchange rate shock, which serves as the proxy for remittance flow to the district. The interacted $XRshock$ term is lagged by one period to $t-1$ to alleviate concerns of reverse causality between the outcome of interest and the remittance proxy, since the shock precedes any changes in the outcome of interest. The regression equation also includes the time-varying $XRshock_{dt-1}$ as a control, which is also lagged by one year. The baseline district migration intensity is absorbed by the district fixed effect θ_d, which captures

[8] The International Monetary Fund's International Transaction in Remittances: Guide for Compilers and Users notes that, "options for direct measurement of remittance transactions are very limited (IMF 2009, p.46)." The Indonesian Central Bank publishes national remittance estimates aggregated from reports by commercial banks and MTOs to the central bank. Staff from one of Indonesia's largest banks with knowledge of the bank's remittance desk operations described these reports as proprietary and confidential.

the variation in outcomes due to the district's time-invariant characteristics. θ_t is the year fixed effects that capture common time effects shared across all districts. The term ε_{dt} is a mean-zero error term. Standard errors in this estimation are clustered at the district level.

The β coefficient could be interpreted as a reduced form estimate from a two-stage least square (2SLS) estimation. In the 2SLS framework, the first stage is the regression of remittances on the plausibly exogenous interaction term, and the second stage is the regression of the outcome variable on the predicted remittances. For the reduced form, a causal interpretation of β relies on the identification assumption that unobserved determinants of outcomes in the district must be unrelated to the interaction term conditional on control variables and fixed effects. The interaction term is plausibly exogenous, as omitted variables in the error term would need to be distributed in a similar manner as the district's migration intensity, its destination countries, and the fluctuations of its currency exchange rates simultaneously.

Using this construction, I find that there is considerable variation in the exchange rate shock to which districts are exposed. This variation is driven by the variation of destination countries. For example, a comparison of the Purwakarta district in West Java and Pesawaran in Lampung shows that 95 percent of Purwakarta migrants worked in Saudi Arabia or Gulf countries, while only 70 percent of Pesawaran migrants worked in the same region. At the same time, a much smaller proportion of Purwakarta migrants worked in Malaysia or Singapore (2 percent) compared to migrants from Pesawaran (21 percent). These differences in the destination mix channel different magnitudes of exchange rate shocks. Compared to June 2007, Purwakarta migrants on average saw their host country's currency appreciate by 5.6 p.p. in 2008, while Pesawaran migrants' average currency appreciation was 10.1 p.p. due to its smaller exposure to SAR (which is pegged to the USD). One year later, Purwakarta migrants' average currency exchange rate rose steeply by 10.3 p.p., while Pesawaran migrants only rose by 1.5 p.p.

There are considerable spatial and temporal variations in the resulting remittance proxy measure. I plot the residual variation in the remittance proxy measure after adjusting for the exchange rate fluctuation, district fixed effects, and year fixed effects and superimpose them on the district boundaries in Figures 2-3. The colors of the districts on the map indicate the magnitude of the residual variation, where the blue color denotes exposure to a smaller remittance shock while the red color denotes exposure to a higher remittance shock. Prior to the Global Financial Crisis of 2008, districts with positive shocks are scattered across all main island groups, mainly in Riau in Sumatera, some urban districts in Java, and districts in Kalimantan and Northern/Central Sulawesi (Figure 2). After the rapid currency valuation change in 2010, considerable variation in the districts that received greater shocks occurred (Figure 3). While many districts in Java ended the year with a positive shock, some benefited considerably less from the remittance shock and remained blue on the map in 2010. Similarly, not all southern Sumatera and southern Sulawesi districts benefited from the exchange rate shock and, therefore, some districts remained blue.

It is unlikely that these variations capture only an unobserved trend in the outcomes of

interest, since future remittances are not correlated with past district outcomes. In Table 3, I report the coefficients resulting from regressing equation (5). In this instance, however, I shift the right hand side variable forward by three periods to capture future remittances. If the remittance variable is merely a proxy for an unobserved trend, then a statistically significant correlation between this "future" remittance and past outcomes should result. I run this regression on my main outcomes—a set of outcomes on enrollment and public goods—and, reassuringly, find that the magnitude of the coefficients is small and statistically indistinguishable from zero.

What is the size of the aggregate windfall? Summary statistics from the migrant panel survey suggest that districts with the normalized remittance proxy of one receive ∼USD 45,000 more remittances per 100,000 people compared to districts at the mean of remittance proxy distribution. Given the average population size of 588,456 for districts in my sample, a back-of-the-envelope calculation suggests a windfall of USD 260,000 to the district for every one standard deviation of the remittance proxy shock. This figure is roughly half of the average district budget for social protection in 2008, underscoring the significance of this financial flow to the region.[9]

4. The Development Impacts of Remittances

Remittance shocks provide extra resources to households, which they can consume and/or invest. In this section, I look at the effects of remittances on household expenditures and asset ownership. At the aggregate level, I look into poverty outcomes and GDP per capita per sector.

4.1. Remittances Increase Consumption

Remittances allow migrants to support their families directly. In turn, the additional funds enable families to increase their consumption. I test this relationship by estimating equation (5) on consumption outcomes. I look at key consumption indicators: the monthly expenditure per capita for the average household and the household in the bottom quintile as well as per capita expenditures on education. All variables are in log IDR unit. Data for these indicators come from Dapoer, which aggregates household responses in Susenas to create district averages. Table 4, Panel A presents the results.

I find that remittances increase household consumption, especially for those at the bottom of the expenditure distribution. They also increase investment in education. For households in the lowest quintile, a one standard deviation (SD) of remittance proxy shock increases the average household expenditure per capita by 0.10 log points (Column 2). This coefficient is more than twice the coefficient for the average household, which lacks the precision to be statistically significantly different from zero (Column 1). The shock also increases the monthly per capita expenditure for education by 0.28 log points. These increases are unlikely to be

[9] In comparison, Dinkelman et al. (2020) estimated that Malawi migrants working in a South African mine created a capital flow of USD 115,000 on average per district in 1973.

a mechanical response to rising prices. In Column 4, I regress the core price index from 47 districts, which is benchmarked to the 2007 price. I cannot reject the null hypothesis that remittances have no effect on price. Although the estimate is positive, it is smaller than the 7 percent average annual inflation rate for the 2005-2012 period, and I can rule out effects larger than 6 percent (3.19×1.96). The increases that I observe in household consumption are thus unlikely to be an artifact of mechanical responses to rising prices. I defer the discussion on the robustness of the results in this section and the next to section 6.

The effect of remittances on consumption is comparable to a government cash transfer program. At the mean, the remittance proxy coefficient implies a higher monthly per capita consumption of IDR 18.5 thousand for the bottom quintile households. In the same time period, Alatas (2011) evaluated PKH, an Indonesian social protection program that provides IDR 200-600 thousand per quarter to eligible households. She found that found that the program raises beneficiary households' consumption per capita by IDR 19 thousand per month, approximately 10 percent of the mean. Meanwhile, my estimated effect on education expenditure is similar to the estimates from the Philippines. Yang (2008) found that migrant households with overseas members raise their education expenditure by 55 percent in response to the exchange rate shocks due to the 1998 crisis; however, he did not observe an effect on the overall household consumption.

4.2. Remittances Increase Asset Ownership and Reduce Poverty

Remittances may finance purchases of durable assets, which is often the preferred mode of investment among households in developing countries. I use an asset index to summarize household asset ownership in the 2010-2012 Susenas surveys.[10]

I find remittances increase the asset ownership index by 0.03 (Panel B, Column 1). This value represents 16 percent of the dependent variable mean. The assets included are motorcycles, cars, bicycles, refrigerators, natural gas canisters, water heaters, air conditioners, cable TVs, and boats. Appendix Table A.7 presents a detailed breakdown by each asset. I estimate precise effects in vehicle ownership, with 4-7 p.p. increases for motorcycles, cars, and bicycles. Motorcycles are the most common vehicles in my sample; three-fifths of households own a motorcycle. Cars, on the other hand, are the least common asset, with a rate of less than one-fifth ownership. Households also appear to acquire refrigerators and natural gas canisters in response to the remittance proxy shock. Specifically, 15 p.p. more households have refrigerators and 10 p.p. more households use 12 kg gas canisters due to a one SD remittance shock, which reflects an increase in the average ownership rate of 17 percent and 12 percent, respectively. These results are consistent with the reported use of remittances from the migrant panel data. Appendix Table A.8 reports the coefficients from the regression of equation (2) with reported remittance use as the outcomes of interest. Households of origin in the migrant panel data use the increased remittances to purchase electronics and durables.

[10]This aggregation improves the statistical power to detect effects that move in the same direction within a domain (Kling et al., 2007; see also a similar asset index in Martinez-Bravo et al., 2017). All individual asset variables share a common range of [0,1].

A series of studies from other settings report increased investment in electronics and durables after households receive remittances or other transfers. For example, benefiting from the 1998 exchange rate shocks, Philippine migrant households responded by purchasing vehicles and radios (Yang, 2008). In a different context, Mexican households receiving cash from the Oportunidades program invested 25 percent of the transfer in productive assets (Gertler et al., 2012). Early descriptive work on Indonesian migrants from Java and East Nusa Tenggara described similar responses to increased income, reporting that migrant families used remittances to buy refrigerators, televisions, radios, motorcycles, and houses (Sukamdi et al., 2004).

More broadly, asset ownership can indicate an escape from poverty. Developing country governments frequently determine poverty status using asset-based proxy-means tests in the absence of complete household income data (Banerjee et al., 2020). Using three different measures—share of district population living below the poverty line, the poverty gap, and Gini coefficient, I examine the effect of remittances on poverty and inequality. The poverty gap is a measure of poverty intensity, while the Gini coefficient serves as a measure of inequality.

Remittances reduce poverty. With households in the bottom quintile showing the strongest gain in household expenditures due to remittances, the added income translates into a reduction in district poverty rate. A one SD remittance proxy shock reduces poverty by nearly 4 p.p., roughly a quarter of the mean poverty rate of 15 percent. It also reduces the poverty gap by 1.3 p.p., nearly halving the mean distance of 2.7 percent between the poor's income with the poverty line. These results underscore the power remittances have to alleviate poverty. My findings echo results from the Philippines, where remittance shocks due to 1998 exchange rate depreciation reduced the incidence of household poverty by two thirds of the pre-crisis mean and offset the mean increase in poverty gap in the aftermath of the crisis (Yang & Martinez, 2005). In addition to poor households primarily benefitting from remittances, I also observed a reduction in Gini coefficient by 0.03, one-tenth of the mean dependent variable in the sample.

4.3. Remittances Lead to Economic Growth

In aggregate, the infusion of resources due to remittances can stimulate growth. To measure growth, I use the district-level gross domestic product (GDP) from Indo-Dapoer, which is calculated and published in official reports issued by an independent statistical agency. Indonesia is one of the few developing countries in the world with reliable regional GDP estimates, and it has been used to benchmark night light satellite data with economic growth measures (Gibson et al., 2021). GDP data is expressed in constant price, benchmarked to the year 2000. I first divide the district GDP figure by population to obtain the GDP per capita value in IDR, and then transform it with a natural logarithm. I group the GDP figure into three major sectors: agriculture, service, and manufacturing. Table 4, Panel C reports the results.

Remittances increase the overall GDP per capita in the district, and the agriculture and service sectors drive this increase. A one SD remittance proxy shock leads to an increase of 0.09 log points in the overall GDP per capita (Column 1). It also leads to an increase in GDP per capita in the agriculture sector (0.13 log points, Column 2), the service sector (0.24 log

points, Column 3), and the manufacturing sector (0.19 log points, Column 4) one year after the shock. The coefficients are most precisely estimated for the agriculture sector, while the estimate for the manufacturing sector is not statistically significantly different from zero. At the mean, the increase is equivalent to higher total GDP per capita by IDR 507,571 or USD 55 at the 2010 exchange rate. This estimate is roughly one-third the effect on the global income in the Philippines one decade after the 1998 exchange rate shocks (Khanna et al., 2022).

The increase in GDP per capita for agriculture possibly reflects the composition of the migrant workers, who come predominantly from agricultural households, while household purchases of goods and use of financial institutions and other services may contribute to the boost in service GDP.[11]

5. Remittances and Education Investments

Education provides a path toward development through investment in human capital. Remittances can relax the budget constraints that prevent households from investing in education. Because education services are commonly provided by the state, analysis of state policies can reveal of the different ways in which the state responds to remittances.

5.1. Remittances Increase Enrollment

I investigate the effect of remittances on enrollment in Table 5. Net enrollment ratio expresses the total school-age students enrolled in schools as a percentage of the population of the same age group. Using age and enrollment information from Susenas, I estimate the effects for all children, and separately by gender.

Remittances increase school enrollments. A one SD shock is associated with 3.7 p.p increase in school enrollment among children ages 6-18 (Panel A, Column 1). In the wake of such shocks, enrollment rates increase for all education levels, with a 3 p.p. increase for primary level, a 4.4 pp. increase for junior secondary level, and a 7.5 p.p. increase for senior secondary level. The smaller impact on the primary level may reflect less room for improvement, as enrollment at this level is already near universal. However, the increase in secondary education enrollment is particularly noteworthy, since participation rates in post-primary education have lagged behind the primary level. These results are robust to an alternate estimation using individual survey weights (Appendix Table A.6).

The effects of remittances on school enrollment differ by gender for different education levels. Panel B and C of Table 5 present the effects of remittances on enrollments for boys and girls, respectively. At the primary level, girls demonstrate a 3.8 p.p. higher enrollment rate in response to a one SD shock, which is 50 percent higher than the estimate for boys at 2.5 p.p. However, the gains in secondary school enrollments mainly reflect the gains in enrollments for boys in junior secondary (6.3 p.p.) and senior secondary (12 p.p.). In contrast,

[11] See Appendix Table A.23 for estimated effects on employment outcomes: remittances do not appear to change the sectoral composition of employment although it reduces the size of the total labor force.

the enrollment gain for girls is merely one-fourth to one-third of the effect sizes for boys. These gendered responses hint at the possibility that some girls forego secondary education to work as migrants. The windfall may send the message that only primary education is important, since women with only primary school education sent the remittances.

5.1.1. Enrollments at School-Entry Age

To verify that the coefficients on remittance proxy from the regressions with enrollment rates as the outcome variable do, in fact, capture the response on the demand for education, I use individual survey data to examine the cohort-specific responses. I estimate the following equation:

$$\begin{aligned} Y_{iaudt} = \alpha + \phi\, CohortTreat_a \times Mig_u \times XRshock_{dt-1} + \beta Mig_u \times XRshock_{dt-1} + \lambda\, CohortTreat_a \\ + \delta\, CohortTreat_a \times Mig_u + \ \xi\, CohortTreat_a \times XRshock_{dt-1} + \eta\, Mig_u + \gamma XRshock_{dt-1} \\ + \theta_d + \theta_t + \varepsilon_{iaudt}. \end{aligned} \tag{6}$$

The outcome of interest Y_{iaudt} is enrollment for individual i at age a in unit u of district d observed at time t. Unit u refers to household of origin h or district, depending on the migration variable $Mig_u \in \{Mig^o_d, Mig_h\}$. Mig^o_d and $XRshock_{dt-1}$ are defined as before at the district level, whereas Mig_h indicates whether the household has a member currently working abroad. Treatment cohort indicators are defined based on the appropriate school level, i.e., 6-12 for primary, 13-15 for junior secondary, 16-18 for senior secondary, and 6-18 for the overall enrollment. I include the lower-term two-way interactions and fixed effects for districts and survey years. The coefficient of interest is ϕ, which indicates the differential enrollment responses to remittances by cohort. I estimate this regression on individuals ages 4-20 years in the Susenas surveys.

Table 6 reports the estimation results, supporting the fact that the effects on enrollment are driven by individuals in the relevant school age brackets. Panel A uses a district-level migration intensity variable. The coefficients could be interpreted as the differential effect of remittances on enrollment by the relevant age cohort relative to the untreated cohort, i.e., cohorts that are too young or too old for each level. Overall, a one SD remittance shock raises enrollment at any level by 4.1 p.p. among the school-age population (Column 1). The enrollment effects are most pronounced for primary school cohorts and senior secondary cohorts (7 p.p.). The estimated effect for junior secondary cohorts is also positive but smaller (3 p.p.).

Panel B of Table 6 focuses on the relative response of school-age cohorts between migrant and non-migrant households in the presence of the exchange rate shock. The sample for estimating this interaction is smaller because the indicator is only available for individuals surveyed between 2005-2007. Coefficient on the interaction of treated (school-age) cohorts, migrant households, and exchange rate shock are positive and statistically significantly different from zero for primary and junior high school enrollment. For further contrast, in a placebo regression where I estimate the effects of remittances on school enrollment for the 19-24 year old population, who are older than the normal primary and secondary school students, I do not observe any effect of remittances on this population (Appendix Table A.5).

To better understand the cohort responses, I estimate the following regression, which replaces the treated cohort indicator with a set of age-specific dummies:

$$Y_{iadt} = \alpha + \Sigma_{a=4}^{20}\, \phi_a\, Cohort_a \times Mig_d^o XRshock_{dt-1} + \beta Mig \times XRshock_{dt-1} + \Sigma_{a=4}^{20}\, \lambda_a\, Cohort_a + \Sigma_{a=4}^{20}\, \delta_a\, Cohort_a Mig_d^o + \Sigma_{a=}^{20}\, \xi_a\, Cohort_a XRshock_{dt-1} + \gamma XRshock_{dt-1} + \theta_d + \theta_t + \varepsilon_{adt}. \quad (7)$$

Figure 4 plots the coefficients ϕ_a of the triple interaction term. The patterns of interaction are pronounced at ages 6, 13, and 16. These are the entry ages for primary, junior secondary, and senior secondary levels. When a child is about to enter a new school level, the realization of positive remittance shocks that occurred in the preceding year is particularly timely to encourage enrollment. In contrast, for children ages 8-11 and 14-15 years, the effect is not significantly different than zero. At these ages children are simply continuing along in their primary and secondary levels. These effects are consistent with Alatas (2011), who does not find an effect on school enrollment from a cash transfer program because its disbursal to beneficiaries did not occur until the school year had already begun. In her study, Son (2015) presents a complementary picture where negative income shocks are less likely to induce dropouts when children are enrolled in their last year of school due to the sheepskin effects. With regard to remittances, the positive shocks likely allow households to afford to pay for things such as uniforms when children begin new school levels.

5.2. Public goods

Table 7 presents the estimation results of equation (5), which investigates the impact of a remittance shock on the publicly provided goods in the district.

I find remittance shocks positively influence the provision of education facilities. A one SD shock leads to 0.87 more public primary schools and 0.27 more public junior secondary schools per 10,000 population one year after the shock. The coefficient for public senior secondary school is also positive at 0.02, but it is smaller and not statistically significant. The coefficients for primary and junior secondary school density amount to 13 percent of the mean density of elementary schools across districts (6.39 schools per 10,000 population) and 23 percent of the mean density of junior secondary schools (1.18 schools per 10,000 population). At 0.23-0.25 SD, this is a significant expansion of education facilities in support of universal basic education.

According to Table 7, Panel B the increase in asphalt roads, electricity, and piped water access indicates that remittances improve the provision of public goods overall. For electricity and piped water, a one SD of remittance shocks increases the share of households with access by 5 and 9 p.p., respectively. This effect size for piped water is more than 50 percent of the mean share of household access to piped water (16 percent), representing a meaningful expansion of this service. The share of villages with asphalt roads in the district rises by 25 p.p., from a mean share of 70 percent. Such improvements in road quality have the potential to reduce transportation costs for tens of thousands of villagers. Appendix Table 20 presents evidence of an informal tax issued to build roads and other village infrastructures from the SPKP survey data. Households in remittance-positive villages are more likely to give money or

in-kind contributions to village building projects and in higher amounts (compare with findings from Olken & Singhal, 2011).

6. Alternative Explanations: Commodities and Trends

Could the findings above not, in fact, be caused by remittances? I consider several alternative explanations for such results, including: commodity trade, differential trends depending on baseline outcome, and differential regional trends.

6.1. Commodity Trade in Oil, Natural Gas, and Palm Oil

It is possible that the exchange rate shock mechanism actually works through a trade channel on various commodities. When the trading partners' currency appreciates, Indonesian commodities become cheaper and more attractive in the international market, leading to a trade surplus that enables districts to finance and provide public goods. If the exchange rate shocks are ordered in a similar distribution among migration destination and trading partners, then this undermines my interpretation that the effects can be attributed to remittances. However, the foreign trade statistics on export data reports on all ports of entry (Appendix Table A.9) show that only a few countries can be considered the top migration and export destinations. Top Indonesian trading partners such as the USA, China, and the EU are not the countries where many Indonesian migrants work. Regressions of the export value and the number of migrants recorded in the migrant terminal data at the country level also do not show a statistically significant correlation between the two variables (Appendix Table A.10).

To further corroborate the incompatibility of the trade channel with the estimated impact of remittances on public goods, I analyze two primary export commodities from Indonesia: oil and natural gas as well as palm oil. Oil and natural gas is Indonesia's most valuable commodity, bringing in USD 22 billion in 2007 and making up nearly one-fifth of the total Indonesian export that year. I construct a measure of a district's oil and gas production by using its oil and gas revenue share in 2005 based on the following relationship: the more intensive the oil production, the higher the district's revenue share from oil. From the foreign trade statistics, I also obtain the list of countries to which specific categories of oil and gas commodities are transported (see the Appendix for the list of specific commodity categories). For these countries, I then retrieve the currency rate fluctuations to construct variable $XRshockOil_t$, which I interact with the oil production intensity.

Similarly, palm oil is Indonesia's most valuable agricultural export commodity, with USD 7.9 billion worth of export in 2007. I obtain the the list of countries to which crude palm oil and crude olein were exported and construct variable $XRshockPalm_t$. I use the area of land dedicated to oil palm plantations from the 2003 agricultural census/village census to obtain a measure of palm oil intensity at the district level and then interact the two variables to obtain the trade shock exposure variable to palm oil.[12] I then include these trade shock variables in

[12] Appendix Table A.11 shows that the intensity of migration at the district level and the intensity of oil and

regression equation 5.

Table 8 reports the results with the inclusion of commodity trade controls. In Panel A, I examine the coefficients of the remittance proxy on regression with development indicators as the outcome variables. Panel A1 reproduces the main estimates, and Panel A2 presents the coefficients including the two commodities as control. The magnitudes of the effects on the expenditures for households in the bottom quintile, asset index, and poverty rate did not vary more than 5 percent of the original estimates. Although as the effect for total GDP per capita is revised downward it loses statistical significance, the estimates in general change little. In Panel B, I examine the coefficients of the remittance proxy for education outcomes. Panel B2 presents the coefficients from regressions that include the two commodities as control. In comparison to the main estimates in Panel B1, the patterns are the same and the inclusion of controls raises the magnitudes of the coefficients by 6-18 percent of the main estimates. The most pronounced increase is in the effect of junior secondary school enrollment from 4.4 p.p. to 5.2 p.p. in response to a one SD remittance shocks. By and large, the coefficients on the oil and gas trade shock and the palm oil trade shock themselves are an order of magnitude smaller than the remittance coefficients (not shown).

These results are consistent with the estimates reported in Cassidy (2022), who ruled out changes in public service delivery due to the oil and gas grant. Edwards (2019) argues that the expansion of palm oil plantations since 2000 has led to a faster poverty reduction. His analysis focus on districts outside of Java, where comparatively fewer migrants originated. In an alternate specification, I interact the remittance shock directly with the pre-period revenue from oil and gas production or with the pre-period palm oil production to check if the remittance effects are systematically different in oil/gas-producing areas or in palm-oil producing area. In this specification, the magnitude of the interaction is roughly one-tenth of the remittance shock coefficients. In contrast, the effects of remittances on their own remain positive. Together, these results present evidence against trade shock being the underlying driver of public service delivery change that I associate with remittances in this paper.

6.2. Baseline and Regional Trends

Another alternative account for the presented results concerns differential trends. If areas observed with high remittances have the inherent propensity to exhibit different development paths due to their characteristics, it would challenge the attribution of the effects to remittances. Two sources of trends are relevant: regional trends and differential trends based on their baseline outcomes. I test for the robustness of the effects of remittances with the inclusion of variables that flexibly controls for these trends.

Table A.13 reports the results with the inclusion of regional trends. The regressions reported in this table add island-year interaction terms that flexibly accounts for potential differential trajectories in outcome variables between districts in different islands. Panels A1 and B1 reproduce the main estimates, while Panels A2 and B2 present the results with regional

gas production as well as palm oil land area are not significantly correlated.

trends for various development indicators and education outcomes, respectively. The remittance proxy coefficient are stable across the two specifications both for development indicators and education outcomes. All development indicators but the total GDP per capita income maintain their precisions and magnitudes (Panel A2). In Panel B2, estimates on education outcomes largely maintain their statistical precision and magnitudes. For the density of senior secondary school, the estimated coefficient is nearly 50 percent larger, which improves the precision of the effect.

Table A.14 reports the results with the inclusion of baseline trends. To account for potential differential responses to remittances in districts that depend on their pre-period outcome, I use two different sets of baseline trends. In Table A.14, Panel A, I include the 2004 agriculture GDP per capita interacted with year dummies as the baseline level-specific trend. Inclusion of the agriculture sector GDP per capita reflects the fact that agriculture is the largest sector of employment in the country and that migrant households also predominantly come from agricultural households (Bazzi, 2017, Makovec et al., 2018). A comparison between Table A.14, Panel A2 and the main estimates in Panel A1 show that the latter are robust to the addition of trends specific to the level of agricultural GDP per capita prior to the shocks. In Panel B, I include the school densities in 2004 separately by level (elementary, junior secondary, and senior secondary) interacted with year dummies. Inclusion of these variables adjusts for potential differential trends that could be due to the fact that the government simply decided to build more schools where there had been fewer schools to serve the school-age populations. Panel B2 shows that all estimates increased in magnitude with the inclusion of these variables, and the statistical precision is maintained in comparison to the main estimates. The estimates for enrollment rate and basic education facility density rise by 18-36 percent from the main specification (Column 1-5).

6.3. Other Robustness Checks

I conduct several other robustness checks—namely, I use alternative counts to construct migration intensity as well as an alternative data source to construct the exchange rate shock measure. In addition, I include lagged outcome variables.

Since I use the migrant count from the 2005 village survey as the measure of district migration intensity, one concern that arises is that the number of migrants may have changed substantially by the end of my sample period. In Appendix Table A.15, I present estimates from an alternate construction that addresses this concern using data from the three waves of village survey (2005, 2008, 2011). I limit my use of the 2005 migrant count to the years 2006-2008, and I refer to the 2008 and 2011 survey to update the count for 2009-2011 and 2012, respectively. The results remain consistent, reflecting the strong correlation between migrant counts within a district during the three periods.

Another possible concern are inaccuracies in destinations recorded in the migrant terminal dataset. Officials collect this data when migrants return to Indonesia. These measurement errors can potentially bias the results. Therefore, I address this using village-level plurality

destination recorded in the 2005 village survey, since this is the only year in which the survey collected migrant destination information. The responses are limited to only the top 11 migration destinations and include only one country per village, i.e., the country to which the most migrants from the village left. Using the same exchange rate data, I measure the shock and aggregate it to the district level. Appendix Table A.16 presents the estimation results. The main estimates are robust to a different information sources of migration destinations.

The inclusion of the lagged outcome variable as a regressor addresses the concern that future outcomes are predicted by past outcomes. If past outcomes are correlated with the remittance proxy when it is omitted from the right hand side of equation (5), this will bias the coefficient upward. In Appendix Table A.17, I show that the results are also robust to the inclusion of lagged outcomes as a control variable.

Lastly, I test for the possibility that the errors are simultaneously correlated within region and within time (Cameron et al., 2010). I first note that the inclusion of year dummies mitigate this concern to some degree, as the fixed effects inclusion in practice reduces within-cluster correlations (Cameron et al., 2010). Appendix Table A.18 shows the estimation results. The statistical precision of the results is preserved most strongly for public school density and the poverty rate.

7. Mechanisms

What drives the government to provide public goods in the presence of positive remittance shock? This question is particularly essential because remittances are private transfers of money between individuals. In this way, local governments do not have access to them. Furthermore, constructing public facilities typically requires significant investment, and governments in developing countries are often resource-strapped.

I investigate several pathways through which migrant remittances may influence local governments in providing public goods. First, remittances may influence government policies through interactions with pre-existing policy priorities. Second, governments may capture remittance windfall through taxation. Third, decentralization may put local governments in a better position to provide public goods for their population. And, finally, electoral competition may induce politicians to provide public goods to win votes.

7.1. Pre-existing policy priorities

Governments pursue their policy goals by allocating public budgets to reflect their priorities. With limited resources, officials may decide to improve their provision of public goods and services only if the improvements align with pre-existing policy priorities. For example, a government with a solid commitment to education may interpret increased enrollment changes brought by remittance windfall as a positive feedback signal, leading to improved provision of public education facilities.

To test this mechanism, I use district finance data from the Ministry of Finance to proxy

a district's commitment to education by the share of the district's expenditure on education out of its total expenditure. I estimate a regression of education facilities at time t on the interaction of remittance proxy at time $t-1$ and the district's share of education expenditure at time $t-2$. The two-period lag for the education expenditure variable helps guard against the contemporaneous effect of the remittances shock on the district's spending profile. The coefficient of the interaction term in this regression will elucidate the relationship between remittances and a district's policy priorities.

The results in Table 9, Panel A suggest that remittances strengthen the provision of education facilities in districts with a stronger fiscal commitment to education. The interaction term between remittance proxy and share of education expenditure has positive and significant coefficients in estimations with elementary and junior secondary schools as the outcome. This finding suggests that the marginal impact of remittance shocks on basic education facilities increases with the district government's level of fiscal commitment to education.

Village Head Survey. How does government policy adaptation operate in practice? At the lowest level, village governments have the best vantage point because they frequently interact with both villagers and the service providers (teachers and school principals). In the SPKP survey, village heads in five provinces were asked to list the main challenges they face in education service provision. Frequent answers included inadequate facilities or families not being able to afford education for their children. I use the survey responses and create indicators of whether the village heads mention facilities and/or cost concern, and whether they rank facilities concern higher than cost concern. I regress these indicators on modified equation (5), specifying the remittance proxy variable at the village level instead of at the district level. Panel B, Table 9 reports the results.

Village heads are less likely to mention education cost concern in villages with remittance-positive shocks (Column 2), which is consistent with the positive effects on household welfare that I documented earlier. The coefficient for facility concern is positive but, statistically, is not significantly different than zero (Column 1). When comparing facility concern and cost concern directly, inadequate education infrastructure was ranked higher than unaffordability of school education within the top three challenges village heads face in education provision (Column 3). These rankings likely would have inclined officials to be more supportive of policies aimed at increasing and improving education facilities in their villages.

Constructing junior high school facilities. One policy to increase education facilities is to build junior high schools through a more intense use of existing resources. In the 1970s and 1980s, the Indonesian government built numerous public primary schools across the country through the INPRES program (Duflo, 2001). This celebrated program provided an initial stock of land that the government in the 2000s could use to expand junior secondary education.

I look into a program that allows local governments to build junior high schools more cheaply by using existing primary schools, building smaller schools, and providing fewer amenities. Within the scope of this "One Roof" program, district governments can build junior high schools as attachments to existing primary schools. The expansion of the existing elementary

school enables current students to seamlessly continue into the subsequent three grades of junior high school. In this program, local governments are still responsible for hiring teachers for the newly created schools; although, in practice, existing primary school teachers or educated locals may be asked to teach the junior high students students (Departemen Pendidikan Nasional, 2008). Similarly, the new junior high school may also borrow already existing primary school classrooms while construction of the junior high facilities takes place. Because the junior high schools are attached to primary schools, the primary school principals are responsible for the joint management of both schools. This policy allows rapid establishment of schools because the district governments do not need to acquire additional land.

I use detailed school-level characteristics from the Ministry of Education's administrative data to examine this margin of response. I look into the following outcome variables: an indicator of whether a junior high school is attached to an primary school, the average number of classrooms per junior high school in the district, and the average number of teachers per junior high school. When new schools are constructed with fewer amenities, which typically occurs under this program, the average number of teachers within the district falls. Table 9, Panel C reports the results of estimating equation (5) for these variables.

I find district governments economize on new school constructions so that they can respond rapidly to the remittance shocks. In Table 9, Panel C, Column 1, a one SD shock in the remittance proxy variable results in 3 p.p. increase in the share of junior high schools that are attached to primary schools in the district. These newly created junior high schools also have fewer classrooms than "normal" junior high schools (Column 2), and fewer teachers (Column 3). Overall, these results point to the trade-off district governments make in order to respond to the remittance shock; they establish schools with less-than-perfect facilities in order to ensure that more children have access to secondary education.

7.2. Taxation

Taxation of economic activities transfers part of the economic gain to the local government which may decide to use it to provide local inhabitants public goods. The question arises: Does an increase in local economic growth due to remittances change government revenues through taxation? I test this pathway by estimating the effects of remittances on local government's various revenue streams. I use data from the Ministry of Finance for this analysis, reporting the outcomes in log IDR and as a share of the total revenue for the district.

Suppose the government is able to capture part of the economic growth in their districts through taxation. In this case, the remittance shock on the regression of tax revenues from centrally or locally collected taxes should result in positive coefficients when using equation (5). Remittances should alter neither the general DAU budget that comes from unconditional intergovernmental transfers nor the share from natural resources revenues. With respect to the DAK budget, the effects are ex-ante ambiguous. Table 10 reports the results.

I do not find supporting evidence that the governments collected higher tax revenues collected after the positive remittance shock. The coefficients for tax revenues and other

revenue streams are imprecisely estimated in log IDR (Table 10, Panel A). The 90 percent confidence intervals from the estimations in Columns 1-2 suggests I can rule out effects where remittance shock leads to tax revenue increases that are higher than 1 percent. Furthermore, when I look at the revenue streams as a share of the total budget, the negative effect on revenue sharing from centrally collected taxes becomes statistically significant at the 5 percent level (Table 10, Panel B, Column 1).

7.3. Decentralization and District Splits

In the presence of a positive remittance shock, decentralized governance could facilitate better provisions of public goods. I use a binary variable of district splitting to indicate regions where the governance accountability changed due to decentralization. This district split indicator takes a value of 1 for parent districts and their children in the year the split occurred/the children districts are created and thereafter. On the other hand, the indicator takes a value of 0 for the following two scenarios: (i) districts that never split and (ii) districts that have not yet split. I regress the public school density on the remittance proxy interacted with the district split indicator.

Table 11, Panel A reports the estimation results: some of the effects of remittances on public goods are driven by the creation of public schools in districts that had split as the result of the decentralization of governance. In a regression where public primary schools per 10,000 population is the outcome, the interacted term has a coefficient roughly half the size of the remittance proxy coefficient in the main specification (Column 1). For public junior high school density, the coefficient for the interaction is roughly one-third of the coefficient in the main specification (Column 2). For these outcomes, the coefficients for the remittance proxy remain precisely estimated. Taken together, these results suggest that a positive association between remittances and public goods is stronger in districts that had split.

7.4. Election

Politicians may provide public goods to bolster their chances of winning votes during elections. During election years, as they campaign for public office, candidates may become sensitive to citizen demand for public goods. As remittances increase the use of public facilities such as schools (see Section 5), mayors seeking reelection may intensify provision of public goods in high remittance areas during the election period. Where the accountability mechanism between citizens and elected politicians is weak, the construction and provision of public goods will correspondingly decrease outside of this period.

To test the aforementioned mechanism, I interact the remittance proxy variable in equation (5) with a dummy for election years. I compile various publicly available information to create a district-year election dummy, which takes a value of 1 if the district holds a direct election in the given year, and 0 otherwise. Suppose elections are the main mediator of the remittance effects on public goods. In this case, we should expect positive coefficients on the remittance and election interaction term, while the uninteracted remittance proxy variable

loses precision. Table 11, Panel B presents the results where I estimate regressions with the same public goods outcome (public schools) on the interaction between remittances and an election.

I find it unlikely that electoral competition drives the local governments' responses to remittances. The interaction term coefficients in Columns 1-3 suggest that public goods provision is no different in election years than in non-election years. In contrast, the coefficients for the remittance proxy remain largely unchanged.

Analysis of household responses in the SPKP panel indicates that remittances lead to lower voter turnout as well as statistically significant lower voter turnout for mayoral elections (Appendix Table A.21). During election years, villagers also complain less to village leaders about the implementation of anti-poverty programs within the villages. Despite the lower formal engagement, villagers may still interact with government officials informally through various community groups. In this regard, remittances lead to heterogenous effects in different community group participations, with positive effect on credit and recreation groups and negative effects on production groups (Appendix Table A.22).

8. Conclusion

Do remittances lead to public goods and local development? When we look at the provision of public goods in education and infrastructure in migrant-origin districts in Indonesia, the answer is "Yes." To isolate the causal effect of remittances, I leverage preexisting spatial variations in migration intensity and destinations across districts, along with unanticipated currency rate fluctuations in migrants' host countries. This approach builds on the positive relationship between currency rate fluctuations and remittance receipt at the household level that I document using a migrant panel survey. At the district level, I find that the remittance shock leads to an increase in the provision of public goods, particularly an increase in the density of primary and junior high schools.

This study provides new evidence on the link between remittances and development in the migrant's area of origin. With a plausibly exogenous variation of remittances, I investigate the causal impact of remittances on local development. The variations allow me to obtain the effect of remittances separately from the decision to migrate. Furthermore, I take advantage of a rich panel dataset from Indonesian districts to analyze the interactions between migrant households and public finance to provide insight into how remittances might influence the provision of public goods.

Since remittances can be linked to the provision of public goods in sectors that are especially salient to migrant households, this empirical relationship can be of particular interest to policymakers in countries that send off many migrants. Stakeholders can direct capital crowd-in from public finance to take further advantage of the remittance windfall. Ultimately, more empirical research is necessary to provide a complete understanding of the pathways between remittances, migration, and development.

References

Abarcar, Paolo and Caroline Theoharides (2021). "Medical Worker Migration and Origin-Country Human Capital: Evidence from U.S. Visa Policy". In: *The Review of Economics and Statistics*, pp. 1–46. ISSN: 0034-6535. DOI: 10.1162/rest_a_01131.

Abdih, Yasser, Ralph Chami, Jihad Dagher, and Peter Montiel (Apr. 2012). "Remittances and Institutions: Are Remittances a Curse?" In: *World Development* 40.4, pp. 657–666. DOI: 10.1016/j.worlddev.2011.09.014.

Adams, Richard H. and John Page (2005). "Do international migration and remittances reduce poverty in developing countries?" In: *World Development* 33.10, pp. 1645–1669. ISSN: 0305750X. DOI: 10.1016/j.worlddev.2005.05.004.

ADB (2006). "Workers' Remittance Flows in Southeast Asia". In: *Asian Development Bank*, p. 262. URL: http://www.adb.org/Documents/Reports/workers-remittance/workers-remittance.pdf.

Adida, Claire L. and Desha M. Girod (2011). "Do migrants improve their hometowns? remittances and access to public services in Mexico, 1995-2000". In: *Comparative Political Studies* 44.1, pp. 3–27. DOI: 10.1177/0010414010381073.

Ahmed, Faisal Z. (2012). "The perils of unearned foreign income: Aid, remittances, and government survival". In: *American Political Science Review* 106.1, pp. 146–165. DOI: 10.1017/S0003055411000475.

— (2013). "Remittances deteriorate governance". In: *Review of Economics and Statistics* 95.4, pp. 1166–1182. ISSN: 00346535. DOI: 10.1162/REST_a_00336.

Alatas, Vivi (2011). "Program Keluarga Harapan: Main Findings from the Impact Evaluation of Indonesia's Pilot Household Conditional Cash Transfer Program".

Alpaslan, Barış, Aysegul Kayaoglu, Jürgen Meckl, Joaquín Naval, Michaella Vanore, and Thomas H.W. Ziesemer (2021). "Economic Effects of Remittances on Migrants' Country of Origin". In: *The Economic Geography of Cross-Border Migration*, pp. 449–483. ISBN: 9783030482916. DOI: 10.1007/978-3-030-48291-6_20. URL: http://link.springer.com/10.1007/978-3-030-48291-6%7B%5C_%7D20.

Ambler, Kate, Diego Aycinena, and Dean Yang (2015). "Channeling remittances to education: A field experiment among migrants from El Salvador". In: *American Economic Journal: Applied Economics* 7.2, pp. 207–232. ISSN: 19457790. DOI: 10.1257/app.20140010.

Ambrosius, Christian (2019). "Government reactions to private substitutes for public goods: Remittances and the crowding-out of public finance". In: *Journal of Comparative Economics* 47.2, pp. 396–415. ISSN: 10957227. DOI: 10.1016/j.jce.2019.02.004. URL: https://doi.org/10.1016/j.jce.2019.02.004.

Amuedo-Dorantes, Catalina and Susan Pozo (2010). "Accounting for Remittance and Migration Effects on Children's Schooling". In: *World Development* 38.12, pp. 1747–1759. ISSN: 0305750X. DOI: 10.1016/j.worlddev.2010.05.008. URL: http://dx.doi.org/10.1016/j.worlddev.2010.05.008.

Banerjee, Abhijit, Rema Hanna, Benjamin A. Olken, and Sudarno Sumarto (2020). "The (lack of) distortionary effects of proxy-means tests: Results from a nationwide experiment in Indonesia". In: *Journal of Public Economics Plus* 1.July, p. 100001. ISSN: 26665514. DOI: 10.1016/j.pubecp.2020.100001. URL: https://doi.org/10.1016/j.pubecp.2020.100001.

Banerjee, Abhijit and Rohini Somanathan (2007). "The Political Economy of Public Goods: Some Evidence from India". In: *Journal of Development Economics* 82, pp. 287–314. DOI: 10.1016/j.jdeveco.2006.04.005.

Bank Indonesia (2018). *Statistik Ekonomi dan Keuangan Indonesia*. Tech. rep. Bank Indonesia, pp. 222–223.

Barajas, Adolfo, Ralph Chami, Connel Fullenkamp, Michael T. Gapen, and Peter Montiel (2009). "Do Workers' Remittances Promote Economic Growth?" In: *IMF Working Papers* 09.153, p. 1. DOI: 10.5089/9781451873009.001.

Bazzi, Samuel (2012). "International Migration from Indonesia: Stylized Facts". In: *Mimeo*.

— (2017). "Wealth heterogeneity and the income elasticity of migration". In: *American Economic Journal: Applied Economics* 9.2, pp. 219–255. ISSN: 19457790. DOI: 10.1257/app.20150548.

Bazzi, Samuel, Lisa Cameron, Simone Schaner, and Firman Witoelar (2021). "Information, Intermediaries, and International Migration".

Bazzi, Samuel and Matthew Gudgeon (2021). "The Political Boundaries of Ethnic Divisions". In: *American Economic Journal: Applied Economics* 13.1, pp. 235–266. ISSN: 1945-7782. DOI: 10.1257/app.20190309.

Bazzi, Samuel, Masyhur Hilmy, and Benjamin Marx (2022). "Religion, Education, and Development".

Bellemare, Marc F. and Casey J. Wichman (2020). "Elasticities and the Inverse Hyperbolic Sine Transformation". In: *Oxford Bulletin of Economics and Statistics* 82.1, pp. 50–61. ISSN: 14680084. DOI: 10.1111/obes.12325.

Bloomberg (2016). *Indonesia Needs More Taxpayers*. URL: https://www.bloomberg.com/opinion/articles/2016-03-28/indonesia-needs-more-taxpayers.

BPS (2005). *Survei Potensi Desa*.

Brodjonegoro, Bambang and Jorge Martinez-Vazquez (2005). "Reforming Intergovernmental Fiscal Relations and the Rebuilding of Indonesia". In: *Reforming Intergovernmental Fiscal Relations and the Rebuilding of Indonesia*. Ed. by James Alm, Jorge Martinez-Vazquez, and Sri Mulyani Indrawati. Northampton: Edward Elgar Publishing, pp. 159–198. ISBN: I 84376 451 2.

Cahyadi, Nur, Rema Hanna, Benjamin A. Olken, Rizal Adi Prima, Elan Satriawan, and Ekki Syamsulhakim (2020). "Cumulative Impacts of Conditional Cash Transfer Programs: Experimental Evidence from Indonesia". In: *American Economic Journal: Economic Policy* 12.4, pp. 88–110. ISSN: 1945774X. DOI: 10.1257/pol.20190245.

Cassidy, Traviss (2022). "Revenue Persistence and Public Service Delivery".

Cassidy, Traviss and Tejaswi Velayudhan (2022). "Government Fragmentation and Economic Growth". DOI: 10.2139/ssrn.4038546.

Catrinescu, Natalia, Miguel Leon-Ledesma, Matloob Piracha, and Bryce Quillin (2009). "Remittances, Institutions, and Economic Growth". In: *World Development* 37.1, pp. 81–92. ISSN: 0305750X. DOI: 10.1016/j.worlddev.2008.02.004. URL: http://dx.doi.org/10.1016/j.worlddev.2008.02.004.

Chami, Ralph, Adolfo Barajas, Thomas Cosimano, Connel Fullenkamp, Michael Gapen, and Peter Montiel (2008). *Macroeconomic Consequences of Remittances*. Occasional Papers 259. Washington, D.C.: International Monetary Fund, pp. 1–84. ISBN: 978-1-58906-701-1. DOI: 10.5089/9781589067011.084. URL: http://elibrary.imf.org/view/IMF084/04374-9781589067011/04374-9781589067011/04374-9781589067011.xml.

Chami, Ralph, Ekkehard Ernst, Connel Fullenkamp, and Anne Oeking (2018). "Is there a remittance trap?" In: *Finance and Development* 55.3, pp. 44–47. ISSN: 15645142.

Chamon, Marcos, Romuald Semblat, and Anne Morant (2005). *Samoa: Selected Issues and Statistical Appendix*. Tech. rep. IMF Country Report 05/221.

Clemens, Michael A. and David McKenzie (2018). "Why Don't Remittances Appear to Affect Growth?" In: *Economic Journal* 128.612, F179–F209. ISSN: 14680297. DOI: 10.1111/ecoj.12463.

Colin Cameron, A., Jonah B. Gelbach, and Douglas L. Miller (2011). "Robust inference with multiway clustering". In: *Journal of Business and Economic Statistics* 29.2, pp. 238–249.

ISSN: 07350015. DOI: 10.1198/jbes.2010.07136. URL: https://doi.org/10.1198/jbes.2010.07136.

Cuecuecha, Alfredo and Richard H. Adams Jr. (2016). "Remittances, Household Investment and Poverty in Indonesia". In: *Journal of Finance and Economics* 4.3, pp. 12–31. ISSN: 22914951. DOI: 10.12735/jfe.v4n3p12.

De Arcangelis, Giuseppe, Majlinda Joxhe, David McKenzie, Erwin Tiongson, and Dean Yang (2015). "Directing remittances to education with soft and hard commitments: Evidence from a lab-in-the-field experiment and new product take-up among Filipino migrants in Rome". In: *Journal of Economic Behavior and Organization* 111, pp. 197–208. ISSN: 01672681. DOI: 10.1016/j.jebo.2014.12.025. URL: http://dx.doi.org/10.1016/j.jebo.2014.12.025.

Departemen Pendidikan Nasional (2008). *Petunjuk Pelaksanaan Depdiknas untuk Pembangunan Sekolah Satu Atap (SATAP)*.

Desierto, Desiree A. (2018). "What resource curse? The null effect of remittances on public good provision". In: *Journal of Theoretical Politics* 30.4, pp. 431–450. ISSN: 14603667. DOI: 10.1177/0951629818791033.

Dinkelman, Taryn and Martine Mariotti (2016). "The Long-Run Effects of Labor Migration on Human Capital Formation in Communities of Origin". In: *American Economic Journal: Applied Economics* 8.4, pp. 1–35. DOI: 10.1257/app.20150405.

Doi, Yoko, David McKenzie, and Bilal Zia (2014). "Who you train matters: Identifying combined effects of financial education on migrant households". In: *Journal of Development Economics* 109, pp. 39–55. ISSN: 03043878. DOI: 10.1016/j.jdeveco.2014.03.009.

Duflo, Esther (Sept. 2001). "Schooling and Labor Market Consequences of School Construction in Indonesia: Evidence from an Unusual Policy Experiment". In: *American Economic Review* 91.4, pp. 795–813. ISSN: 0002-8282. DOI: 10.1257/aer.91.4.795. URL: http://pubs.aeaweb.org/doi/10.1257/aer.91.4.795.

Dustmann. C., Ku. H., Surovtseva. T. (2021). "Real Exchange Rates and the Earnings of Immigrants".

Easton, Malcolm R. and Gabriella R. Montinola (2017). "Remittances, Regime Type, and Government Spending Priorities". In: *Studies in Comparative International Development* 52.3, pp. 349–371. ISSN: 00393606. DOI: 10.1007/s12116-016-9233-7.

Economist, The (2019). "In much of Africa the family is bank, business and welfare state". In: *The Economist* 14 December 2019. URL: https://www.economist.com/middle-east-and-africa/2019/12/12/in-much-of-africa-the-family-is-bank-business-and-welfare-state.

Edwards, Alejandra Cox and Manuelita Ureta (2003). "International migration, remittances, and schooling: Evidence from El Salvador". In: *Journal of Development Economics* 72.2, pp. 429–461. ISSN: 03043878. DOI: 10.1016/S0304-3878(03)00115-9.

Edwards, Ryan (2019). "Export agriculture and rural poverty: evidence from Indonesian palm oil". In: *Working Paper*.

Esteves, Rui and David Khoudour-Casteras (2011). "Remittances, capital flows and financial development during the mass migration period, 1870-1913". In: *European Review of Economic History* 15.3, pp. 443–474. ISSN: 13614916. DOI: 10.1017/S1361491611000037.

Esteves, Rui and David Khoudour-Castéras (2009). "A fantastic rain of gold: European migrants' remittances and balance of payments adjustment during the gold standard period". In: *Journal of Economic History* 69.4, pp. 951–985. ISSN: 00220507. DOI: 10.1017/S002205070900134X.

Frankel, Jeffrey (2011). "Are Bilateral Remittances Countercyclical?" In: *Open Economies Review* 22.1, pp. 1–16. ISSN: 09237992. DOI: 10.1007/s11079-010-9184-y.

Funkhouser, Edward (2012). "Using longitudinal data to study migration and remittances". In: *Handbook of Research Methods in Migration*, pp. 186–206. DOI: 10.4337/9781781005231.00016.

Gertler, Paul J, Sebastian W Martinez, and Marta Rubio-Codina (Jan. 2012). "Investing Cash Transfers to Raise Long-Term Living Standards". In: *American Economic Journal: Applied Economics* 4.1, pp. 164–192. ISSN: 1945-7782. DOI: 10.1257/app.4.1.164. URL: https://pubs.aeaweb.org/doi/10.1257/app.4.1.164.

Gibson, John and David McKenzie (2017). "How reliable are survey estimates of remittances? Evidence from a cross-reporting survey exercise". In: *Migration Studies* 5.1, pp. 97–115. ISSN: 20495838. DOI: 10.1093/migration/mnw029.

Gibson, John, David J. McKenzie, and Halahingano Rohorua (2006). "How cost-elastic are remittances? Estimates from Tongan migrants in New Zealand". In: *Pacific Economic Bulletin* 21.1, pp. 112–128. ISSN: 08178038.

Gibson, John, Susan Olivia, Geua Boe-Gibson, and Chao Li (2021). "Which night lights data should we use in economics, and where?" In: *Journal of Development Economics* 149.December 2020, p. 102602. ISSN: 03043878. DOI: 10.1016/j.jdeveco.2020.102602. URL: https://doi.org/10.1016/j.jdeveco.2020.102602.

Giuliano, Paola and Marta Ruiz-Arranz (2009). "Remittances, financial development, and growth". In: *Journal of Development Economics* 90.1, pp. 144–152. ISSN: 03043878. DOI: 10.1016/j.jdeveco.2008.10.005. URL: http://dx.doi.org/10.1016/j.jdeveco.2008.10.005.

Gupta, Sanjeev, Catherine A. Pattillo, and Smita Wagh (2009). "Effect of Remittances on Poverty and Financial Development in Sub-Saharan Africa". In: *World Development* 37.1, pp. 104–115. ISSN: 0305750X. DOI: 10.1016/j.worlddev.2008.05.007. URL: http://dx.doi.org/10.1016/j.worlddev.2008.05.007.

Inman, Robert P. (2008). "The Flypaper Effect". In: *NBER Working Paper* 14579.

Kapur, Devesh (2010). *Diaspora, development, and democracy: The domestic impact of international migration from india*. Princeton University Press.

Khanna, Gaurav and Nicolas Morales (2021). "The IT Boom and Other Unintended Consequences of Chasing the American Dream". In: *SSRN Electronic Journal* February. DOI: 10.2139/ssrn.3015317.

Khanna, Gaurav, Emir Murathanoglu, Caroline Theoharides, and Dean Yang (2022). "Abundance from Abroad: Migrant Income and Long-Run Economic Development". In: *Working Paper*.

KNOMAD (Oct. 2017). *Migration and Remittances: Recent Developments and Outlook*. October. World Bank, Washington, DC. DOI: 10.1596/28444.

Le, Thanh (Sept. 2009). "Trade, Remittances, Institutions, and Economic Growth". In: *International Economic Journal* 23.3, pp. 391–408. ISSN: 1016-8737. DOI: 10.1080/10168730903119443. URL: http://www.tandfonline.com/doi/abs/10.1080/10168730903119443.

Lin, Hannah Huidan (2011). "Determinants of Remittances: Evidence from Tonga".

Makovec, Mattia, Ririn S. Purnamasari, Matteo Sandi, and Astrid R. Savitri (2018). "Intended versus unintended consequences of migration restriction policies: evidence from a natural experiment in Indonesia". In: *Journal of Economic Geography* 18.4, pp. 915–950. ISSN: 1468-2702. DOI: 10.1093/jeg/lby029.

Martinez-Bravo, Monica, Priya Mukherjee, and Andreas Stegmann (2017). "The Non-Democratic Roots of Elite Capture: Evidence From Soeharto Mayors in Indonesia". In: *Econometrica* 85.6, pp. 1991–2010. ISSN: 0012-9682. DOI: 10.3982/ecta14125.

Marx, Benjamin (2018). "Elections as Incentives: Project Completion and Visibility in African Politics". In: *Working Paper*.

Media Indonesia (Jan. 2017). *Remitansi TKI Lebih Besar dari Tax Amnesty*. Jakarta. URL: https://mediaindonesia.com/ekonomi/89453/remitansi-tki-lebih-besar-dari-tax-amnesty.

Mohapatra, Sanket, Dilip Ratha, and Ani Silwal (2012). "Migrant Remittances in Nepal: Impact of Global Financial Crisis and Policy Options". In: *Migration and Remittances during the Global Financial Crisis and Beyond*. Ed. by Ibrahim Sirkeci, Jeffrey H. Cohen, and Dilip Ratha. Chap. 9, p. 121.

Mosley, Layna and David A. Singer (2015). "Migration, labor, and the international political economy". In: *Annual Review of Political Science* 18, pp. 283–301. ISSN: 10942939. DOI: 10.1146/annurev-polisci-020614-094809.

Nekoei, Arash (2013). "Immigrants' labor supply and exchange rate volatility". In: *American Economic Journal: Applied Economics* 5.4, pp. 144–164. ISSN: 19457782. DOI: 10.1257/app.5.4.144.

Olken, Benjamin A., Junko Onishi, and Susan Wong (2014). "Should Aid Reward performance? Evidence from a field experiment on health and education in Indonesia". In: *American Economic Journal: Applied Economics* 6.4, pp. 1–34. ISSN: 19457790. DOI: 10.1257/app.6.4.1.

Olken, Benjamin A. and Monica Singhal (2011). "Informal taxation". In: *American Economic Journal: Applied Economics* 3.4, pp. 1–28. ISSN: 19457782. DOI: 10.1257/app.3.4.1.

Olsson, Ola and Michele Valsecchi (2015). "Resource Windfalls and Local Government Behavior: Evidence from a Policy Reform in Indonesia". In: *Working Paper* 635.

Pant, Bhubanesh and Birendra Bahadur Budha (2016). "Remittances and Exchange Rate Linkages: Experiences of Nepal".

Pierskalla, Jan H. and Audrey Sacks (2018). "Unpaved road ahead: The consequences of election cycles for capital expenditures". In: *Journal of Politics* 80.2, pp. 510–524. ISSN: 14682508. DOI: 10.1086/694547.

— (2020). "Personnel Politics: Elections, Clientelistic Competition and Teacher Hiring in Indonesia". In: *British Journal of Political Science* 50.4, pp. 1283–1305. ISSN: 14692112. DOI: 10.1017/S0007123418000601.

Rajan, S. Irudaya and D. Narayana (2012). "The Financial Crisis in the Gulf and Its Impact on South Asian Migration and Remittances". In: *Migration and Remittances during the Global Financial Crisis and Beyond2*. Ed. by Ibrahim Sirkeci, Jeffrey H. Cohen, and Dilip Ratha. The World Bank, p. 67.

Rapoport, Hillel, Sulin Sardoschau, and Arthur Silve (2020). "Migration and Cultural Change". In: *Working Paper*.

Ratha, Dilip (2007). "Leveraging remittances for development". In: *Migration, Trade, and Development*. Ed. by James F. Hollifield, Pia M. Orrenius, and Thomas Osang. Federal Reserve Bank of Dallas, pp. 173–186. ISBN: 0976349434. URL: https://www.dallasfed.org/assets/documents/research/pubs/migration/migration.pdf%7B%5C#%7Dpage=195.

Ratha, Dilip, Supriyo De, Eung Ju Kim, Sonia Plaza, Ganesh Seshan, and Nadege Desiree Yameogo (2020). *Covid-19 crisis through a migration lens*. Tech. rep. 32. KNOMAD-World Bank.

Ratha, Dilip, Sonia Plaza, and Caglar Ozden (2016). *Migration and Development: A Role for the World Bank Group*. Tech. rep.

Ratha, Dilip and William Shaw (2007). "South-South Migration and Remittances".

Riester, Andrea (2012). "Resilience of Remittances during the Global Financial Crisis and the Entrenchment of Migration". In: *Migration and Remittances during the Global Financial Crisis and Beyond*. Ed. by Ibrahim Sirkeci, Jeffrey H. Cohen, and Dilip Ratha. The World Bank. Chap. 11, p. 141.

Salas, Vania B. (2014). "International remittances and human capital formation". In: *World Development* 59.2003, pp. 224–237. ISSN: 0305750X. DOI: 10.1016/j.worlddev.2014.01.035. URL: http://dx.doi.org/10.1016/j.worlddev.2014.01.035.

Sirkeci, Ibrahim, Jeffrey H. Cohen, and Dilip Ratha, eds. (2012). *Migration and Remittances during the Global Financial Crisis and Beyond*. ISBN: 9780821388266. DOI: 10.1596/978-0-8213-8826-6.

SMERU (2009). *Monitoring the socioeconomic impact of the 2008/2009 global financial crisis in Indonesia*. Tech. rep.

Theoharides, Caroline (2018). "Manila to Malaysia, Quezon to Qatar: International migration and its effects on origin-country human capital". In: *Journal of Human Resources* 53.4, pp. 1022–1049. ISSN: 15488004. DOI: 10.3368/jhr.53.4.0216.7714R1.

— (2020). "The unintended consequences of migration policy on origin-country labor market decisions". In: *Journal of Development Economics* 142.July, p. 102271. ISSN: 03043878. DOI: 10.1016/j.jdeveco.2018.07.012. URL: https://doi.org/10.1016/j.jdeveco.2018.07.012%20https://linkinghub.elsevier.com/retrieve/pii/S0304387818310307.

Tribun News (Sept. 2013). *Transaksi Remitansi Kantor Pos Cirebon Tembus Rp 418 Miliar*. Bandung. URL: https://www.tribunnews.com/regional/2013/09/04/transaksi-remitansi-kantor-pos-cirebon-tembus-rp-418-miliar.

World Bank (2006). *Global Economic Prospects: Economic Implications of Remittances and Migration*. Tech. rep.

— (2017). *Indonesia's Global Workers: Juggling Opportunities and Risks*. Tech. rep., pp. 1–94.

— (2019). *Leveraging Economic Migration for Development: A Briefing for the World Bank Board*. Tech. rep. World Bank.

Yang, Dean (2006). "Why do migrants return to poor countries? Evidence from Philippine migrants' responses to exchange rate". In: *Review of Economics and Statistics* 88.4, pp. 715–735. ISSN: 00346535. DOI: 10.1162/rest.88.4.715.

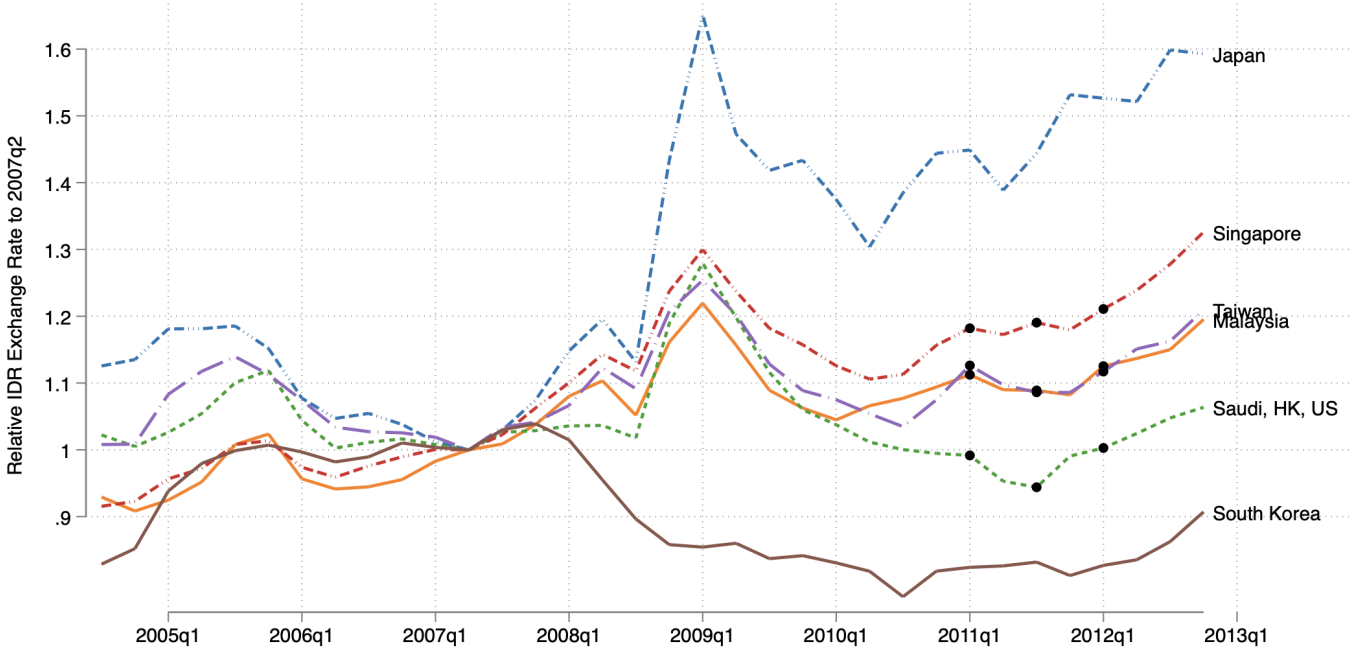
— (2008). "International Migration, Remittances and Household Investment: Evidence from Philippine Migrants' Exchange Rate Shocks". In: *The Economic Journal* 118.528, pp. 591–630. ISSN: 0013-0133. DOI: 10.1111/j.1468-0297.2008.02134.x.

— (Aug. 2011). "Migrant Remittances". In: *Journal of Economic Perspectives* 25.3, pp. 129–152. ISSN: 0895-3309. DOI: 10.1257/jep.25.3.129. URL: http://pubs.aeaweb.org/doi/10.1257/jep.25.3.129.

Yang, Dean and Claudia A Martínez (2005). "Remittances and Poverty in Migrants' Home Areas: Evidence from the Philippines". In: *International Migration, Remittances, and the Brain Drain*. Ed. by Caglar Ozden and Maurice Schiff. World Bank.

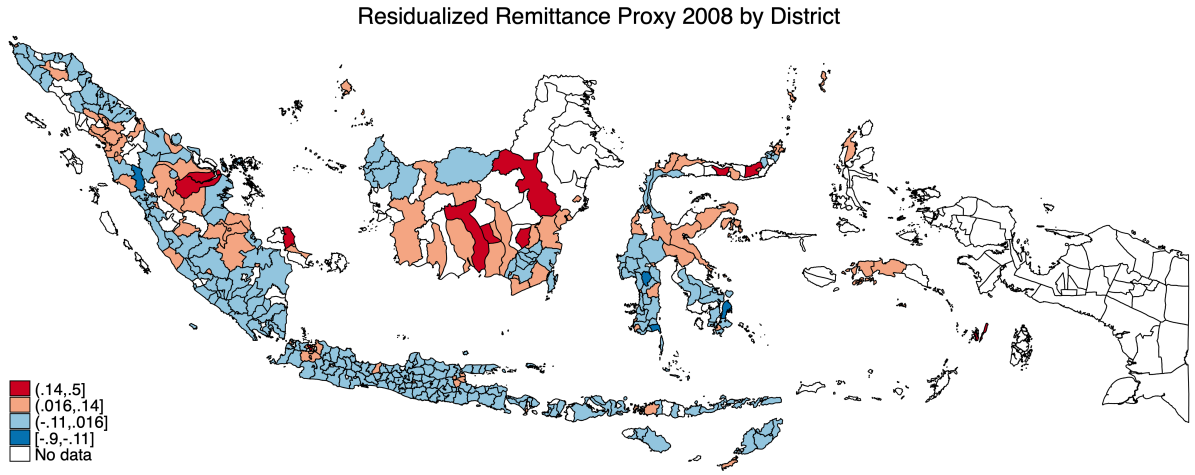
Figures and Tables

Figure 1: Variations of Exchange Rate to Indonesian Rupiah (IDR)



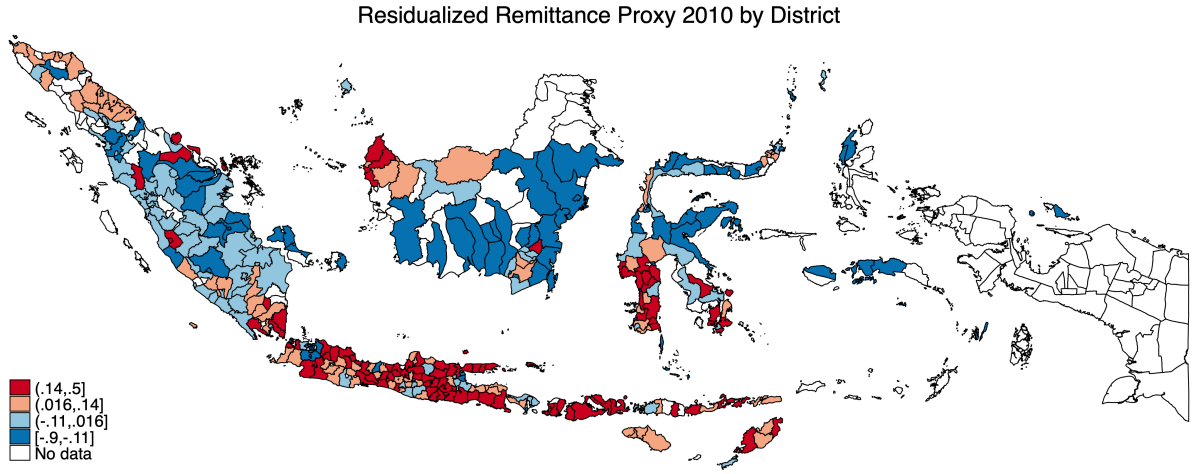
Note: Exchange rates plotted are relative to the prevailing exchange rate in Q2-2007. Countries selected are major migration destination countries. Quarterly data averaged from monthly exchange rates provided by Refinitiv Datastream (2021). Black dots denote quarters when Doi et al. (2014)'s follow-up surveys were administered.

Figure 2: Spatial Distribution of Residualized Remittance Proxy in 2008



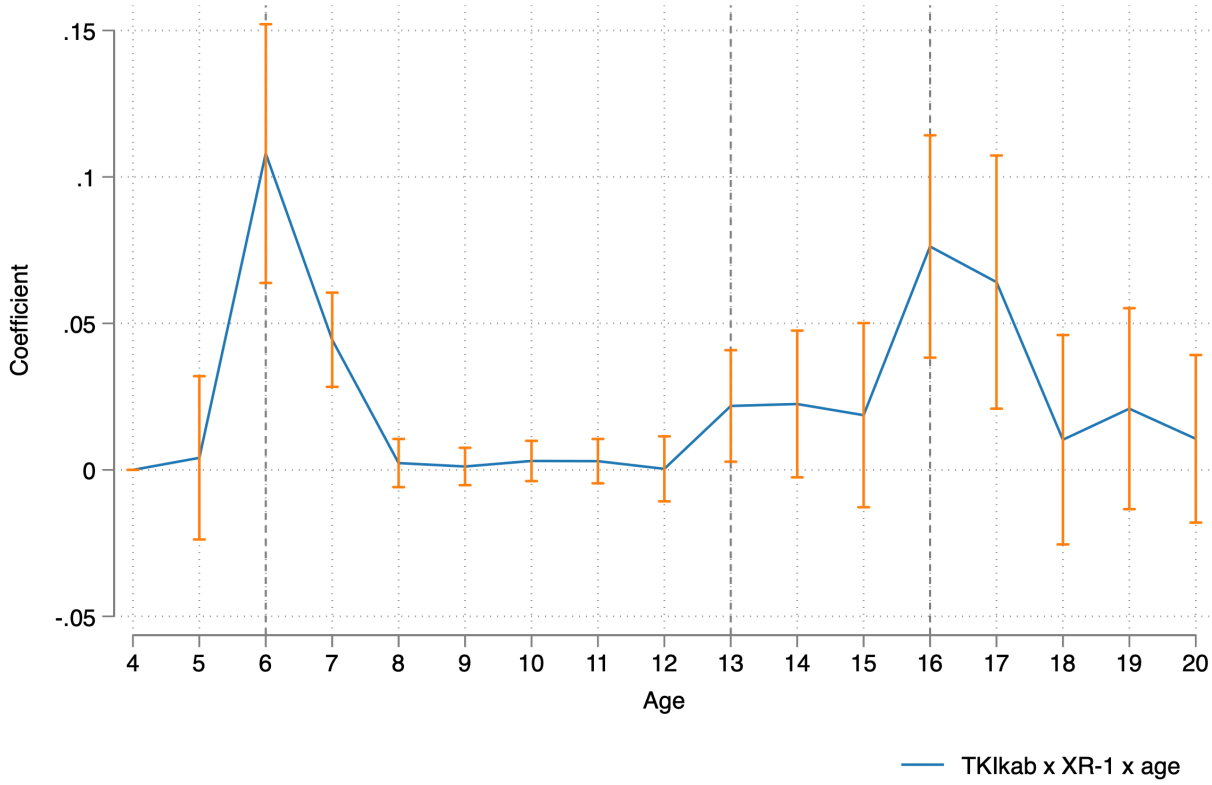
Note: This map displays Indonesian districts (*Kabupaten/Kota*) with the color indicating the magnitude of residualized remittance proxy in 2008. The residual term is from a regression of remittance proxy (interaction of migration intensity and exchange rate shock) on district and year fixed effects. Map plots district boundaries as of 2010. Bin thresholds corresponds to quartile thresholds in 2010. Districts are coded with no data if they have no record of abroad stock of TKI migrant workers in the migrant arrival data for the corresponding year.

Figure 3: Spatial Distribution of Residualized Remittance Proxy in 2010



Note: This map displays Indonesian districts (*Kabupaten/Kota*) with the color indicating the magnitude of residualized remittance proxy in 2010. The residual term is from a regression of remittance proxy (interaction of migration intensity and exchange rate shock) on district and year fixed effects. Map plots district boundaries as of 2010. Bin thresholds corresponds to quartile thresholds in 2010. Districts are coded with no data if they have no record of abroad stock of TKI migrant workers in the migrant arrival data for the corresponding year.

Figure 4: Age-specific Enrollment Responses to Remittance Shocks



Note: This figure plots coefficients of a set of age dummies with exchange rate shock and kabupaten level migration status. Spikes are 90% confidence intervals. Sample = Individuals ages 4-20 in Susenas 2005-2011. N = 2,035,426.

Table 1: Summary Statistics

	Mean	SD	Min	Max	Obs.
A. Migrant Panel Data from Doi et al. (2014)					
Remittance (z-score of log IDR)	-0.00	1.00	-3.87	2.76	418
Remittance (USD)	804.60	885.59	6.87	9943.21	418
Exchange rate shock (z-score)	0.00	1.00	-3.05	1.70	418
Exchange rate shock (%)	1.01	0.02	0.96	1.04	418
B. District-level Regressors					
Migrants (Podes 2005)	3,185	6,494	1	38,367	353
Population (Podes 2005)	588,456	593,375	44,699	4,004,632	353
Migrants per one million people (log)	7.2	1.8	.16	11	353
Exchange rate shock (%)	1.07	0.07	0.86	1.31	2419
Remittance proxy (z-score)	-0.00	1.00	-3.92	2.47	2419
C. Household Outcomes					
Enrollment elementary level (%)	93.34	2.96	70.38	100.00	2393
Enrollment junior secondary level (%)	66.52	9.93	20.25	91.47	2393
Enrollment senior secondary level (%)	46.03	12.84	1.35	86.62	2393
Household per capita (p.c.) expenditure (log IDR)	12.83	0.45	11.59	14.33	2062
Household p.c. expenditure for poorest 20%	12.08	0.38	10.85	13.10	2062
Household p.c. education expenditure (log IDR)	9.62	0.69	7.56	11.73	2062
Poor population (% of population)	15.13	7.79	1.52	45.18	2394
Poverty gap (index)	2.66	1.78	0.06	13.19	2394
D. District Education Supply					
Public elementary schools per 10,000 people	6.39	3.03	0.02	17.00	2419
Public junior high schools per 10,000 people	1.18	0.86	0.00	6.56	2419
Public high schools per 10,000 people	0.31	0.25	0.00	1.83	2419
District education expenditure (% of total)	0.35	0.11	0.00	1.00	2222
E. Other District Outcomes					
District GDP p.c. Excl. Oil & Gas (log IDR)	15.50	0.64	12.79	18.68	2401
Agriculture GDP p.c. (log IDR)	13.98	1.03	8.57	15.68	2401
Industry GDP p.c. (log IDR)	13.81	2.50	-12.29	18.08	2419
Service GDP p.c. (log IDR)	14.40	2.36	-12.29	18.57	2419

Table 2: Effect of Currency Exchange Fluctuations on Remittances

	(1) Remittance	(2) Remittance	(3) Remittance	(4) Remittance
XR shock	0.050	0.378**	0.410**	0.406**
	(0.048)	(0.159)	(0.162)	(0.163)
Duration abroad			-0.001	-0.001
			(0.000)	(0.000)
Time to next Eid				-0.069
				(0.192)
Dep. Var. Mean	-0.0	-0.0	-0.0	-0.0
Household FE, Wave FE		✓	✓	✓
HH	183	183	183	183
Observations	418	418	418	418

Notes: The sample is migrant household panel from Doi et al. (2014) who reported receiving remittances in more than one follow-up surveys (March 2011-January 2012). Remittances are total received remittances since migrant departure at the first follow-up, and the difference from previous response in subsequent follow-ups. Remittances are expressed in log Indonesian rupiah (IDR), standardized. XR shock is the exchange rate to IDR relative to March 2011, standardized. Exchange rate data are from Refinitiv Datastream. Standard errors are clustered at the household level. * $p \leq 0.10$, ** $p \leq 0.05$, *** $p \leq 0.01$.

Table 3: Correlations between Subsequent Remittances and Past Outcomes

	(1)	(2)	(3)	(4)	(5)	(6)
	A. GDP Per Capita and Household Consumption Expenditure (Log IDR)					
	Household Expenditure	Household Exp Bottom 20%	GDP Total	GDP Agriculture	GDP Service	GDP Industry
$\text{Migration}_d^o \times \text{XRShock}_{dt+2}$	0.01	-0.00	-0.00	-0.00	0.23	0.20
	(0.02)	(0.02)	(0.02)	(0.02)	(0.16)	(0.16)
District FE, Year FE	✓	✓	✓	✓	✓	✓
Dep. Var. Mean	12.45	11.77	15.40	13.94	14.23	13.68
Districts	341	341	350	350	353	353
Observations	1522	1522	1907	1907	1924	1924
	B. Net Enrollment Rate (%) and Education Facilities (Per 10,000 people)					
	Elementary Enrollment (Ages 6-12)	Junior Secondary Enrollment (Ages 13-15)	Senior Secondary Enrollment (Ages 16-18)	Elementary School (Grades 1-6)	Junior Secondary School (Grades 7-9)	Senior Secondary School (Grades 10-12)
$\text{Migration}_d^o \times \text{XRShock}_{dt+2}$	-0.49	0.51	1.48	0.16	-0.00	0.01
	(0.48)	(1.41)	(1.02)	(0.10)	(0.04)	(0.01)
District FE, Year FE	✓	✓	✓	✓	✓	✓
Dep. Var. Mean	88.63	65.73	44.24	6.59	1.11	0.29
Districts	350	350	350	353	353	353
Observations	1590	1590	1590	1924	1924	1924

Notes: This table reports the estimates of a modified version of equation (5), where the exchange rate shock variable (XRShock) is shifted forward by two periods. Sample is from 2005-2012 panel of Indonesian districts in the Indo-Dapoer dataset with recorded returnees from airport arrival data. The interaction variable $\text{Migration}_d \times \text{XRShock}_{t+2}$ proxies for remittances, and is standardized to have a mean of zero and a standard deviation of one. XRShock is the district-level yearly average of migrant-weighted foreign currency exchange rates between the host country's currency and IDR, relative to June 2007. The district-level migrant stock abroad for XRshock is reconstructed based on the departure and arrival dates in the migrant terminal data. Migration (intensity) is the natural log of ratio between the total migrant and total population from the 2005 village census. GDP per capita are expressed in a log of 2010 IDR. Other outcomes data sources and details are as described in Appendix A.1. * $p \leq 0.10$, ** $p \leq 0.05$, *** $p \leq 0.01$. Standard errors are clustered at the district level in parentheses.

Table 4: Effects of Remittances on Development Indicators

	(1)	(2)	(3)	(4)
	A. Household Expenditures Per Capita (Log IDR)			
	Average Household	Bottom 20% Household	Education Expenditures	Core Price Index
$\text{Migration}_d^o \times \text{XRShock}_{dt-1}$	0.04	0.10***	0.28***	1.90
	(0.04)	(0.03)	(0.09)	(3.19)
District FE, Year FE	✓	✓	✓	✓
Dep. Var. Mean	12.83	12.08	9.62	113.76
Districts	350	350	350	47
Observations	2060	2060	2060	330
	B. Asset and Poverty			
	Asset Index	Poverty Rate	Poverty Gap	Gini Coefficient
$\text{Migration}_d^o \times \text{XRShock}_{dt-1}$	0.03***	-3.93***	-1.29***	-0.03**
	(0.01)	(0.76)	(0.23)	(0.01)
District FE, Year FE	✓	✓	✓	✓
Dep. Var. Mean	0.19	15.13	2.66	0.29
Districts	327	350	350	319
Observations	907	2392	2392	1844
	C. GDP Per Capita (Log IDR)			
	GDP Total	GDP Agriculture	GDP Service	GDP Industry
$\text{Migration}_d^o \times \text{XRShock}_{dt-1}$	0.09*	0.13***	0.24*	0.19
	(0.05)	(0.04)	(0.14)	(0.14)
District FE, Year FE	✓	✓	✓	✓
Dep. Var. Mean	15.50	13.98	14.40	13.81
Districts	350	350	353	353
Observations	2399	2399	2417	2417

Notes: This table reports the estimates of equation (5). The sample is 2005-2012 panel of Indonesian districts in the Indo-Dapoer dataset with recorded returnees from airport arrival data. The interaction variable $\text{Migration}_d \times \text{XRShock}_{t-1}$ proxies for remittances, and is standardized to have mean of zero and a standard deviation of one. XRShock is the exchange rate between migrants' host country currencies and IDR, relative to June 2007, averaged at the district-year level. The district-level migrant stock abroad for XRshock is reconstructed based on the departure and arrival dates from the migrant terminal data. Migration (intensity) is the natural log of the ratio between the total migrant and total population from the 2005 village census. GDP per capita is expressed in log of 2010 IDR. Other outcomes data sources and details are as described in Appendix A.1. * $p \leq 0.10$, ** $p \leq 0.05$, *** $p \leq 0.01$. Standard errors are clustered at the district level in parentheses.

Table 5: Effects on School Enrollment

	(1) School Enrollment All Levels Among 6-18 yo.	(2) Elementary School Enrollment Among 6-12 yo.	(3) Jr. Sec School Enrollment Among 13-15 yo.	(4) Sr. Sec School Enrollment Among 16-18 yo.
	A. Boys and Girls			
$\text{Migration}_d^o \times \text{XRShock}_{dt-1}$	3.73***	3.17***	4.37**	7.48***
	(0.81)	(0.76)	(2.14)	(2.21)
District FE, Year FE	✓	✓	✓	✓
Dep. Var. Mean	83.80	88.98	66.76	46.55
Districts	353	353	353	353
Observations	2411	2411	2411	2411
	B. Boys			
$\text{Migration}_d^o \times \text{XRShock}_{dt-1}$	4.43***	2.47**	6.29***	11.95***
	(1.00)	(1.00)	(2.34)	(2.74)
District FE, Year FE	✓	✓	✓	✓
Dep. Var. Mean	83.19	88.92	65.61	46.01
Districts	353	353	353	353
Observations	2411	2411	2411	2411
	C. Girls			
$\text{Migration}_d^o \times \text{XRShock}_{dt-1}$	2.92***	3.84***	1.87	2.82
	(0.89)	(0.88)	(2.86)	(2.78)
District FE, Year FE	✓	✓	✓	✓
Dep. Var. Mean	84.46	89.04	68.01	47.20
Districts	353	353	353	353
Observations	2411	2411	2411	2411

Notes: This table reports the estimates of equation (5). The sample is from the 2005-2012 panel of Indonesian districts in the Indo-Dapoer dataset with recorded returnees from airport arrival data. Interaction variable $\text{Migration}_d \times \text{XRShock}_{t-1}$ proxies for remittances and is standardized to have a mean of zero and a standard deviation of one. XRShock is the exchange rate between migrants' host country currencies and IDR, relative to June 2007, averaged at the district-year level. The district-level migrant stock abroad for XRshock is reconstructed based on the departure and arrival dates from the migrant terminal data. Migration (intensity) is the natural log of the ratio between the total migrant and total population from the 2005 village census. Outcomes data is from Susenas household surveys. Other outcomes data details are as described in Appendix A.1. * p≤ 0.10, ** p≤ 0.05, *** p≤ 0.01. Standard errors clustered at the district level in parentheses.

Table 6: Effects on Enrollment, Cohort-Specific Analysis

	(1)	(2)	(3)	(4)
	Enrollment All Levels	Enrollment Elementary	Enrollment Jr. Sec	Enrollment Sr. Sec
	A. District-level Remittance Proxy			
CohortTreat$\times Mig_d^o \times XRshock_{dt-1}$	0.041***	0.074***	0.027*	0.077***
	(0.010)	(0.006)	(0.014)	(0.015)
$Mig_d^o \times XRshock_{dt-1}$	0.006	-0.031***	-0.011***	0.029***
	(0.008)	(0.003)	(0.002)	(0.003)
CohortTreat	0.726***	0.851***	0.603***	0.370***
	(0.001)	(0.001)	(0.001)	(0.001)
Year FE, Kab FE	✓	✓	✓	✓
Dep. Var. Mean	0.675	0.417	0.138	0.092
Districts	962,605	962,605	962,605	962,605
Observations	1,826,794	1,826,794	1,826,794	1,826,794
	B. Present Migrant Household and XR shock			
$CohortTreat_i \times Mig_h \times XRshock_{dt-1}$	0.009	0.019**	0.051***	-0.004
	(0.010)	(0.008)	(0.017)	(0.018)
$CohortTreat_i \times XRshock_{dt-1}$	0.005***	0.023***	0.006***	-0.015***
	(0.001)	(0.001)	(0.002)	(0.002)
Age FE, Year FE, Kab FE	✓	✓	✓	✓
Dep. Var. Mean	0.659	0.409	0.143	0.094
Households	393,272	393,272	393,272	393,272
Observations	757,991	757,991	757,991	757,991

Notes: This table reports the estimates of equation (5). The sample is 2005-2007 individuals aged 4-20 in Susenas survey. XRShock is the exchange rate between migrants' host country currencies and IDR, relative to June 2007, averaged at the district-year level. CohortTreat dummies are indicators for individuals in school age (6-18 years), primary school age (7-12 years), junior secondary age (13-15 years), and senior secondary age (16-18 years). * p≤ 0.10, ** p≤ 0.05, *** p≤ 0.01. Standard errors are clustered at the household level in parentheses.

Table 7: Effects on Public Goods Provision

	(1)	(2)	(3)
	A. Public Schools (per 10,000 population)		
	Elementary (Grades 1-6)	Junior Secondary (Grades 7-9)	Senior Secondary (Grades 10-12)
$\text{Migration}_d^o \times \text{XRShock}_{dt-1}$	0.85***	0.27***	0.02
	(0.28)	(0.09)	(0.03)
District FE, Year FE	✓	✓	✓
Dep. Var. Mean	6.39	1.18	0.31
Districts	353	353	353
Observations	2417	2417	2417
	B. Other Public Goods		
	Share Household with Electricity	Share Household with Piped Water	Share Villages with Asphalt Roads
$\text{Migration}_d^o \times \text{XRShock}_{dt-1}$	0.05***	0.09***	0.25**
	(0.02)	(0.03)	(0.10)
District FE, Year FE	✓	✓	✓
Dep. Var. Mean	0.89	0.16	0.70
Districts	350	353	308
Observations	2175	2411	831

Notes: This table reports the estimates of equation (5). The sample is 2005-2012 panel of Indonesian districts in the Indo-Dapoer dataset with recorded returnees from airport arrival data. The interaction variable $\text{Migration}_d \times \text{XRShock}_{t-1}$ proxies for remittances and is standardized to have a mean of zero and a standard deviation of one. XRShock is the exchange rate between migrants' host country currencies and IDR, relative to June 2007, averaged at the district-year level. The district-level migrant stock abroad for XRshock is reconstructed based on the departure and arrival dates in the migrant terminal data. Migration (intensity) is the natural log of the ratio between the total migrant and total population from the 2005 village census. Outcomes data sources and details are as described in Appendix A.1. * $p \leq 0.10$, ** $p \leq 0.05$, *** $p \leq 0.01$. Standard errors are clustered at the district level in parentheses.

Table 8: Effects on Development and Education Outcomes, Robustness with Main Trade Commodities

	(1)	(2)	(3)	(4)	(5)	(6)
	A. Development Indicators					
	Household Expenditure	Household Exp Bottom 20%	Asset Index	Poverty Rate	GDP Total	GDP Agriculture
A1. Main Estimates						
$\text{Migration}_d^o \times \text{XRShock}_{dt-1}$	0.04	0.10***	0.03***	-3.93***	0.09*	0.13***
	(0.04)	(0.03)	(0.01)	(0.76)	(0.05)	(0.04)
A2. With Commodity Trade Controls (Oil and Natural Gas, Palm Oil)						
$\text{Migration}_d^o \times \text{XRShock}_{dt-1}$	0.06	0.11***	0.03***	-4.14***	0.06	0.13***
	(0.04)	(0.03)	(0.01)	(0.75)	(0.05)	(0.04)
District FE, Year FE	✓	✓	✓	✓	✓	✓
Dep. Var. Mean	12.83	12.08	0.19	15.13	15.50	13.98
Districts	350	350	327	350	350	350
Observations	2060	2060	907	2392	2399	2399
	B. Net Enrollment Rate (%) and Education Facilities (per 10,000 People)					
	Elementary Enrollment (Ages 6-12)	Junior Secondary Enrollment (Ages 13-15)	Senior Secondary Enrollment (Ages 16-18)	Elementary School (Grades 1-6)	Junior Secondary School (Grades 7-9)	Senior Secondary School (Grades 10-12)
B1. Main Estimates						
$\text{Migration}_d^o \times \text{XRShock}_{dt-1}$	3.17***	4.37**	7.48***	0.85***	0.27***	0.02
	(0.76)	(2.14)	(2.21)	(0.28)	(0.09)	(0.03)
B2. With Commodity Trade Controls (Oil and Natural Gas, Palm Oil)						
$\text{Migration}_d^o \times \text{XRShock}_{dt-1}$	3.17***	5.17**	8.00***	0.90***	0.31***	0.03
	(0.77)	(2.11)	(2.12)	(0.29)	(0.09)	(0.03)
District FE, Year FE	✓	✓	✓	✓	✓	✓
Dep. Var. Mean	88.98	66.76	46.55	6.39	1.18	0.31
Districts	353	353	353	353	353	353
Observations	2411	2411	2411	2417	2417	2417

Notes: This table reports the estimates of equation (5) with the addition of two control variables on the right hand side to account for commodity trades. The variables are $\text{OilGas}_d^0 \times \text{XROilGas}_{t-1}$ and $\text{PalmOil}_d^0 \times \text{XRPalmOil}_{t-1}$. The sample is from the 2005-2012 panel of Indonesian districts in the Indo-Dapoer dataset with recorded returnees from airport arrival data. The interaction variable $\text{Migration}_d \times \text{XRShock}_{t-1}$ proxies for remittances and is standardized to have a mean of zero and a standard deviation of one. XRShock is the exchange rate between migrants' host country currencies and IDR, relative to June 2007, averaged at the district-year level. District-level migrant stock abroad for XRshock is reconstructed based on the departure and arrival dates from the migrant terminal data. Migration (intensity) is the natural log of the ratio between the total migrant and total population from the 2005 village census. GDP per capita is expressed in a log of 2010 IDR. Other outcomes data sources and details are as described in Appendix A.1. * $p \leq 0.10$, ** $p \leq 0.05$, *** $p \leq 0.01$. Standard errors are clustered at the district level in parentheses.

Table 9: Effects of Remittances on Education Supply

	(1)	(2)	(3)
	A. Public Schools (per 10,000 Population)		
	Elementary (Grades 1-6)	Junior Secondary (Grades 7-9)	Senior Secondary (Grades 10-12)
Migration × XRShock_{t-1}	0.65**	0.28***	0.03
	(0.31)	(0.10)	(0.03)
Migration × XRShock_{t-1} × $EduBudget_{t-2}$	0.45*	0.13*	0.00
	(0.26)	(0.08)	(0.03)
District FE, Year FE	✓	✓	✓
Dep.Var Mean	6.45	1.20	0.32
Districts	341	341	341
Observations	1999	1999	1999
	B. Challenges in Jr Secondary Education		
	Facility Inadequate	Cost Unaffordable	Facility Over Cost
Migration x $XRShock_{t-1}$	0.353	-0.506*	0.206*
	(0.373)	(0.286)	(0.119)
Village FE, Survey FE	✓	✓	✓
Dep.Var Mean	0.791	0.365	0.244
Villages	572	572	572
Observations	6886	6886	6886
	C. Jr. Secondary Type and Facilities		
	Jr Sec Attached to Elementary	Classrooms per Jr Sec School	Teachers per Jr Sec School
Migration_d^o × XRShock_{dt-1}	0.03***	-0.45***	-0.57**
	(0.01)	(0.15)	(0.27)
District FE, Year FE	✓	✓	✓
Dep. Var. Mean	0.08	10.91	19.43
Districts	353	353	353
Observations	2417	2417	2417

Notes: This table reports the estimates of equation (5). Panel A include interaction terms with lagged education expenditure budget as a share of total expenditures. The sample in Panels A and C are the 2005-2012 panel of Indonesian districts in the Indo-Dapoer dataset with recorded returnees from the airport arrival data. The interaction variable $\text{Migration}_d \times \text{XRShock}_{t-1}$ proxies for remittances and is standardized to have a mean of zero and a standard deviation of one. XRShock is the exchange rate between migrants' host country currencies and IDR, relative to June 2007, averaged at the district-year level. District-level migrant stock abroad for XRshock is reconstructed based on the departure and arrival dates from the migrant terminal data. Migration (intensity) is the natural log of the ratio between the total migrant and total population from the 2005 village census. The sample for Panel B is the Village Head Survey from Olken et al. (2014) and Cahyadi et al. (2020). Other outcomes data sources and details are as described in Appendix A.1. * p≤ 0.10, ** p≤ 0.05, *** p≤ 0.01. Standard errors are clustered at the district level in parentheses.

Table 10: Effects on District Revenue Streams

	(1)	(2)	(3)	(4)	(5)
	Central Taxes (DBH)	Local Taxes (PAD)	Natural Resources	Special Grant (DAK)	Formulaic Base Grant (DAU)
	A. District Revenue Streams (Log IDR)				
$\text{Migration}_d^o \times \text{XRShock}_{dt-1}$	-1.58	-1.21	-0.23	0.57	1.82
	(1.15)	(0.74)	(2.20)	(1.71)	(1.26)
District FE, Year FE	✓	✓	✓	✓	✓
Dep. Var. Mean	23.98	24.01	21.01	23.60	26.38
Districts	345	345	345	345	345
Observations	2324	2324	2324	2324	2324
	B. Revenues as Share of Total (%)				
$\text{Migration}_d^o \times \text{XRShock}_{dt-1}$	-0.05**	-0.01	0.03	0.03***	-0.01
	(0.02)	(0.01)	(0.02)	(0.01)	(0.02)
District FE, Year FE	✓	✓	✓	✓	✓
Dep. Var. Mean	0.07	0.07	0.06	0.07	0.62
Districts	345	345	345	345	345
Observations	2320	2320	2320	2320	2320

Notes: This table reports the estimates of equation (5). The sample is 2005-2012 panel of Indonesian districts in the Indo-Dapoer dataset with recorded returnees from airport arrival data. The interaction variable $\text{Migration}_d \times \text{XRShock}_{t-1}$ proxies for remittances and is standardized to have a mean of zero and standard deviation of one. XRShock is the exchange rate between migrants' host country currencies and IDR, relative to June 2007, averaged at the district-year level. District-level migrant stock abroad for XRshock is reconstructed based on the departure and arrival dates from the migrant terminal data. Migration (intensity) is the natural log of the ratio between the total migrant and total population from the 2005 village census. Outcomes data sources and details are as described in Appendix A.1. * p≤ 0.10, ** p≤ 0.05, *** p≤ 0.01. Standard errors are clustered at the district level in parentheses.

Table 11: Effects of Remittances, Interaction with District Split and Election Indicators

	(1) Public Elementary (Grade 1-6)	(2) Public Junior Secondary (Grade 7-9)	(3) Public Senior Secondary (Grade 10-12)
	A. District Splitting		
Migration × XRShock_{t-1}	0.52***	0.18**	0.1
	(0.18)	(0.07)	(0.02)
Migration × $\text{XRShock}_{t-1} \times 1[Split]_t$	0.41**	0.094*	-0.01
	(0.16)	(0.056)	(0.01)
District FE, Year FE	✓	✓	✓
Dep. Var. Mean	6.39	1.18	0.31
Districts	353	353	353
Observations	2417	2417	2417
	B. Election		
Migration × XRShock_{t-1}	0.87***	0.28***	0.02
	(0.28)	(0.09)	(0.03)
Migration × $\text{XRShock}_{t-1} \times 1[Election]_t$	-0.01	-0.00	-0.00
	(0.02)	(0.01)	(0.00)
District FE, Year FE	✓	✓	✓
Dep. Var. Mean	6.39	1.18	0.31
Districts	353	353	353
Observations	2417	2417	2417

Notes: This table reports estimates of equation (5). Panel A includes interaction terms with an indicator of whether the district has split into smaller districts, Panel B includes interaction terms with an indicator of whether there is a district-level election in the year. Sample are 2005-2012 panel of Indonesian districts in Indo-Dapoer dataset with recorded returnees from airport arrival data. Interaction variable $\text{Migration}_d \times \text{XRShock}_{t-1}$ proxies for remittances, and is standardized to have mean zero and standard deviation of one. XRShock is district-level yearly average of migrant-weighted foreign currency exchange rate between host country currency and Indonesian rupiah, relative to June 2007. District-level migrant stock abroad for XRshock is reconstructed based on the departure and arrival dates in the migrant terminal data. Migration (intensity) is the natural log of ratio between the total migrant and total population from the 2005 village census. Other outcomes data sources and details as described in Appendix A.1. * $p \leq 0.10$, ** $p \leq 0.05$, *** $p \leq 0.01$. Standard errors clustered at the district level in parentheses.

Appendix

A. Data Sources and Constructions

Main Explanatory Variables

Migration Intensity data comes from Podes (*Potensi Desa*), a triennial survey of all villages in Indonesia (2005, 2008, 2011). Information on the number of Overseas Indonesian Workers (TKI) was provided by village heads and aggregated at the district level. Migration Intensity is expressed as the natural logarithm of the ratio of the total migrant population in the district to the district's total population. Population denominator uses population estimates from Podes in the same year.

Migrant Stock data are based on migrant terminal data collected between March 2008-March 2011 and provided by BNP2TKI. The migrant terminal collects the following individual-level information: migrant home district, country of work, date of departure, date of arrival, gender, and reason for return. Using the arrival and departure month, I construct a migrant-by-month level dataset. With the average migration duration lasting 25 months, the resulting dataset has 26,235,872 observations. I aggregate this to the district-destination-month level so that each observation conveys how many migrants from a given district in a given month are working each destination country. I drop the outlier of migrants who stay longer in order to create a dataset with 215,072 observations, which covers 366 districts with information on migrants in 89 countries spanning from January 2004-March 2011. The average migrant per district-destination-month cell is 121 migrants. Each observation above is then merged based on a month and currency code with exchange rate data from Datastream (below). All exchange rates of foreign currencies to the Indonesian rupiah (IDR) are benchmarked to the rate in June 2007. I drop information from migrants in Zimbabwe (0.2% of the total migrants) because of the country's economic volatility.

I aggregate the district-destination/currency-month level data to the district-year level using the number of migrants in each destination country and month as a weight to create the average at the district-year level (N=2,463). This panel is not balanced. The resulting district-year exchange rate shock is then matched with the Dapoer dataset on district and year identifiers.

Exchange Rate data, 2005-2011. Refinitiv Datastream provides monthly exchange rates to IDR from the following currencies: US Dollar, Euro, British Pound, Singapore Dollar, Canadian Dollar, Swiss Franc, Danish Kroner, Malaysian Ringgit, New Zealand Dollar, Norwegian Kroner, Philippines Peso, Thai Baht, and Australian Dollar. Currencies to other migration destination countries not listed above are only available against the US Dollar, British Pound, and Euro. These are converted to the exchange rate to Indonesian rupiah using the prevailing USD-IDR, GBP-IDR, and EUR-IDR exchange rates for the same month. This data is supplemented with data from the Pacific Exchange Rate Service for Kuwait Dinar and Bahrain Dirham to Indonesian Rupiah, and the Bloomberg Terminal for Syrian Pound and Solomon Islander Dollars to US Dollar.

Commodity data comes from Statistik Perdagangan Luar Negeri Indonesia on Exports and Imports 2005. The Central Bureau of Statistics compiled export and import data from Customs and Excise at the port level to aggregate commodities using Harmonized Systems and SITC/Standard International Trade Classification. I aggregate the commodities at the SITC code level to the country destination level. The commodities covered under palm oil are: crude palm oil (SITC 42221) and crude olein (42229). The commodities covered under oil and natural gas include: crude petroleum oil, condensate (SITC 33300), motor spirit premium leaded (33419), topped crudes, other lubricating oil (33429), lubricating oil basestock (33450), other fuel oils (33430), liquid natural gas (34310), liquid propane (34210), liquid butanes (34250), liquid ethylene, liquid propylene, butylene, butadiene (34410). The palm oil plantation area comes from Podes 2003 (Agricultural Census).

Election data are obtained from Sam Bazzi and Ben Marx's work and are supplemented by reports from Indonesian media for districts not covered in the dataset.

Outcomes Variables

Indo-Dapoer (Indonesia Database for Policy and Economic Research) is a compilation of Indonesian district-level indicators compiled from various sources by the World Bank. The unit of observation is districts as defined by the 2014 boundaries. Observations of post-split district children are backcasted to years before the split. Most indicators are available yearly, and I use data from 2005-2012. I use the following variables from Dapoer: household expenditures (average household, household in bottom 20%, education), GDP in constant price by sector, population, CPI/consumer price index (based on 2002 and 2007), poverty rate, poverty gap, Gini coefficient, share of households with electricity, share of villages with asphalt roads, education budget, revenue streams (DBH, PAD, DBH SDA, DAK, DAU, oil and gas revenue), employment (total labor force, employment, unemployment, underemployment, employment by sector). I conduct the following transformations: household expenditure data are transformed with log, GDP sectoral data are combined into three big sectors: agriculture, service, industry; converted from million IDR to IDR, divided by population, and then transformed with log. Population data in Dapoer is based on the 2000 and 2010 censuses, with population projection in intervening years from BPS. I rescale CPI base-2002 to CPI base-2007 to create a longer series. Price data is only available in 45 cities for the 2002 base, and 66 cities for the 2007 base. Asphalt road is available only every three years because it aggregates data from the triennial Podes survey. For district budget and expenditures, I create a share of each revenue stream out of the total budget and share of education expenditures out of the total expenditures.

Susenas (*Survei Sosio-Ekonomi Nasional*/National Socioeconomic Survey) is a household survey with representative sampling at the district level conducted by the Central Bureau of Statistics (BPS). I use data from 2005-2012 for the following variables: participation in school (elementary, secondary), gender, age, and location in order to create a district-average enrollment rate by gender and age groups (7-12, 13-15, 16-18, 7-18, and 19-24 as placebo). I also use households' answers to source of drinking water and assets. Asset data are only available from 2010-2012.

Dapodik (*Data Pokok Pendidikan*) is an administrative school registry maintained by the Mistry of Education, Culture, Research, and Technology. Dapodik covers the universe of schools under the purview of MOECRT in Indonesia. These include 166,257 publicly run schools and 52,888 privately run schools. School administrators submit information periodically to the database, which isrequired for schools to access capitation funds (BOS/*Bantuan Operasi Sekolah*). In areas with poor connectivity, schools often pool resources to hire a dedicated IT administrator who handles periodic submissions to the MOECRT system. I use the following information from Dapodik: whether a school is public, its education level (primary, junior secondary, or senior secondary), year of establishment (for all levels of schools). I aggregate this using location and year of establishment at the district-year level to create a count of schools existing in a given district in a given year. I further use the following information for junior secondary schools: name of school, number of teachers per school, number of classrooms per school, number of toilets per school. I create an indicator of whether the junior high school is a "One-Roof School" that share a location with an elementary school by extracting from its name string ("Satap" or "Satu Atap"). I aggregate this to district-year level.

Local budget. I obtained district budget and expenditure data from the Ministry of Finance (MoF; *Direktorat Jenderal Perimbangan Keuangan*). This dataset provide information at the district-year level, based on reports from the district governments to the MoF. The datasets are downloadable at http://djpk.kemenkeu.go.id.

I used Kabupaten crosswalk to merge district identifiers across datasets, i.e., to merge Susenas, Podes, and Dapoer datasets. Other datasets are merged at the district level by name after standardizing the spelling, i.e., for BNP2TKI terminal data and Dapodik.

Supplementary Datasets

Migrant Panel data. This data comes from Doi et al. (2014). This dataset follows 400 migrant workers from East Java between 2010-2012. A baseline interview was administered prior to their departure (February-June 2010) and households were re-interviewed during three follow-up surveys

(March-April

2011, September-October 2011, January 2012). The same household members interviewed at baseline were interviewed during the follow-up surveys. The re-contact rates were 91-98% for the three follow-up surveys. I retained samples from the survey: (1) the migrant was located abroad during more than one of the follow-up rounds, (2) the household reported receiving international remittances, and (3) the migrant sent remittances after the last follow-up survey. With regard to criteria (1), I excluded households that did not know in which country the migrant was working. For criteria (3), I used the difference in the reported amount of remittances received between the follow-up surveys, since the migrant's departure is an indicator of subsequent remittance transfers.

SPKP data (*Survei Pelayanan Kesehatan dan Pendidikan*) are a set of baseline and follow-up surveys conducted in 700 subdistricts across Indonesia to evaluate the impact of a household cash transfer program (PKH/*Program Keluarga Harapan*) and a community block grant program (Generasi, see: Alatas, 2011; Olken and Singhal, 2011; Olken et al., 2014; Cahyadi et al., 2020). The respondents are households, village heads, schools, health workers, and subdistrict heads. I analyzed data from the following four survey waves: 2007, 2008, 2009, and 2014. Village and household samples are a mixture of cross-section and panel (i.e. some households/villages were observed only once). Sample sizes vary between survey waves, depending on its purpose, e.g., the 2008 was a midline survey only for the Generasi block grant program. The surveys cover: West Java, East Java, North Sulawesi, Gorontalo, and NTT.

I use the following variables from the village head surveys: challenges in junior secondary education in the village, and complaints about the anti-poverty programs made to village head. I code an indicator for whether the village head (unprompted) mentioned that the village lacks a junior secondary education facility, or the facility is located too far away, or the infrastructure is inadequate. I also code an indicator for whether statements were made about the high education cost or insufficient financial assistance for the school to operation/offer scholarship. Lastly, I code an indicator if the infrastructure concern is ranked higher than the cost concern.

From the household surveys, I use the following variables: indicator for participation in community work/*gotong royong*, household contribution (manpower, goods or money), voting history, and participation in community groups. Voting history variables are indicators pertaining to the 2009 presidential election, district election (if there were any elections in the past 2 years), and village head election (if there was any election in the past 2 years). I use village codes to match SPKP villages with Podes dataset, constructing the remittance shock variable based on migrant count and village plurality destinations from Podes 2005. I match this with the exchange rate data (above) to construct the shock variable.

IFLS (Indonesia Family Life Survey) data is a series of panel surveys of ∼40k households. The first survey took place in 1993 and was representative of approximately eighty percent of the Indonesian population at that time. My study period overlaps only with the fourth wave of the survey (2007), which I use to investigate the correlation between remittances and household children's aspiration for education.

Table A.1: Summary statistics – Supplementary

	Mean	SD	Min	Max	Obs.
A. Other Migrant Panel Variables from Doi et al. (2014)					
Remittances since last follow up (IDR)	7,149,120	7,953,597	60,000	90,000,000	418
Remittance transactions since departure	4.54	3.79	1	23	418
Work in Hong Kong	0.58	0.49	0	1	418
Work in Taiwan	0.41	0.49	0	1	418
Work in Singapore	0.01	0.12	0	1	418
IDR exchange rate per 1 Hong Kong Dollar	1138.23	21.06	1095	1166	242
IDR exchange rate per 1 Taiwan New Dollar	297.15	3.66	284	302	170
IDR exchange rate per 1 Singapore Dollar	6990.25	72.87	6903	7080	6
Days since migration departure	160.81	217.18	0	1100	418
Month(s) to next Eid al-Fitr	7.81	2.46	1	11	418
B1. Alternative District-level Regressors					
Migrants (Podes 2008)	3,811	7,995	0	57,067	353
Population (Podes 2008)	591,363	583,632	47,824	4,219,324	353
Migrants (Podes 2011)	3,857	8,412	0	55,459	353
Population (Podes 2011)	604,238	613,640	47,591	4,626,937	353
Migrants 2008 per one million people (log)	7.3	1.9	.47	12	352
Migrants 2011 per one million people (log)	7.2	2	.34	12	348
District Oil & Gas revenues 2005 (log IDR)	11.7	11	0	28.5	353
Palm oil plantation (Podes 2003, in ha.)	6,382	22,565	0	299,541	291
B2. Time-varying Regressors Common to All Districts					
Exchange Rate shock, Oil & Gas export dest.	1.13	0.10	1.00	1.29	8
Exchange Rate shock, Palm Oil export dest.	1.02	0.06	0.95	1.10	8
C. Other Household Outcomes					
Ownership of a motorcycle	0.59	0.17	0.11	0.94	928
Ownership of a car	0.07	0.05	0.00	0.28	580
Ownership of a bicycle	0.34	0.21	0.00	0.85	928
Ownership of a refrigerator	0.31	0.17	0.02	0.83	928
Ownership of a 12-kg LPG canister	0.14	0.12	0.00	0.65	928
Household water from piped water	0.16	0.15	0.00	0.95	2413
Household water from a protected well	0.29	0.18	0.00	0.82	2413
Households with electricity	0.89	0.15	0.10	1.00	2177
Villages with asphalt road (%)	69.54	24.15	3.39	100.00	873
D. Other District-level Education Characteristics					
Public elementary schools	323.88	250.95	1	1534	2419
Public junior high schools	45.57	23.29	0	152	2419
Public high schools	12.35	7.45	0	45	2419
District education expenditure (log IDR)	25.61	3.27	0.00	28.00	2222
E. District Finances					
Total district revenues	27.10	1.25	0.00	29.47	2326
Tax sharing rev. with central govt (log IDR)	23.98	3.19	0.00	28.64	2326
Own district rev. (local taxes and fees, log IDR)	24.01	2.55	0.00	28.46	2326
Share central govt tax sharing out of total rev.	0.07	0.06	0.00	0.86	2322
Share of own revenues out of total rev.	0.07	0.06	0.00	1.00	2322

Table A.2: Major Migration Destination Countries

	Country	Migrants Arrival 2008-2010
1	Saudi	563,016
2	UAE	83,629
3	Kuwait	74,101
4	Malaysia	73,346
5	Taiwan	41,332
6	Singapore	32,096
7	Jordan	31,139
8	Oman	27,966
9	Qatar	25,373
10	Hong Kong	19,067
11	Syria	9,057
12	Bahrain	8,944
13	Brunei	5,755
14	Samoa	2,040
15	Egypt	1,108
16	United Kingdom	1,080
17	South Korea	718
18	Macao SAR	638
19	Yemen	575
20	Malawi	538
	Total	1,006,241
	Top 20 subtotal	99%

Table A.3: Remittance Estimates from Survey Data

Publication	Survey Year	N	Average Surveyed Remittances	Unit	Average Frequency	Estimated Annual Remittances	Destinations	Survey Locations
ADB (2006)	2005	647	USD 376	per transaction	7	USD 2,390	Hong Kong, Japan, Malaysia, Singapore	Hong Kong, Japan, Malaysia, Singapore
World Bank (2010)	2008	3,368	USD 200	per transaction	N/A	N/A	Saudi Arabia and Malaysia	East Java, NTB, NTT
Doi et al. (2014)	2011	400	USD 1,119	since departure	4	USD 1,119	Hong Kong, Taiwan, Malaysia, Singapore	East Java
World Bank (2017)	2013	4,660	USD 82	monthly	N/A	USD 984	Middle East, Malaysia	15 Indonesian provinces
Bazzi et al. (2021)	2019	2,705	USD 183	monthly	N/A	USD 2196	Taiwan, Hongkong, Singapore, UAE, Saudi, Malaysia, Qatar, and others	West Java, East Java, Central Java

Table A.4: Effect of Currency Exchange Fluctuations on Remittances Frequency

	(1) Remittances Frequency	(2) Remittances Frequency	(3) Remittances Frequency	(4) Remittances Frequency
XR shock	1.400***	0.896*	0.903*	0.929*
	(0.191)	(0.502)	(0.510)	(0.504)
Time abroad			-0.000	-0.000
			(0.001)	(0.001)
Time to next Eid				0.478
				(0.396)
Dep. Var. Mean	4.5	4.5	4.5	4.5
HH FE, Wave FE		✓	✓	✓
HH	183	183	183	183
Observations	418	418	418	418

Notes: The sample is migrant household panel from Doi et al. (2014) that reported receiving remittances in more than one follow-up surveys (March 2011-January 2012). Remittances are the total remittances received since the migrant's departure in the first follow-up, and the difference from the previous response in subsequent follow-ups. Remittances are expressed in log IDR, and XR shock is the exchange rate to IDR relative to March 2011. Exchange rate data is from Refinitiv Datastream. Standard errors are clustered at the household level. * p≤ 0.10, ** p≤ 0.05, *** p≤ 0.01.

Table A.5: Placebo Effects on School Enrollment

	(1) Elementary School Enrollment Among 19-24 yo.	(2) Jr. Sec School Enrollment Among 19-24 yo.	(3) Sr. Sec School Enrollment Among 19-24 yo.
	A. Boys and Girls		
$\text{Migration}_d^o \times \text{XRShock}_{dt-1}$	-0.12	-0.12	-0.79
	(0.09)	(0.18)	(0.79)
District FE, Year FE	✓	✓	✓
Dep. Var. Mean	0.03	0.20	2.86
Districts	353	353	353
Observations	2411	2411	2411
	B. Boys		
$\text{Migration}_d^o \times \text{XRShock}_{dt-1}$	-0.10	0.11	-0.34
	(0.10)	(0.20)	(0.88)
District FE, Year FE	✓	✓	✓
Dep. Var. Mean	0.03	0.23	3.44
Districts	353	353	353
Observations	2411	2411	2411
	C. Girls		
$\text{Migration}_d^o \times \text{XRShock}_{dt-1}$	-0.19	-0.36	-1.21
	(0.15)	(0.27)	(0.97)
District FE, Year FE	✓	✓	✓
Dep. Var. Mean	0.03	0.16	2.29
Districts	353	353	353
Observations	2411	2411	2411

Notes: This table reports the estimates of equation (5). The sample is 2005-2012 panel of Indonesian districts in the Indo-Dapoer dataset with the record of returnees from airport arrival data. The interaction variable $\text{Migration}_d \times \text{XRShock}_{t-1}$ proxies for remittances and is standardized to have a mean of zero and standard deviation of one. XRShock is the exchange rate between migrants' host country currencies and IDR, relative to June 2007, averaged at the district-year level. The district-level migrant stock abroad for XRshock is reconstructed based on the departure and arrival dates from the migrant terminal data. Migration (intensity) is the natural log of the ratio between the total number of migrants and total population from the 2005 village census. Outcomes data comes from the Susenas household surveys. Other outcomes data details are as described in Appendix A.1. * $p \leq 0.10$, ** $p \leq 0.05$, *** $p \leq 0.01$. Standard errors are clustered at the district level in parentheses.

Table A.6: Effects on School Enrollment, with Survey Weight

	(1) School Enrollment among 7-18 yo. (weighted)	(2) Elem School Enrollment among 7-12 yo. (Weighted)	(3) Jr. Sec School Enrollment among 13-15 yo. (Weighted)	(4) Sr. Sec School Enrollment among 16-18 yo. (Weighted)
	A. Boys and Girls			
Migration × $XRShock_{t-1}$	2.53***	1.02	4.57**	6.10***
	(0.76)	(0.69)	(2.19)	(2.05)
District FE, Year FE	✓	✓	✓	✓
Dep. Var. Mean	85.7	93.5	66.8	46.3
Clusters	353	353	353	353
Observations	2411	2411	2411	2411
	B. Boys			
Migration × $XRShock_{t-1}$	3.47***	0.12	5.91**	10.23***
	(0.94)	(0.88)	(2.43)	(2.61)
District FE, Year FE	✓	✓	✓	✓
Dep.Var. Mean	85.2	93.7	65.6	45.8
Districts	353	353	353	353
Observations	2411	2411	2411	2411
	C. Girls			
Migration × $XRShock_{t-1}$	1.50	1.92**	2.65	1.80
	(0.92)	(0.85)	(2.85)	(2.60)
District FE, Year FE	✓	✓	✓	✓
Dep.Var. Mean	86.3	93.4	68.0	46.9
Districts	353	353	353	353
Observations	2411	2411	2411	2411

Notes: This table reports the estimates of equation (5). The sample is 2005-2012 panel of Indonesian districts in the Indo-Dapoer dataset with the record of returnees from airport arrival data. The interaction variable $Migration_d \times XRShock_{t-1}$ proxies for remittances and is standardized to have a mean of zero and standard deviation of one. XRShock is the exchange rate between migrants' host country currencies and IDR, relative to June 2007, averaged at the district-year level. The district-level migrant stock abroad for XRshock is reconstructed based on the departure and arrival dates from the migrant terminal data. Migration (intensity) is the natural log of the ratio between the total number of migrants and total population from the 2005 village census. Outcomes data comes from the Susenas household surveys, aggregated to the district level with the survey weight. Other outcomes data details are as described in Appendix A.1. * p≤ 0.10, ** p≤ 0.05, *** p≤ 0.01. Standard errors are clustered at the district level in parentheses.

Table A.7: Effects on Household Assets Ownership

	(1) Motorbike	(2) Car	(3) Bicycles	(4) Fridge	(5) LPG 12kg
Migration x $XRShock^{t-1}$	0.03**	0.04	0.07***	0.15***	0.10***
	(0.02)	(0.04)	(0.02)	(0.02)	(0.02)
Dep. Var. Mean	0.59	0.07	0.35	0.31	0.14
Districts	327	253	327	327	327
Observations	907	506	907	907	907

Notes: The sample is the 2005-2012 unbalanced panel of Indonesian districts in the Indo-Dapoer dataset with recorded returnees from airport arrival data. XRShock is the district-level yearly average of migrant-weighted foreign currency exchange rates between host country's currency and IDR, relative to June 2007. District-level migrant stock abroad is reconstructed based on the departure and arrival dates in the migrant terminal data. Migration intensity is the natural log of the ratio between the total number of migrants and total population from the 2005 village census. Outcomes data sources are as described in Appendix A. All regressions include district and year fixed effects. Standard errors are clustered at the district level in parentheses. * p≤ 0.10, ** p≤ 0.05, *** p≤ 0.01.

Table A.8: Use of Increased Remittances

	(1) Electronics	(2) Durables	(3) Migration Loan	(4) School	(5) Consumption	(6) Other
XR shock	0.58***	0.43**	0.44*	0.15	-0.10	0.96**
	(0.21)	(0.19)	(0.26)	(0.32)	(0.39)	(0.39)
Dep. Var. Mean	1.0	0.7	2.4	4.8	7.6	5.8
FE	hh	hh	hh	hh	hh	hh
HH	183	183	183	183	183	183
Observations	418	418	418	418	418	418

Notes: The sample is the migrant household panel from Doi et al. (2014) who reported receiving remittances during more than one of the follow-up surveys (March 2011-January 2012). Remittances are total received remittances since the migrant's departure as reported during the first follow-up, and the difference from the previous response in subsequent follow-ups. Remittances are expressed in log IDR, and XR shock is the exchange rate to IDR relative to March 2011. Exchange rate data are from Refinitiv Datastream. Standard errors are clustered at the household level. * p≤ 0.10, ** p≤ 0.05, *** p≤ 0.01.

Table A.9: Indonesia's Major Trading Partners

	Country	Export value 2007 US$		Country	Import value 2007 US$
1	Japan	23,632,796,842	1	Singapore	9,839,794,842
2	USA	11,614,229,704	2	China	8,557,877,121
3	Singapore	10,501,617,286	3	Japan	6,526,673,892
4	China	9,675,512,723	4	Malaysia	6,411,927,287
5	South Korea	7,582,734,443	5	USA	4,787,174,352
6	Malaysia	5,096,063,502	6	Thailand	4,287,065,396
7	India	4,943,905,977	7	Saudi	3,372,825,227
8	Australia	3,394,557,284	8	South Korea	3,196,686,587
9	Thailand	3,054,275,983	9	Australia	3,004,011,966
10	Netherlands	2,749,459,736	10	Germany	1,982,022,283
11	Taiwan	2,596,730,725	11	Brunei	1,864,720,849
12	Germany	2,316,013,330	12	Kuwait	1,705,790,311
13	Spain	1,906,222,913	13	India	1,609,606,816
14	UK	1,454,164,863	14	France	1,443,687,264
15	Italy	1,380,002,074	15	Canada	1,055,580,227
	Total	114,100,890,751			74,473,430,118
	Subtotal top 15	81%			80%

Table A.10: Migration Destination and Trade Countries

	(1) Export Weight 2007 (kg)	(2) Export Weight 2007 (kg)	(3) Export Value 2007 (USD)	(4) Export Value 2007 (USD)
Migrants 2008-2010	5160.48	-12237.45	2946.94	-1425.55
	(12286.29)	(11807.95)	(3755.16)	(3705.65)
Africa		-7.41e+09***		-1.97e+09***
		(1.43e+09)		(4.47e+08)
Oceania		-7.28e+09***		-1.85e+09***
		(1.74e+09)		(5.45e+08)
Americas		-7.27e+09***		-1.71e+09***
		(1.46e+09)		(4.59e+08)
Europe		-6.94e+09***		-1.74e+09***
		(1.42e+09)		(4.46e+08)
Constant	1.57e+09***	7.52e+09***	5.17e+08***	2.01e+09***
	(4.89e+08)	(1.09e+09)	(1.49e+08)	(3.42e+08)
Observations	215	215	215	215

Notes: Standard errors are in parentheses. * p≤ 0.10, ** p≤ 0.05, *** p≤ 0.10.

Table A.11: Correlation between Commodity Production and Migration

	(1) Oil and Gas Revenue 2005 (Log IDR)	(2) Oil and Gas Revenue 2005 (Log IDR)	(3) Palm oil Area 2003 (Log Ha)	(4) Palm oil Area 2003 (Log Ha)
Migration Intensity	0.34	0.15	-0.22	0.16
	(0.68)	(0.090)	(0.18)	(0.11)
FE		prop		prop
Clusters	31	31	31	31
Observations	384	384	384	384

Notes: Standard errors are clustered at the province level in parentheses. * p≤ 0.10, ** p≤ 0.05, *** p≤ 0.01.

Table A.12: Effects on Development and Education Outcomes, Interacted with Pre-period Commodity Production

	(1)	(2)	(3)	(4)	(5)	(6)
	A. Development Indicators					
	Household Expenditure	Household Exp Bottom 20%	Asset Index	Poverty Rate	GDP Total	GDP Agriculture
A1. With Oil and Gas Revenue Share 2005						
$Migration^o_d \times XRShock_{dt-1}$	0.16***	0.20***	0.02	-3.77***	0.06	0.13**
	(0.06)	(0.05)	(0.02)	(1.04)	(0.06)	(0.07)
$Migration^o_d \times XRShock_{dt-1} \times OilGas^o_d$	-0.01***	-0.01***	0.00	-0.02	0.00	-0.00
	(0.00)	(0.00)	(0.00)	(0.07)	(0.01)	(0.00)
A2. With Palm Oil Plantation 2003						
$Migration^o_d \times XRShock_{dt-1}$	0.05	0.10***	0.03**	-4.69***	0.11***	0.15***
	(0.04)	(0.03)	(0.01)	(0.77)	(0.04)	(0.04)
$Migration^o_d \times XRShock_{dt-1} \times PalmOil^o_d$	-0.00	0.01	0.01**	0.30	-0.01	-0.01
	(0.01)	(0.01)	(0.00)	(0.22)	(0.02)	(0.01)
District FE, Year FE	✓	✓	✓	✓	✓	✓
Dep. Var. Mean	12.83	12.08	0.19	15.13	15.50	13.98
Districts	350	350	327	350	350	350
Observations	2060	2060	907	2392	2399	2399
	B. Net Enrollment Rate (%) and Education Facilities (per 10,000 People)					
	Elementary Enrollment (Ages 7-12)	Junior Secondary Enrollment (Ages 13-15)	Senior Secondary Enrollment (Ages 16-18)	Elementary School (Grades 1-6)	Junior Secondary School (Grades 7-9)	Senior Secondary School (Grades 10-12)
B1. With Oil and Gas Revenue Share 2005						
$Migration^o_d \times XRShock_{dt-1}$	0.77	6.47**	11.37***	1.33***	0.63***	0.05
	(0.95)	(2.90)	(2.77)	(0.46)	(0.13)	(0.04)
$Migration^o_d \times XRShock_{dt-1} \times OilGas^o_d$	0.01	-0.19	-0.36*	-0.04*	-0.03***	-0.00
	(0.06)	(0.18)	(0.19)	(0.02)	(0.01)	(0.00)
B2. With Palm Oil Plantation 2003						
$Migration^o_d \times XRShock_{dt-1}$	0.56	5.91**	9.38***	0.92***	0.32***	0.04
	(0.71)	(2.37)	(2.06)	(0.29)	(0.09)	(0.02)
$Migration^o_d \times XRShock_{dt-1} \times PalmOil^o_d$	0.19	-0.78*	-0.91*	-0.07	-0.03*	-0.01***
	(0.16)	(0.43)	(0.47)	(0.06)	(0.02)	(0.00)
District FE, Year FE	✓	✓	✓	✓	✓	✓
Dep. Var. Mean	88.98	66.76	46.55	6.39	1.18	0.31
Districts	353	353	353	353	353	353
Observations	2411	2411	2411	2417	2417	2417

Notes: This table reports the estimates of equation (5), modified to include an interaction with pre-period commodity production. In Panel A the baseline trend is the 2004 Agriculture GDP per capita interacted with a set of year dummies. In Panel B the baseline trend is 2004 public schools per 10,000 population interacted with a set of year dummies, each level of schooling added separately. The sample is 2005-2012 panel of Indonesian districts in the Indo-Dapoer dataset with records of returnees from the airport arrival data. XRShock is the district-level yearly average of migrant-weighted foreign currency exchange rate between host country currency and IDR, relative to June 2007. District-level migrant stock abroad for XRshock is reconstructed based on the departure and arrival dates in the migrant terminal data. Migration (intensity) is the natural log of the ratio between the total migrant and the total population from the 2005 village census. GDP per capita are expressed in logarithm of 2010 IDR. Other outcomes data sources and details are as described in Appendix A.1. * p≤ 0.10, ** p≤ 0.05, *** p≤ 0.01. Standard errors are clustered at the district level in parentheses.

Table A.13: Effects on Development and Education Outcomes, Robustness with Island-specific Trends

	(1)	(2)	(3)	(4)	(5)	(6)
	A. Development Indicators					
	Household Expenditure	Household Exp Bottom 20%	Asset Index	Poverty Rate	GDP Total	GDP Agriculture
A1. Main Estimates						
$\text{Migration}_d^o \times \text{XRShock}_{dt-1}$	0.04	0.10***	0.03***	-3.93***	0.09*	0.13***
	(0.04)	(0.03)	(0.01)	(0.76)	(0.05)	(0.04)
A2. With Island Trends						
$\text{Migration}_d^o \times \text{XRShock}_{dt-1}$	0.05	0.11***	0.05***	-4.14***	0.05	0.13***
	(0.04)	(0.03)	(0.01)	(0.85)	(0.05)	(0.05)
District FE, Year FE	✓	✓	✓	✓	✓	✓
Dep. Var. Mean	12.83	12.08	0.19	15.13	15.50	13.98
Districts	350	350	327	350	350	350
Observations	2060	2060	907	2392	2399	2399
	B. Net Enrollment Rate (%) and Education Facilities (per 10,000 People)					
	Elementary Enrollment (Ages 6-12)	Junior Secondary Enrollment (Ages 13-15)	Senior Secondary Enrollment (Ages 16-18)	Elementary School (Grades 1-6)	Junior Secondary School (Grades 7-9)	Senior Secondary School (Grades 10-12)
B1. Main Estimates						
$\text{Migration}_d^o \times \text{XRShock}_{dt-1}$	3.17***	4.37**	7.48***	0.85***	0.27***	0.02
	(0.76)	(2.14)	(2.21)	(0.28)	(0.09)	(0.03)
B2. With Island Trends						
$\text{Migration}_d^o \times \text{XRShock}_{dt-1}$	2.63***	5.03**	6.74***	0.66**	0.25***	0.04**
	(0.83)	(2.21)	(2.40)	(0.30)	(0.08)	(0.02)
District FE, Year FE	✓	✓	✓	✓	✓	✓
Dep. Var. Mean	88.98	66.76	46.55	6.39	1.18	0.31
Districts	353	353	353	353	353	353
Observations	2411	2411	2411	2417	2417	2417

Notes: This table reports the estimates of equation (5) with the addition of island trends on the right hand side. The sample is from the 2005-2012 panel of Indonesian districts in the Indo-Dapoer dataset with recorded returnees from airport arrival data. XRShock is the exchange rate between migrants' host country currencies and IDR, relative to June 2007, averaged at the district-year level. The district-level migrant stock abroad for XRshock is reconstructed based on the departure and arrival dates from the migrant terminal data. Migration (intensity) is the natural log of the ratio between the total migrant and total population from the 2005 village census. GDP per capita is expressed in log of 2010 IDR. Other outcomes data sources and details are as described in Appendix A.1. * p≤ 0.10, ** p≤ 0.05, *** p≤ 0.01. Standard errors are clustered at the district level in parentheses.

Table A.14: Effects on Development and Education Outcomes, Robustness with Baseline Trends

	(1)	(2)	(3)	(4)	(5)	(6)
	A. Development Indicators					
	Household Expenditure	Household Exp. Bottom 20%	Asset Index	Poverty Rate	GDP Total	GDP Agriculture
A1. Main Estimates						
$\text{Migration}_d^o \times \text{XRShock}_{dt-1}$	0.04	0.10***	0.03***	-3.93***	0.09*	0.13***
	(0.04)	(0.03)	(0.01)	(0.76)	(0.05)	(0.04)
A2. With Baseline Trends – 2004 Agriculture GDP per capita						
$\text{Migration}_d^o \times \text{XRShock}_{dt-1}$	0.01	0.09***	0.03**	-2.27***	0.11**	0.13***
	(0.04)	(0.03)	(0.01)	(0.82)	(0.05)	(0.05)
District FE, Year FE	✓	✓	✓	✓	✓	✓
Dep. Var. Mean	12.83	12.08	0.19	15.13	15.50	13.98
Districts	350	350	327	350	350	350
Observations	2060	2060	907	2392	2399	2399
	B. Net Enrollment Rate (%) and Education Facilities (per 10,000 people)					
	Elementary enrollment (age 6-12)	Junior Secondary enrollment (age 13-15)	Senior Secondary enrollment (age 16-18)	Elementary school (grade 1-6)	Junior Secondary school (grade 7-9)	Senior Secondary school (grade 10-12)
B1. Main Estimates						
$\text{Migration}_d^o \times \text{XRShock}_{dt-1}$	3.17***	4.37**	7.48***	0.85***	0.27***	0.02
	(0.76)	(2.14)	(2.21)	(0.28)	(0.09)	(0.03)
B2. With Baseline Trends – 2004 school density						
$\text{Migration}_d^o \times \text{XRShock}_{dt-1}$	3.43***	5.16**	10.20***	1.03***	0.32***	0.03
	(0.76)	(2.27)	(2.01)	(0.31)	(0.10)	(0.03)
District FE, Year FE	✓	✓	✓	✓	✓	✓
Dep. Var. Mean	88.98	66.76	46.55	6.39	1.18	0.31
Districts	353	353	353	353	353	353
Observations	2411	2411	2411	2417	2417	2417

Notes: This table reports the estimates of equation (5) with the addition of baseline trends on the right hand side. In Panel A the baseline trend is the 2004 Agriculture GDP per capita interacted with a set of year dummies. In Panel B the baseline trend is 2004 public schools per 10,000 population interacted with a set of year dummies, each level of schooling added separately. The sample is the 2005-2012 panel of Indonesian districts in the Indo-Dapoer dataset with recorded returnees from airport arrival data. XRShock is the exchange rate between migrants' host country currencies and IDR, relative to June 2007, averaged at the district-year level. The district-level migrant stock abroad for XRshock is reconstructed based on the departure and arrival dates from the migrant terminal data. Migration (intensity) is the natural log of the ratio between the total migrant and total population from the 2005 village census. GDP per capita is expressed in log of 2010 IDR. Other outcomes data sources and details are as described in Appendix A.1. * p≤ 0.10, ** p≤ 0.05, *** p≤ 0.01. Standard errors are clustered at the district level in parentheses.

Table A.15: Effects on Development and Education Outcomes, Robustness Checks Using Podes 2005, 2008, 2011 migrant count

	(1)	(2)	(3)	(4)	(5)	(6)
	A. Development Indicators					
	Household Expenditure	Household Exp Bottom 20%	Asset Index	Poverty Rate	GDP Total	GDP Agriculture
A1. Main Estimates - Podes 2005 migrant count only						
$\text{Migration}_d^o \times \text{XRShock}_{dt-1}$	0.04	0.10***	0.03***	-3.93***	0.09*	0.13***
	(0.04)	(0.03)	(0.01)	(0.76)	(0.05)	(0.04)
A2. Podes 2005, 2008, 2011 migrant count						
$Migration_{dt-1} \times XRShock_{dt-1}$	0.06	0.10***	0.02*	-3.61***	0.13**	0.13***
	(0.04)	(0.03)	(0.01)	(0.83)	(0.06)	(0.05)
District FE, Year FE	✓	✓	✓	✓	✓	✓
Dep. Var. Mean	12.83	12.08	0.19	15.13	15.50	13.98
Districts	350	350	327	350	350	350
Observations	2060	2060	907	2392	2399	2399
	B. Net Enrollment Rate (%) and Education Facilities (per 10,000 People)					
	Elementary Enrollment (Ages 7-12)	Junior Secondary Enrollment (Ages 13-15)	Senior Secondary Enrollment (Ages 16-18)	Elementary School (Grades 1-6)	Junior Secondary School (Grades 7-9)	Senior Secondary School (Grades 10-12)
B1. Main Estimates - Podes 2005 migrant count only						
$\text{Migration}_d^o \times \text{XRShock}_{dt-1}$	3.17***	4.37**	7.48***	0.85***	0.27***	0.02
	(0.76)	(2.14)	(2.21)	(0.28)	(0.09)	(0.03)
B2. Podes 2005, 2008, 2011 migrant count						
$Migration_{dt-1} \times XRShock_{dt-1}$	0.93	4.67**	7.11***	0.74**	0.23**	0.02
	(0.70)	(2.14)	(2.42)	(0.30)	(0.09)	(0.03)
District FE, Year FE	✓	✓	✓	✓	✓	✓
Dep. Var. Mean	88.98	66.76	46.55	6.39	1.18	0.31
Districts	353	353	353	353	353	353
Observations	2411	2411	2411	2417	2417	2417

Notes: This table reports estimates of equation (5). The sample is 2005-2012 panel of Indonesian districts in the Indo-Dapoer dataset with records of returnees from the airport arrival data. XRShock is the district-level yearly average of migrant-weighted foreign currency exchange rates between host country's currency and IDR, relative to June 2007. District-level migrant stock abroad for XRshock is reconstructed based on the departure and arrival dates from the migrant terminal data. Migration (intensity) is the natural log of the ratio between the total migrant and the total population from the 2005 village census. GDP per capita are expressed in logarithm of 2010 IDR. Other outcomes data sources and details are as described in Appendix A.1. * p≤ 0.10, ** p≤ 0.05, *** p≤ 0.01. Standard errors are clustered at the district level in parentheses.

Table A.16: Effects on Development and Education Outcomes, Robustness Checks using Village Plurality Destinations in Podes 2005

	(1)	(2)	(3)	(4)	(5)	(6)
	A. Development Indicators					
	Household Expenditure	Household Exp Bottom 20%	Asset Index	Poverty Rate	GDP Total	GDP Agriculture
A1. Main Estimates - Migrant Terminal data for destination exposure						
$\text{Migration}_d^o \times \text{XRShock}_{dt-1}$	0.04	0.10***	0.03***	-3.93***	0.09*	0.13***
	(0.04)	(0.03)	(0.01)	(0.76)	(0.05)	(0.04)
A2. Podes 2005 village plurality destination						
$Migration_{t-1} \times XRShock_{dt-1}^{2005dest}$	-0.01	0.05	0.04***	-4.50***	0.06	0.12**
	(0.04)	(0.04)	(0.02)	(0.98)	(0.05)	(0.05)
District FE, Year FE	✓	✓	✓	✓	✓	✓
Dep. Var. Mean	12.83	12.08	0.19	15.13	15.50	13.98
Districts	350	350	327	350	350	350
Observations	2060	2060	907	2392	2399	2399
	B. Net Enrollment Rate (%) and Education Facilities (per 10,000 People)					
	Elementary Enrollment (Ages 7-12)	Junior Secondary Enrollment (Ages 13-15)	Senior Secondary Enrollment (Ages 16-18)	Elementary School (Grades 1-6)	Junior Secondary School (Grades 7-9)	Senior Secondary School (Grades 10-12)
B1. Main Estimates - Podes 2005 migrant count only						
$\text{Migration}_d^o \times \text{XRShock}_{dt-1}$	3.17***	4.37**	7.48***	0.85***	0.27***	0.02
	(0.76)	(2.14)	(2.21)	(0.28)	(0.09)	(0.03)
B2. Podes 2005, 2008, 2011 migrant count						
$Migration_{t-1} \times XRShock_{dt-1}^{2005dest}$	0.52	5.89***	4.29*	0.67*	0.34***	-0.03
	(0.80)	(2.25)	(2.32)	(0.35)	(0.11)	(0.05)
District FE, Year FE	✓	✓	✓	✓	✓	✓
Dep. Var. Mean	88.98	66.76	46.55	6.39	1.18	0.31
Districts	353	353	353	353	353	353
Observations	2411	2411	2411	2417	2417	2417

Notes: This table reports estimates of equation (5). The sample is 2005-2012 panel of Indonesian districts in the Indo-Dapoer dataset with records of returnees from the airport arrival data. XRShock is the district-level yearly average of migrant-weighted foreign currency exchange rates between host country's currency and IDR, relative to June 2007. District-level migrant stock abroad for XRshock is reconstructed based on the departure and arrival dates from the migrant terminal data. Migration (intensity) is the natural log of the ratio between the total migrant and the total population from the 2005 village census. GDP per capita are expressed in logarithm of 2010 IDR. Other outcomes data sources and details are as described in Appendix A.1. * p≤ 0.10, ** p≤ 0.05, *** p≤ 0.01. Standard errors are clustered at the district level in parentheses.

Table A.17: Effects on Development and Education Outcomes, Robustness with Lagged Outcome Variables

	(1)	(2)	(3)	(4)	(5)	(6)
	A. Development Indicators					
	Household Expenditure	Household Exp Bottom 20%	Asset Index	Poverty Rate	GDP Total	GDP Agriculture
A1. Main Estimates						
$\text{Migration}_d^o \times \text{XRShock}_{dt-1}$	0.04	0.10***	0.03***	-3.93***	0.09*	0.13***
	(0.04)	(0.03)	(0.01)	(0.76)	(0.05)	(0.04)
A2. with Lagged Outcome Variables						
$Migration_d^o \times XRShock_{dt-1}$	0.05	0.11***	0.08*	-2.06***	0.10***	0.09***
	(0.04)	(0.03)	(0.04)	(0.33)	(0.03)	(0.03)
District FE, Year FE	✓	✓	✓	✓	✓	✓
Dep. Var. Mean	12.83	12.08	0.19	15.13	15.50	13.98
Districts	350	350	327	350	350	350
Observations	2060	2060	907	2392	2399	2399
	B. Net Enrollment Rate (%) and Education Facilities (per 10,000 people)					
	Elementary Enrollment (Ages 7-12)	Junior Secondary Enrollment (Ages 13-15)	Senior Secondary Enrollment (Ages 16-18)	Elementary School (Grades 1-6)	Junior Secondary School (Grades 7-9)	Senior Secondary School (Grades 10-12)
B1. Main Estimates						
$\text{Migration}_d^o \times \text{XRShock}_{dt-1}$	3.17***	4.37**	7.48***	0.85***	0.27***	0.02
	(0.76)	(2.14)	(2.21)	(0.28)	(0.09)	(0.03)
B2. with Lagged Outcome Variables						
$Migration_d^o \times XRShock_{dt-1}$	0.65	2.29	3.87*	0.81***	0.23***	0.03
	(0.73)	(2.08)	(2.08)	(0.21)	(0.07)	(0.02)
District FE, Year FE	✓	✓	✓	✓	✓	✓
Dep. Var. Mean	88.98	66.76	46.55	6.39	1.18	0.31
Districts	353	353	353	353	353	353
Observations	2411	2411	2411	2417	2417	2417

Notes: This table reports estimates of equation (5). The sample is 2005-2012 panel of Indonesian districts in the Indo-Dapoer dataset with records of returnees from the airport arrival data. XRShock is the district-level yearly average of migrant-weighted foreign currency exchange rates between host country's currency and IDR, relative to June 2007. District-level migrant stock abroad for XRshock is reconstructed based on the departure and arrival dates from the migrant terminal data. Migration (intensity) is the natural log of the ratio between the total migrant and the total population from the 2005 village census. GDP per capita are expressed in logarithm of 2010 IDR. Other outcomes data sources and details are as described in Appendix A.1. * p≤ 0.10, ** p≤ 0.05, *** p≤ 0.01. Standard errors are clustered at the district level in parentheses.

Table A.18: Effects on Development and Education Outcomes, Two-way Clustering Checks

	(1)	(2)	(3)	(4)	(5)	(6)
	A. Development Indicators					
	Household Expenditure	Household Exp Bottom 20%	Asset Index	Poverty Rate	GDP Total	GDP Agriculture
A1. Main Estimates						
$\text{Migration}_d^o \times \text{XRShock}_{dt-1}$	0.04	0.10***	0.03***	-3.93***	0.09*	0.13***
	(0.04)	(0.03)	(0.01)	(0.76)	(0.05)	(0.04)
A2. Two-way clustering at district and year						
$Migration_d^o \times XRShock_{dt-1}$	0.04	0.10	0.03	-3.93***	0.09	0.13
	(0.06)	(0.06)	(0.01)	(1.08)	(0.05)	(0.07)
District FE, Year FE	✓	✓	✓	✓	✓	✓
Dep. Var. Mean	12.83	12.08	0.19	15.13	15.50	13.98
Districts	350	350	327	350	350	350
Observations	2060	2060	907	2392	2399	2399
	B. Net Enrollment Rate (%) and Education Facilities (per 10,000 people)					
	Elementary Enrollment (Ages 7-12)	Junior Secondary Enrollment (Ages 13-15)	Senior Secondary Enrollment (Ages 16-18)	Elementary School (Grades 1-6)	Junior Secondary School (Grades 7-9)	Senior Secondary School (Grades 10-12)
B1. Main Estimates						
$\text{Migration}_d^o \times \text{XRShock}_{dt-1}$	3.17***	4.37**	7.48***	0.85***	0.27***	0.02
	(0.76)	(2.14)	(2.21)	(0.28)	(0.09)	(0.03)
B2. Two-way clustering at district and year						
$Migration_d^o \times XRShock_{dt-1}$	0.83	4.37	7.48*	0.85**	0.27**	0.02
	(0.89)	(2.85)	(3.48)	(0.30)	(0.09)	(0.02)
District FE, Year FE	✓	✓	✓	✓	✓	✓
Dep. Var. Mean	88.98	66.76	46.55	6.39	1.18	0.31
Districts	353	353	353	353	353	353
Observations	2411	2411	2411	2417	2417	2417

Notes: This table reports estimates of equation (5). The sample is 2005-2012 panel of Indonesian districts in the Indo-Dapoer dataset with records of returnees from the airport arrival data. XRShock is the district-level yearly average of migrant-weighted foreign currency exchange rates between host country's currency and IDR, relative to June 2007. District-level migrant stock abroad for XRshock is reconstructed based on the departure and arrival dates from the migrant terminal data. Migration (intensity) is the natural log of the ratio between the total migrant and the total population from the 2005 village census. GDP per capita are expressed in logarithm of 2010 IDR. Other outcomes data sources and details are as described in Appendix A.1. * p≤ 0.10, ** p≤ 0.05, *** p≤ 0.01. Standard errors are clustered by district and year in parentheses.

Table A.19: Correlation between Transfers from Household Members Abroad and Expectations of Future Outcomes for Children in the Household

	(1) In School	(2) Years of Education	(3) Better Life
International Transfer (Log IDR)	0.01	0.43**	0.03*
	(0.02)	(0.18)	(0.02)
Observations	170	92	170

Notes: The sample is made up of households in the Indonesia Family Life Survey (2007) panel that reported receiving non-zero transfer from parent(s)/child(ren) abroad in the past 12 months. The dependent variable is the average expectations for children 7-24 years old in the household in three dimensions. Expectation of better life is surveyed as a question with a response based on five-point Likert scale and recoded as an indicator of slightly better or much better life. Years of education is surveyed as the expectation of the highest level of education completed and the highest grade. Only children who are still/will be at school were asked about their expectation of years of education. Transfer is expressed in log IDR. * p≤ 0.10, ** p≤ 0.05, *** p≤ 0.01.

Table A.20: Effects of Remittances on Village Informal Taxation

	(1) Household Manpower for Building Village	(2) Household Contribute Money/ Goods for Building	(3) Money/ Goods Contribution for Building (Log IDR)	(4) Household Manpower for Maintenance in Village	(5) Household Contribute Money/ Goods for Maintenance	(6) Money/ Goods Contribution for Maintenance (Log IDR)
Migration x $XRShock^{t-1}$	0.0341	0.0514**	0.489**	0.00852	0.0369	0.361
	(0.96)	(2.23)	(2.06)	(0.26)	(1.59)	(1.60)
Dep. Var. Mean	0.2	0.1	0.9	0.6	0.1	1.3
Clusters	611	611	611	611	611	611
Observations	55975	55975	55975	55975	55975	55974

Notes: This data from Generasi SPKP survey (Olken et al, 2014). The respondents are households. This table presents the regression coefficients of the outcome variables on the remittance proxy, i.e., the interaction of migration intensity and currency exchange rate changes lagged by one year from migrant destinations recorded in Podes 2005. The outcomes are participation in and contribution to building and maintenance activities in the village. All regressions include village fixed effects, survey wave fixed effects, and subdistrict-trend terms. Standard errors are clustered at the subdistrict level. * p≤ 0.10, ** p≤ 0.05, *** p≤ 0.01.

Table A.21: Effects of Remittances on Voting Behavior

	(1) Presidential Election 2009	(2) District Election (in past two years)	(3) Village Head Election (in past two years)	(4) Complaints to Village Head about Anti- Poverty Programs
Migration x $XRShock^{t-1}$	-0.0162	-0.0260**	-0.00250	-0.0969*
	(-0.95)	(-2.21)	(-0.15)	(-1.65)
Dep. Var. Mean	0.98	0.97	0.97	0.58
Clusters	605	520	549	589
Observations	18539	16636	12079	5301

Notes: This data is from the Generasi SPKP survey (Olken et al, 2014). The respondents are households for Columns 1-3 and village head for Column 4. The table presents the regression coefficients of the outcome variables on the remittance proxy, i.e., the interaction of migration intensity and currency exchange rate changes lagged by one year from migrant destinations recorded in Podes 2005. The outcomes are voting turnout for the presidential, mayoral, and village head elections in Columns 1-3, and complaints to the village head about the implementations of anti-poverty programs in Column 4. Presidential elections are cross-section regressions in 2009 with subdistrict fixed effects. Regresssions of mayoral and village head elections use survey waves 2009 and 2013 as well as subdistrict and survey wave fixed effects. The regression of complaints to the village head use survey waves 2009 and 2013 as well as village fixed effects, survey wave fixed effects, and subdistrict trend terms. Standard errors are clustered at the subdistrict level. * p$\leq$ 0.10, ** p$\leq$ 0.05, *** p$\leq$ 0.01.

Table A.22: Effects of Remittances on Household Participation in Community Groups

	(1) Religious Groups	(2) Social Service Groups	(3) Credit Groups	(4) Production Groups	(5) Governance Groups	(6) Recreation Groups	(7) Political Groups
Migration x $XRShock^{t-1}$	-0.0414	0.0455	0.0799*	-0.0470*	-0.0114	0.0268*	0.00874
	(-0.88)	(1.01)	(1.67)	(-1.66)	(-0.43)	(1.79)	(1.15)
mean(y)	0.58	0.30	0.29	0.09	0.09	0.02	0.01
Clusters	611	611	611	611	611	611	611
Observations	45518	45518	45518	45518	45518	45518	45518

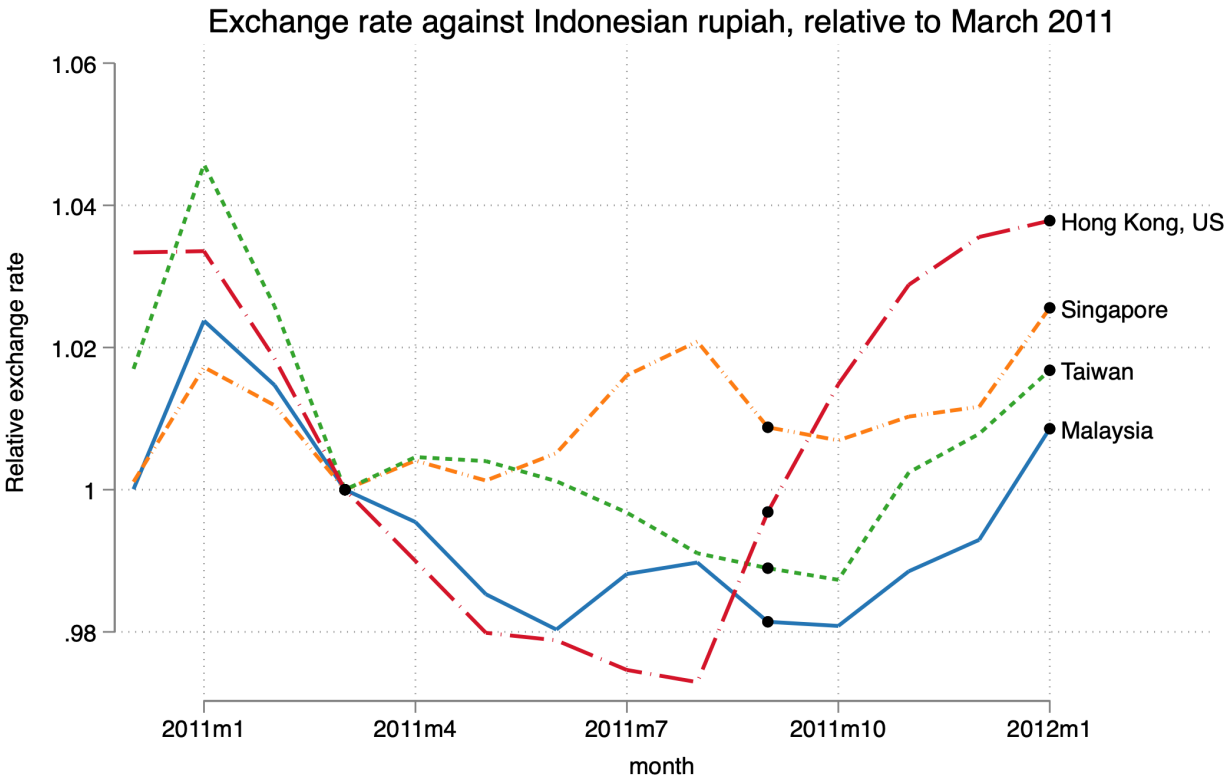
Notes: This data is from the Generasi SPKP survey (Olken et al, 2014). The respondents are households. This table presents the regression coefficients of outcome variables on the remittance proxy, i.e., the interaction of migration intensity and currency exchange rate changes lagged by one year from migrant destinations recorded in Podes 2005. The outcomes are participation in various community groups. All regressions include village fixed effects, survey wave fixed effects, and subdistrict trend terms. Standard errors are clustered at the subdistrict level. * p$\leq$ 0.10, ** p$\leq$ 0.05, *** p$\leq$ 0.01.

Table A.23: Impact on Employment Outcomes

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	A. LFP and Employment Status						
	Total Labor Force (Log)	Employed (Log)	Unemployed (Log)	Underemployed (Log)	Employed (% TLF)	Unemployed (%TLF)	Underemployed (%TLF)
$\text{Migration}_d^o \times \text{XRShock}_{dt-1}$	-0.17***	-0.17***	-0.38***	-0.03	0.00	-0.00	0.04**
	(0.05)	(0.05)	(0.10)	(0.08)	(0.01)	(0.01)	(0.02)
District FE, Year FE	✓	✓	✓	✓	✓	✓	✓
Dep. Var. Mean	12.24	12.16	9.41	11.02	0.93	0.07	0.33
Districts	350	350	350	350	350	350	350
Observations	1905	1905	1905	1905	1905	1905	1905
	B. Sectoral employment (%)						
	Agriculture	Trade	Social	Industry	Transport	Construction	Finance
$\text{Migration}_d^o \times \text{XRShock}_{dt-1}$	-0.04	-0.01	-0.03***	0.01	0.01	0.00	0.01**
	(0.03)	(0.01)	(0.01)	(0.01)	(0.00)	(0.00)	(0.00)
District FE, Year FE	✓	✓	✓	✓	✓	✓	✓
Dep. Var. Mean	0.46	0.18	0.14	0.09	0.05	0.05	0.01
Districts	350	350	350	350	350	350	347
Observations	1903	1901	1899	1881	1900	1892	1733
	C. Sectoral employment (log)						
	Agriculture	Trade	Social	Industry	Transport	Construction	Finance
$\text{Migration}_d^o \times \text{XRShock}_{dt-1}$	-0.17***	-0.17***	-0.38***	-0.03	0.00	-0.00	0.04**
	(0.05)	(0.05)	(0.10)	(0.08)	(0.01)	(0.01)	(0.02)
District FE, Year FE	✓	✓	✓	✓	✓	✓	✓
Dep. Var. Mean	11.08	10.32	10.04	9.40	8.99	9.02	7.42
Districts	350	350	350	350	350	350	347
Observations	1902	1901	1899	1881	1900	1892	1733

Notes: This table reports the estimates of equation (5). The sample is the 2005-2012 panel of Indonesian districts in the Indo-Dapoer dataset with records of returnees from airport arrival data. The interaction variable Migrationd×XRShockt+2 proxies for remittances and is standardized to have a mean of zero and a standard deviation of one. XRShock is the district-level yearly average of the migrant-weighted foreign currency exchange rates between the host country's currency and IDR, relative to June 2007. District-level migrant stock abroad for XRshock is reconstructed based on the departure and arrival dates from the migrant terminal data. Migration (intensity) is the natural log of the ratio between the total number of migrants and the total population from the 2005 village census. Other outcomes data sources and details are as described in Appendix A.1. * p≤ 0.10, ** p≤ 0.05, *** p≤ 0.01. Standard errors clustered at the district level in parentheses.

Figure A.1: Monthly Exchange Rate Variation for Year 2011



Note: Monthly exchange rate variation for 2011, by destination countries of migrants in the Doi et al. (2014) panel. Black dots denote when the follow up surveys were conducted. Data are from Refinitiv Datastream (2021).