Where Did the Money Go?

Internal Migration, Remittances, and

Household Spending in Indonesia

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1 Introduction

As transportation technologies develop, moving to different places is getting easier. As a result, migration is becoming a familiar option for individuals to increase their income and to improve their working conditions. International migration is a type of migration that individuals cross national borders and resettle in different countries. Internal migration is another type of migration that they move to different parts of the same countries and settle there. There are some differences between these two. One of them is that a distinction between original residents and newcomers. The distinction seems clearer in international migration than in internal migration due to more explicit differences in cultures, languages, and currencies. Therefore, in a conversation on migration's effects on people's utility, focusing on such differences and talking about the effects of international migration seem to be more popular than the whole discussion on internal migration. Furthermore, when talking about migration, the consequences of immigrants on receiving communities get more attention than the consequences of emigrants on sending communities[1]. This is possibly because the former is rather direct whereas the latter is somewhat indirect.

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[1] Source: https://trends.google.com/trends/explore?date=all&q=immigration,emigration

These current situations on migration studies make me question, if there are any effects that those who have left have on those who are left, what it looks like, and if it is something that can contribute to creating better utility and a better future in the long run. Specifically, my question of "in Indonesia, how do remittances from internal migrants affect the spending behaviour of their original household back home?" attempts to answer a part of my wonder. This question explores the indirect influences that internal migration brings to migrant-sending households in Indonesia.

A better understanding of internal migration's externalities helps us to develop constructive applications. Migration, both internal and international, can be a vehicle for economic growth. To make the best of it, it is significant for us to be aware of what is behind their externalities. Whether the externalities of internal migration are positive or negative and how much magnitude they are need to be discussed in order for the creation of effective policies in both national and regional levels of governments.

2 Literature Review

2.1 Literature on Migration Economics

Clemens (2011) surveyed the literature on recent international migration research and found that there were not enough studies exploring the externalities of international migration. In his review of the existing literature, Clemens (2011) found a wide range of estimates regarding the GDP gains associated with the full removal of labor mobility barriers from 50 to 150 percent. He also found that, with partial removal of barriers for labor mobility, the estimated increase of world GDP would be 20 to 60 percent (Clemens, 2011). He attempted to know what was behind this wide range of estimated increase in world GDP and found that there were not enough studies done on what exact changes of externalities led to these estimates (Clemens, 2011). Furthermore, Clemens (2011) claimed that the words "international trade" appeared 13 times more often than the words "international migration" did in the abstracts of *Research Papers in Economics* despite the fact that the removal of international tariffs was estimated to account for a few percentage points of increase in world GDP. His argument sheds light on the

understudied situation of an impressive field of research.

At the same time, however, his review restricts attention to international migration out of the whole migration conversation, which is surprising in light of the fact that internal migration is more common than international migration. It's important that economists also investigate the impact of internal remittances. This is because we may reasonably expect internal migrants to maintain a different relationship with the migrant-sending household which could impact how the remittances are spent.

Out of a limited number of research focusing on migrant-sending communities, Yang (2008)'s literature revealed strong positive externalities of international migration in migrant-sending communities. Specifically, his study utilized an instrument to identify a strong positive impact of international remittances on household investment (Yang, 2008). Yang (2008) studied the relationship between foreign currency exchange rates, remittances from overseas migrants, and the household's usage of the changed amount of remittances in Philippines. He employed a unique methodology of using the number of exchange rates as an instrument variable and creating exogenous variations in the size of remittances that the households received (Yang, 2008). Then, he found that a favorable exchange rate increased the number of remittances, and as the remittances went up, the households used the gain for investment-related areas, especially for education, instead of for temporary consumption (Yang, 2008). These results can be connected to the migrant's family structure: one or both of the parents work overseas, leading to a lack of parental control over children's lives; therefore, the family may substitute education and schooling for children's guardianship. This research also highlights the fact that internal and international migration differs in several respects: migrants traveling internally do not have to exchange currency and, given the shorter physical distance between the migration destination and their original households, migrants have better communication and closeness with their families back home. After all, internal migrants, compared to international migrants, have better control of their and their families' lives. This difference can result in changes in the way the households spend their remittances and is worthy of evaluation.

Given these clear differences between international migration and internal migration, some research has been done to compare the externalities of these two types of migration on migrant-

sending communities. For example, Adams (1998) used panel data in Pakistan and studied the effects of the two types of migrations on the household-level asset accumulation. The author found that the international migration helped the families to invest more in expensive assets such as irrigated land and rain land, whereas the internal migration's effect on these assets was not statistically significant (Adams, 1998). Similarly, Cuong et al. (2009) addressed a question on the effects of remittances from international and internal migration family members on the household's spending behavior. Cuong et al. (2009) conducted empirical research with fixed effect and random effect regressions by using panel data of households in Viet Nam (Cuong et al., 2009). They concluded that, with international remittances, households spent more on saving and investing, whereas households spent more on temporary consumption with internal remittances (Cuong et al., 2009).

2.2   New Economics of Labor Migration

One key theory that facilitates me to understand the externalities of migration on the sending communities is the new economics of labor migration (NELM) theory. This theory is used to illustrate the relationship between migration, remittances, and household's revenue and is tested by L. Li et al. (2013), Rozelle et al. (1999), Sindi and Kirimi (2006), Taylor (1992), Taylor et al. (2003). This theory illustrates varying effects of migration and remittances. Migration and remittances can either overcome or tighten labor and credit constraints for households in a rural area (Stark & Taylor, 1991). To be precise, the NELM theory supposes that migration can complement productivity in farm by loosening risk or credit constraints; however, it can also cause labor shortages, bringing a negative impact on farm income in migrant-sending communities (Stark & Taylor, 1991). One can support this theory by finding a significant influence of migration and remittances on the non-migration-related source of income or household productivity (Sindi & Kirimi, 2006). Further, one underlying assumption of the NELM theory is that migration decision is not made by an individual, rather it is made by family as a mean to increase prosperity (Stark & Taylor, 1991).

Stark and Taylor (1991)'s theoretical model, draw from the NELM theory, can be simplified as follows. Household's liquidity available for productive investment, K, is influenced by

Migration, M, and remittances, R.

$$K = \theta(R, M)$$

Such available liquidity for investment, K, has an impact on how much resource the household actually allocate in high productive technology, T_1.

$$T_1 = \phi(K)$$

Then, the resource allocated for high technology, T_1, and the household characteristics Z have an influence on the household's output with the high productive technology, Q_1.

$$Q_1 = f_1(T_1, Z)$$

Many of the econometric models draw from this theoretical model take remittances, R ,migration ,M, and output ,Q_1, into consideration (Adams, 1998; L. Li et al., 2013; Sindi & Kirimi, 2006; Taylor et al., 2003). In other words, the econometric models in these literature can be expressed in theoretical manner as follows.

$$Q_1 = g_1(R, M)$$

However, such econometric models skip to measure how migration and remittances have an impact on household's available liquidity, K, and household's actual resource allocation, T_1. The findings from the aforementioned literature are informative. That being said, to accurately measure what impact migration and remittances have to the ultimate output, Q_1, it is essential for me to learn household's decision making function, ϕ, for the available resource allocation, T_1. Specifically, I am first interested to know how feasible it is for household to invest in highly productive technology with remittances even before I jump into measuring how much remittance-backed highly productive technology increases household's revenue. In my study, I attempt to measure how migration and remittances impact the household's resource allocation,

T_1. This relationship can be expressed theoretically using some function h_1 as follows.

$$T_1 = h_1(R, M)$$

2.3 Literature on Internal Migration

Literature focusing on exploring the externalities of internal migration on migrant-sending communities are roughly divided into two subcategories: the literature that used the econometric models mentioned in Section 2.2 and the literature that did not.

Because of the nature of the NELM theory, the majority of the literature under the former subcategories focused on observing the changes on agricultural crop production with migration and remittances. Rozelle et al. (1999) used cross-sectional data in northeast part of China and iterative three stage-least-square regressions to observe the influence of migration and remittances on crop production. They found that the migration indeed reduced the production of the crop that required intense human labor, yet remittances from migrations helped families to invest in high productivity technology, thus partially offsetting the labor loss from migration (Rozelle et al., 1999). Correspondingly, L. Li et al. (2013) used cross-sectional data in northwest part of China and the same three stage-least-square regressions and made the same findings. Sindi and Kirimi (2006) practiced the same methodology with panel data in Kenya. They discovered that the migration decreased the household's crop production, but they did not find the evidence that the remittances-based-high productivity technology helped the household to offset the loss (Sindi & Kirimi, 2006).

The literature under the latter subcategories showed varying findings regarding the influence of migration and remittances on household's spending and asset accumulation. Quisumbing and McNiven (2010)'s study used panel data in Philippines and instrument variable to observe changes in household's assets and expenditures. They identified a positive impact of remittances on housing, consumer goods, non-land assets, and total expenditures per adult (Quisumbing & McNiven, 2010). C. Li et al. (2012) used cross-sectional data in western part of China and three stage-least-square regressions to estimate the impact of migration and remittances on household's different types of capital accumulation. They found migration's positive

influence on financial, human, and social capitals and negative influences on physical and and natural capitals (C. Li et al., 2012).

2.4 Indonesia

According to Meng and Manning (2010), countries experiencing periods of economic growth usually faced extensive rural-urban migration. The trend of such internal migration was recently seen in China and Indonesia (Meng & Manning, 2010). Indeed, out of 261 million population in Indonesia, as recorded by UNESCAP in 2016, almost 9.8 million people were estimated to be temporary internal migrants in 2010 (Sukamdi & Mujahid, 2015). Lu (2010)'s study showed that more than 85 % of rural-urban migrants sent money to their families back home. Further, Indonesia has less regulation regarding rural-urban migration than China does (Meng & Manning, 2010). This fact motivates me to observe results that are not impacted by government regulations.

The closest study to answer my question in context of Indonesia was done by Adams and Cuecuecha (2010). Adams and Cuecuecha (2010) used panel data and three-stage conditional logit model with instrument variables to investigate the relationship between international remittances and household spending. They find that remittances have a positive impact on household's spending on food and education (Adams & Cuecuecha, 2010). On account of the impressive magnitude of internal migration, this impact ought to be reevaluated in the context of internal migration in Indonesia. All in all, my study aims to fill the gap in internal migration literature, specifically the gap in the study on how households spend the remittances from internal migrants.

3 Data

3.1 Data and Variables

My data comes from the most recent version of the Indonesian Family Life Survey (IFLS). This data is a household level, and each observation represents each household. This data includes

the answers to survey questions from 12728 households. The households are located in 13 out of the 27 provinces in Indonesia, as shown in Figure 1, and represent about 83 percent of the

Figure 1

Reprinted from "Longitudinal Survey Explores Indonesian Family Life.",
https://www.rand.org/well-being/social-and-behavioral-policy/data/FLS/IFLS.html. Copyright 2016 by RAND Corporation.

population of the country ("Longitudinal Survey Explores Indonesian Family Life", n.d.). I look at the last three waves of the survey in 2000, 2007, and 2014 to observe changes over time.

Figure 2 and 3 list the definitions of the dependent variables, different measures of spending per household in my case. To keep the accuracy of the measure, I employ the questions in Strauss et al. (2016)'s survey to the outcome variables. All of the outcome variables are continuous variables and measured in one million Rupiahs. I look at eight different outcome variables. Five of them are for observing changes in short-term spending behavior. Three of them are for estimating long-term spending behavior. Short-term spendings are for goods with temporal usage. Goods included in this category usually do not last long and they are not counted towards net worth. Short-term spendings are further divided into food-related consumption and non-food-related consumption for different units of time periods. Long-term spending means money spent on goods that last long. The goods in this category are counted towards the family's net worth.

Figure 4 lists the definitions of the independent variables. IFLS data does not include the exact amount of remittances that households sent or received. Therefore, I use the amount of

Figure 2: Short-Term Outcome Variables Definitions
Source: Indonesian Family Life Survey (2000, 2007, 2014)

Food Consumption (Weeks)	Total expenditure to purchase the following items during the past week (1) Staple foods - corn, sago/flour, cassava, tapioca, dried cassava, other staple foods, like sweet potatoes, yams (2) Vegetables - Kangkung, cucumber, spinach, mustard greens, tomatoes, cabbage, katuk, green beans, string beans and the like. Beans like mung-beans, peanuts, soya beans, and the like. Fruits like papaya, mango, banana and the like (3) Dried foods - Noodles, rice noodles, macaroni, shrimp chips, other chips, and the like, Cookies, bread, crackers (4) Meat and fish - Beef, mutton, water buffalo meat and the like, Chicken, duck and the like, Fresh fish, oysters, shrimp, squid and the like. Salted fish, smoked fish (5) Other dishes like - Jerky, shredded beef, canned meat, sardine and the like, Tofu, tempe, other side dishes (6) Milk/eggs - Eggs, Fresh milk, canned milk, powdered milk and the like (7) Spices - Sweet and salty soy sauce, salt, shrimp paste, chill sauce, tomato sauce, and the like, shallot, garlic, chill, candlenuts, coriander, MSG and the like, Javanese(brown) sugar, Butter, Cooking oil like coconut oil, peanut oil, corn oil, palm oil and the like. (8) Beverages and other drinks/consumer products - drinking water, granulated sugar, coffee, tea, cocoa, soft drinks like Fanta, sprite, alcoholic beverages like beer, palm wine, rice wine, betel nut(for chewing, traditional drug, others), cigarettes, tobacco, prepared food(eaten at home), and prepared food(away from home)
Food Consumption (Months)	Amount of the money that the household paid for the following items in the last month Rice, beef, chicken, fish, kangkung, spinach, cooking oil, granulated sugar
Non-Food Consumption (Months)	Amount of the total expenditures by all household members for the following items during the past month Electricity, water, fuel, telephone (including vouchers and mobile starter pack), personal toiletries, household items, domestic services and servants' wages, recreation and entertainment, transportation, sweepstakes and the like, arisa, and non-food items given to others/other parties outside the household on a regular basis
Non-Food Consumption (Years)	Total expenditures by all household members for purchasing the following items during the past year Clothing for children and adults, household supplies, furniture, medical costs, ritual ceremonies, charities, and gifts, taxes, other expenses not specified above, and non-food items given to others/other parties outside the household on an irregular basis (less than twelve times per year)
Non-Food Consumption	Total value of the following items owned by the household and not used for a farm or non-farm business Household appliances (radio, tape recorder, tv, fridge, sewing or washing machine, VCD player, HP, etc.), household furniture, and utensils

Figure 3: Long-Term Outcome Variables Definitions
Source: Indonesian Family Life Survey (2000, 2007, 2014)

Farm Assets (Years)	Total value of the following items owned by the household and were used for farm business in the last 12 months Farmland, poultry, livestock, fishpond, hard stem plants, house or building used for the farm business, vehicles, tractor, irrigation equipment, heavy equipment, small tools like saws and axes, machetes, forks, plows, and finishing equipment
Non-Farm Assets	Total value of the following items owned by the household and not used for a farm or non-farm business House and land occupied by this household, other houses/ building (including land), poultry, livestock, fishpond, vehicles (cars, boats, bicycles, motorbikes)
Savings	Total value of the following items owned by the household and not used for a farm or non-farm business Land (not used for farm or nonfarm), savings, certificate of deposit, stocks, and jewelry

money transfer that the household received in the past year from parents, siblings, children, neighbors, and others as a proxy for value of remittances. This method is used by Adams (1998).

In my specification, I estimate the effects of a number of present migrant members and the amount of money transfer on short-term and long-term consumption, while controlling for household demographics, education, a number of previous migrants, income, farmland size, year, and time-invariant household characteristics.

Based on Rozelle et al. (1999), C. Li et al. (2012), L. Li et al. (2013), I instrument for an amount of money transfer using a number of current migrants. The unit for the amount of money transfer is one million Rupiah. I expect that an amount of money transfer would bring an increase in either the amount of short-term spending or that of long-term spending. In other words, I expect that the remittances do not have influence over every aspect of household spending. Rather, the household would focus on allocating the remittances to either only short-term spending or only long-term spending.

Following C. Li et al. (2012), L. Li et al. (2013), Rozelle et al. (1999), Sindi and Kirimi (2006), I control for demographics characteristics, education characteristics, household head characteristics, and economic characteristics. Additionally, I control for previous migration characteristics in the household. These variables are all continuous variables.

Figure 4: Independent Variables Definitions
Source: Indonesian Family Life Survey (2000, 2007, 2014)

Migration Characteristics	# of Current Migrants	Number of people who were in the household moved across the village to a different place in the last 7 years for a job-related reason, and currently live there for more than 6 months
	Amount of Money Transfer (Years)	Amount of monetary help the household received from the following people not in the household in the past 12 months father, mother, children, sibling(s), spouse, non-biological parents, family members other than parents, siblings or children, friends and/or neighbors
Demographic Characteristics	Household Size	Number of people who are in the household
	# of Children	Number of household members who are younger than 20
	# of ELderly People	Number of household members who are older than 60
Education Characteristics	# of Students	Number of household members who go to some kind of school
	% of HS+ Graduates	Percent of members whose highest education completed is highschool or higher among household members who are older than 20
Household Head Characteristics	Age of Household Head	Age of the person who is regarded as a household head by the household members
Economics Characteristics	Household Income (Years)	Total earnings of the household in the last 12 months
	Farmland Size (Hectares)	Size of the land for farming that the household owns
Previous Migration Characteristics	# of Past Migrants	Number of people who are in the household, moved across the village to a different place in the last 7 years for a job-related reason, lived there for more than 6 months, came back to the original household, and currently live in the original household

Demographics characteristics include a number of people, a number of children, and a number of elderly people in the family. Previous literature suggests that the rate of people who are dependent on the working-age family members has an impact on capital accumulation in the household(C. Li et al., 2012). I control this rate by including the aforementioned three variables. I expect a household size to have a positive impact on short-term spending. As there are more people in the family, more food and goods are consumed. I expect that a number of children in the family has a negative impact on spending, as children do not need as much money as adults do for a living. I expect a number of elderly people in the family to have an impact in either direction. The elderly people in the family, on one hand, may require additional monetary help for maintaining their life such as with hospitalization. On the other hand, they may take care of the kids at home while the kids' parents are out for a job (L. Li et al., 2013) and therefore contribute to the household's income and assets accumulation.

Education characteristics include a number of students and a percent of household members whose highest education completed is a high school or higher among household members who are older than 20. I expect to see a negative impact of a number of students on household spending. As the household spends money to send children to school, they would have less money to spend. I expect that higher education contributes to a change in the spending, as L. Li et al. (2013) specifies that the household's education, especially household head's education, can have an impact on decision on an amount of remittances and money allocation.

Household head characteristics include the age of household head. I expect to see a negative impact of the age of household head to the value of farm assets, as past literature suggests that the younger heads link to better farm productivity (L. Li et al., 2013).

Economic characteristics include an amount of household income and farmland size that the household owns. Household income is measured in one million Rupiahs. Farmland size is measured in hectares. I expect to find that the household income has a strongly positive coefficient for every category of spending, as income is one of the sources for spending. I include farmland size, as L. Li et al. (2013) suggest to control for land availability per person with household size and farmland size. Following C. Li et al. (2012), L. Li et al. (2013), I do not expect farmland size to have an impact on the value of farm assets.

Previous migration characteristics include a number of people in the household who used to be migrants. This is to distinguish the influence of current migrants from the influence of past migrants. I expect the coefficient to be positive for either short-term or long-term spending.

Lastly, I include household dummy variables to control for time-invariant characteristics of the household spending and year dummy variables to capture year-specific trends throughout households.

3.2   Descriptive Statistics

Tables 1 provides descriptive statistics of the chosen variables. These statistics represents the characteristics of the population in the data. I compare two groups of households, the one with at least one current migrants and the one without. Among 38386 households in 2000, 2007, 2014, 4035 of them have at least one labor migrant currently. The households with current migrants account for about 10 percent of the whole household population. Out of my eight outcome variables that represent various types of spending, all of them except the value of Farm Assets (Years) shows a statistically significant increase in numbers with households with one or more current migrants. Especially, the amount of Non-Food Consumption (Months) doubles when the household has at least one migrant currently. The amount of Savings is small compared to the amount of Farm Assets and Non-Farm Assets in both groups. This difference suggests that the households in the data spend more money on accumulating physical assets than on storing their money to banks as a saving.

In terms of migration characteristics, if the household has at least one migrant currently, the number of current migrants would likely be multiple, with 2.12 people on average. Money Transfer (Years) for households with current migrants is more than double that without current migrants. This increase suggests a correlation between the number of current migrants and the amount of money transfer. Other interesting differences include: the households with current migrants have slightly larger families, the households with current migrants have older household heads by three years on average, the households with current migrants tend to have more migrants in the past, and households with current migrants have more income than those without. There is not much difference in Farmland Size (Hectares) between these two groups,

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Table 1: Descriptive Statistics

	# of Current Migrants			All
	== 0	>0		
	(n = 34,151)	(n=4,035)		(n=38,186)
Variables	Mean	Mean	T	Mean
Food Consumption (Weeks)	0.4251 (0.6929)	0.5378 (1.8405)	-7.6299***	0.4370 (0.8879)
Food Consumption (Months)	0.1766 (0.3168)	0.2221 (0.4825)	-8.0766***	0.1814 (0.3385)
Non-Food Consumption (Months)	2.67364 (33.6530)	5.3369 (65.1745)	-4.1848***	2.9550 (38.2396)
Non-Food Consumption (Years)	9.4439 (38.7674)	13.5231 (65.7293)	-5.7749***	9.8749 (42.4510)
Non-Food Consumption	9.6413 (21.6111)	11.7929 (25.9747)	-5.8449***	9.8686 (22.1224)
Farm Assets (Years)	43.8474 (184.1167)	43.0965 (167.9317)	0.2472	43.7681 (182.4724)
Non-Farm Assets	134.1051 (276.4524)	155.2547 (325.3299)	-4.5050***	136.3399 (282.0879)
Savings	18.2116 (92.3067)	21.6077 (101.9473)	-2.1849**	18.5705 (93.3768)
# of Current Migrants	0 (0)	2.1204 (2.0762)	-190***	0.2240 (0.9382)
Amount of Money Transfer (Years)	2.5191 (101.0836)	6.7564 (200.2807)	-2.2008**	2.9669 (115.6611)
Household Size	3.7971 (1.8788)	4.2044 (2.0436)	-12.8971***	3.8402 (1.9010)
# of Children	2.1159 (1.4947)	2.3283 (1.7126)	-8.3995***	2.1384 (1.5205)
# of Elderly People	0.3301 (0.6051)	0.3972 (0.6480)	-6.6094***	0.3372 (0.6101)
# of Students	0.8536 (0.9912)	0.7915 (1.005)	3.7582***	0.8471 (0.9928)
% of HS+ Graduates	0.5114 (.4232)	0.5274 (0.4047)	-2.2788**	0.5131 (0.4214)
Age of Household Head	44.0398 (15.1980)	47.4257 (14.5631)	-13.4413***	44.3976 (15.1677)
# of Past Migrants	0.5956 (1.7323)	1.3764 (2.4154)	-25.8180***	0.6781 (1.8324)
Household Income (Years)	28.7132 (56.5226)	36.7677 (100.9919)	-7.7134***	29.5643 (62.7761)
Farmland Size (Hectares)	1.0032 (18.4239)	1.2310 (19.5748)	-0.7377	1.0272 (18.5487)

Note: Standard Deviation in parenthesis. 1 unit is 1 million Rupiahs for Amount of Money Transfer (Years), Household Income (Years), and all outcome variables.

which can partially explain the absence of the difference in Farm Assets (Years) between the groups.

4 Methods and Results

4.1 Fixed-Effects OLS Linear Regressions

To start off, I introduce fixed-effect OLS linear regressions to observe the relationship between the number of different spending, the number of current migrant family members, and the amount of money transfer. The year fixed-effect controls for year specific factors that can influence the amount of spending. The household fixed-effect controls for household-specific factors that matter to the spending.

Consider the following model:

$$
\begin{aligned}
Y_{ti} = {} & \alpha + \beta_1 \text{Number of Current Migrants}_{ti} + \beta_2 \text{Amount of Money Transfer}_{ti} \\
& + \beta_3 \text{Household Size}_{ti} + \beta_4 \text{Number of Children}_{ti} + \beta_5 \text{Number of Elderly People}_{ti} \\
& + \beta_6 \text{Number of Students}_{ti} + \beta_7 \text{Percent of HS+ Graduates}_{ti} \\
& + \beta_8 \text{Age of Household Head}_{ti} + \beta_9 \text{ Number of Past Migrants}_{ti} \\
& + \beta_{10} \text{Household Income}_{ti} + {} + \beta_{11} \text{Farmland Size}_{ti} \\
& + \gamma_1 \text{is2007}_{ti} + {} + \gamma_2 \text{is2014}_{ti} + \delta_j \sum_{j=2}^{38186} \text{Household}_{ti}
\end{aligned}
$$

where Y_{ti}, the outcome variable, is the amount of each type of spending, is2007_{ti} and is2014_{ti} are the binary dummy variables for the year-fixed effect, and Household_{ti} is the binary dummy variable for the household-fixed effect.

Table 2 and Table 3 show the results of this fixed-effect OLS regressions with different outcome variables. In some of the models (column 2, 4, 5, 6, 7, 8), I do not observe a statistically significant relationship between the number of current migrants, the number of remittances, and the amount of money spent by the household. Yet, I observe a significant relationship between the number of current migrants and the amount of money spent on food consumption last

week(column 1). As the number of current migrants increases by one person, the amount spent on food last week in the household is expected to increase by 0.0111 million Rupiah (0.666 USD[2]).

For Non-Food Consumption (Months), I observe a significantly positive relationship between the number of current migrants and the amount spent on non-food consumption last month (column 3). As the number of current migrants in the household increases by one person, the amount consumed for non-food goods last month is expected to increase by 0.424 million Rupiah (25.44 USD), on average. The non-food-related spending last month does not have a statistically significant relationship with the amount of money transfer that the household had last year. However, given that the p-value is 0.178, I consider that the number of current migrants and an amount of money transfer are jointly significant to the amount of non-food consumption last month. Otherwise stated, there is a possibility that the amount of money transfer and the number of current migrants are strongly correlated that the coefficient that one of these variables carries is shared with another. I did a f-test to observe the significance. The result shows that it is jointly significant at the ten percent level with a p-value of 0.0918.

Although the models above seem to be a good starting point, there's an issue of reverse causality that overstates the resulting coefficients. When the independent variable is related to the outcome variable, it can not only be because the independent variable affects the outcome variable, but also because the outcome variable affects the independent variable. In my case, the household's consumption behavior might affect the number of members that the households are willing to send. Specifically, having more assets may help the household to generate more income, and the increased income may allow households to support and send more family members to different places.

4.2 Fixed-Effect 2-Stage Least Square Regressions

In order to overcome the issue of reverse causality and to further explore the relationship between the variables, I introduce an instrumental variable technique. This is a common technique in the research on the influence of internal migration, as used by C. Li et al. (2012), L. Li et al.

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[2]I use 1 million Rupiahs = 60 USD for this and following conversions.

Table 2: Fixed-Effects OLS Linear Regressions

Variables	(1) Food Consumption (Weeks)	(2) Food Consumption (Months)	(3) Non-Food Consumption (Months)	(4) Non-Food Consumption (Years)
# of Current Migrants	0.0111*	0.000516	0.424*	0.301
	(0.051)	(0.815)	(0.09)	(0.306)
Amount of Money Transfer	0.00000118	0.00000566	0.00239	0.00321
(Years)	(0.977)	(0.719)	(0.179)	(0.126)
Household Size	0.0667***	0.0298***	0.625*	1.078***
	(0.000)	(0.000)	(0.073)	(0.009)
# of Children	-0.0292***	-0.0120***	-0.853**	-0.327
	(0.002)	(0.001)	(0.036)	(0.496)
# of Elderly People	0.197	0.102	-0.0288**	-0.00573
	(0.022)	(0.241)	(0.721)	(0.875)
# of Students	-0.00918	-0.00279	0.219	-0.346
	(0.167)	(0.279)	(0.453)	(0.316)
Percent of HS+ Graduates	0.000697	0.0336***	-1.588	-1.24
	(0.980)	(0.002)	(0.186)	(0.381)
Age of Household Head	0.000496	0.000757***	0.0105	0.0368
	(0.453)	(0.003)	(0.717)	(0.282)
# of Past Migrants	0.0011	-0.00122	-0.0209	-0.0092
	(0.707)	(0.280)	(0.871)	(0.951)
Household Income	0.000525***	0.000256***	0.00472	0.0492***
(Years)	(0.000)	(0.000)	(0.282)	(0.000)
Farmland Size	-0.00000384	-0.000016	-0.00367	-0.00377
	(0.988)	(0.873)	(0.745)	(0.777)
is2007	0.0737***	0.0398***	4.242***	4.717***
	(0.000)	(0.000)	(0.000)	(0.000)
is2014	0.115***	0.0742***	0.481	4.921***
	(0.000)	(0.000)	(0.419)	(0.000)
cons	0.150***	-0.00331	0.628	0.642
	(0.000)	(0.799)	(0.669)	(0.711)
N	38186	38186	38186	38186
R^2	0.006	0.012	0.016	0.036

$^{***}p < 0.01$, $^{**}p < 0.05$, $^{*}p < 0.1$

Note: 1 unit is 1 million Rupiahs for Amount of Money Transfer (Years), Household Income (Years), and all outcome variables.

Table 3: Fixed-Effects OLS Linear Regressions cont.

Variables	(5) Non-Farm Consumption	(6) Farm Assets (Years)	(7) Non-Farm Assets	(8) Savings
# of Current Migrants	-0.00415	-1.805	-0.968	-0.108
	(0.977)	(0.125)	(0.542)	(0.864)
Amount of Money Transfer	-0.000836	0.00182	0.0179	-0.000885
	(0.423)	(0.828)	(0.115)	(0.844)
Household Size	1.020***	5.999***	16.72***	1.02
	(0.000)	(0.000)	(0.000)	(0.245)
# of Children	-0.0777	-3.905**	-8.734***	0.0166
	(0.745)	(0.042)	(0.001)	(0.987)
# of Elderly People	-0.00476	5.659**	6.744*	-1.151
	(0.988)	(0.030)	(0.055)	(0.410)
# of Students	-0.0586	-0.847	-0.534	-0.304
	(0.732)	(0.538)	(0.774)	(0.680)
Percent of HS+ Graduates	2.189***	11.93**	-1.001	0.607
	(0.002)	(0.035)	(0.896)	(0.841)
Age of Household Head	0.0652***	0.431***	1.337***	0.214***
	(0.000)	(0.002)	(0.000)	(0.003)
# of Past Migrants	-0.000653	-0.0516	-1.43*	0.317
	(0.993)	(0.932)	(0.080)	(0.327)
Household Income	0.0268***	0.155***	0.385***	0.153***
	(0.000)	(0.000)	(0.000)	(0.000)
Farmland Size	-0.000392	0.179***	-0.000576	-0.0214
	(0.953)	(0.001)	(0.994)	(0.453)
is2007	-0.135	0.321	29.92***	-4.161***
	(0.644)	(0.892)	(0.000)	(0.001)
is2014	1.611***	24.61***	96.79***	4.125***
	(0.000)	(0.000)	(0.000)	(0.006)
cons	0.776	-11.49*	-28.37***	0.549
	(0.367)	(0.097)	(0.002)	(0.882)
N	38186	38186	38186	38186
R^2	0.02	0.021	0.093	0.016

$^{***}p < 0.01$, $^{**}p < 0.05$, $^{*}p < 0.1$

Note: 1 unit is 1 million Rupiahs for Amount of Money Transfer (Years), Household Income (Years), and all outcome variables.

(2013), Rozelle et al. (1999), Sindi and Kirimi (2006). It is often used when there's a reverse causality between the independent variable and the dependent variable. To prove the independent variable's causality over the dependent variable, I use an instrumental variable. By finding a variable that has a correlation with the dependent variable but does not with the independent variable, I can distinguish the dependent variable's variations based on independent variables and from variations based on the error term. In other words, the instrument variable cannot have a direct influence on the dependent variable. The influence of the instrument variable must appear through the variance in the independent variable.

I apply this technique to my study by regarding the number of current migrants as an instrument variable and regarding the number of remittances as an independent variable. The number of current migrants might have an influence on food consumption through the change in household size and not through the change in the amount of money transfer. However, the household size is already controlled and therefore it is not an issue.

I introduce new models, a fixed-effect two-stage least square (2SLS) regressions. In the first stage, I regress the amount of money transfer on the number of current migrants. Consider the following model:

$$
\begin{aligned}
\text{Amount of Money Transfer}_{ti} = {}& \alpha + \beta_1 \text{Number of Current Migrants}_{ti} + \beta_2 \text{Household Size}_{ti} \\
& + \beta_3 \text{Number of Children}_{ti} + \beta_4 \text{Number of Elderly People}_{ti} \\
& + \beta_5 \text{Number of Students}_{ti} + \beta_6 \text{Percent of HS+ Graduates}_{ti} \\
& + \beta_7 \text{Age of Household Head}_{ti} + \beta_8 \text{ Number of Past Migrants}_{ti} \\
& + \beta_9 \text{Household Income}_{ti} + + \beta_{10} \text{Farmland Size}_{ti} \\
& + \gamma_1 \text{is2007}_{ti} + + \gamma_2 \text{is2014}_{ti} + \delta_j \sum_{j=2}^{38186} \text{Household}_{ti}
\end{aligned}
$$

where Amount of Money Transfer$_{ti}$, the outcome variable, is the amount of money transfer and a proxy for remittances, is2007$_{ti}$ and is2014$_{ti}$ are the binary dummy variables for the year-fixed effect, and Household$_{ti}$ is the binary dummy variable for the household-fixed effect.

I measure the extent to which the variation in current migrants number influences the varia-

tion in the amount of transfer. This is based on the assumption that the change in the amount of money transfer is through the family member's migration status. I expect the coefficient, β_1, to be positive. That is, I expect to see an increase in the amount of money transfer as the number of current migrants increases.

Table 4 shows the result. I observe an increase in the amount of money transfer associated with the number of current migrants. This is statistically significant at the one percent level. As the number of current migrants increases by one person, the amount of money transfer the family had past year is expected to increase by 2.677 millions Rupiah(160.62 USD), on average. This increase is economically significant as well. 2.677 million Rupiahs is more than 2.5191 million Rupiahs(151.146 USD), the average amount of money transfer for families without migrants, as seen in Table 1.

In the second stage, I regress spending on the fitted amount of money transfer and measure how much the variations in the fixed value of the household's money transfer affect the variation in the household spending.
Consider the following model:

$$
\begin{aligned}
\mathrm{Y}_{ti} = {}& \alpha + \beta_1 \text{Amount of } \widehat{\text{Money Transfer}}_{ti} + \beta_2 \text{Household Size}_{ti} \\
& + \beta_3 \text{Number of Children}_{ti} + \beta_4 \text{Number of Elderly People}_{ti} \\
& + \beta_5 \text{Number of Students}_{ti} + \beta_6 \text{Percent of HS+ Graduates}_{ti} \\
& + \beta_7 \text{Age of Household Head}_{ti} + \beta_8 \text{ Number of Past Migrants}_{ti} \\
& + \beta_9 \text{Household Income}_{ti} + + \beta_{10} \text{Farmland Size}_{ti} \\
& + \gamma_1 \text{is2007}_{ti} + + \gamma_2 \text{is2014}_{ti} + \delta_j \sum_{j=2}^{38186} \text{Household}_{ti}
\end{aligned}
$$

where Y_{ti} , the outcome variable, is the amount of each type of spending,
Amount of $\widehat{\text{Money Transfer}}_{ti}$ is a newly predicted variable estimated from the first stage, is2007$_{ti}$ and is2014$_{ti}$ are the binary dummy variables for the year-fixed effect, and Household$_{ti}$ is the binary dummy variable for the household-fixed effect.

I expect the coefficients, β_1 ,to be positive for some of the outcome variables. That is, the

family with more migrants is likely to receive more money compared to those families with fewer current migrants. Then, I expect the families with more migrants to spend more money in some parts of their lives.

Table 5 and Table 6 show the results of the second stages of the 2SLS regressions. The fitted amount of money transfer has a positive relationship with the amount of food consumption last week (column 1) and an amount of non-food consumption last month (column 3). As the amount of fitted money transfer increases by 1 million Rupiahs, the amount of food consumption per week is expected to increase by 0.00415 million Rupiahs (0.249 USD), on average. This is statistically significant at the 10 percent level. This number is economically significant in some cases. 0.00415 million Rupiahs is equivalent to a price for a bottle of water[3]. Hence, especially when the household lives on the margin, this increase can allow the household to purchase more foods. Similarly, as the fitted amount of money transfer increases by 1 million Rupiahs, the amount of money spent on non-food consumption last month is predicted to increase by 0.161 million Rupiahs (9.66 USD). This is also statistically significant at the 10 percent level. 0.161 million Rupiahs is almost equivalent to a price for a monthly pass for public transportation[4]. With this increase, households can have more monetary leeway in their regular spending.

Although the estimates of the amount of money transfer on other variables are not statistically significant, I am confident to say that the result shows the statistically significant impact of money transfer on short-term spending. As seen in Figure 2, the amount of Food Consumption (Weeks) represents a more comprehensive amount of money spent on food in the household than Food Consumption (Months). Likewise, Non-Food Consumption (Months) covers the amount of money spent on more items than the other two variables in terms of non-food consumption. Therefore, I conclude that remittances from internal migrants have a statistically positive influence on household's temporary non-food spending, aligned with a finding by Quisumbing and McNiven (2010), and a positive influence on temporary food-spending by Cuong et al. (2009). In addition, insignificant impact of remittances on Farm Assets aligns with the finding from Adams (1998), Cuong et al. (2009), C. Li et al. (2012). The insignifi-

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[3]Source: https://www.numbeo.com/cost-of-living/countryresult.jsp?country=Indonesia
[4]Source: https://www.numbeo.com/cost-of-living/countryresult.jsp?country=Indonesia

cant impact of remittances on Non-Farm Assets is in line with findings from Adams (1998), Cuong et al. (2009) but not in line with a finding from Quisumbing and McNiven (2010), thus requiring a further investigation.

Furthermore, the results show interesting findings other than the relationship between migration, money transfer, and spending. Household size has a significantly positive impact on all types of spending except for Saving. This aligns with my earlier assumptions that a) the larger families need to spend more in general for maintaining the family and b) households in the data may not have the habit to put their money to the banks. The number of Children has negative impacts on most of the short-term spending, Farm Assets (Years), and Non-Farm Assets. Is is surprising is that kids do not contribute to decrease long-term spending, despite the fact that the kids contribute to decrease short-term spending. It is possible that the children can cost money in unobserved ways in this study and that such cost does not allow families to accumulate more assets. The number of elderly people has a negative impact on Non-Food Consumption (Months) and positive impacts on both assets. I imagine that elderly people do not do many extra things such as going out in life, which helps families to decrease spending on non-food spending last month. These elderly people may have already earned enough to purchase some assets, which may help the whole family get more assets in value. The number of students does not explain any of the outcome variables. I can assume the cost of school does not impact much to spending. Age of Household Head does not have a negative impact on spending against L. Li et al. (2013)'s assumption. Rather, the results show that the older the household head is, the more they spend on assets. I can imagine the older the household head is, the experienced and educated decision they can make regarding money allocation. The number of past migrants does not have significant impacts on any of the spending. This shows that the number of past migrants has less influence on household spending than the number of current migrants.

Table 4: Fixed-Effect 2-Stage Least Square Regression: First Stage

Variables	(1) Amount of Money Transfer
# of Current Migrants	2.677***
	(0.007)
Household Size	3.636***
	(0.009)
# of Children	-3.028*
	(0.063)
# of Elderly People	3.891*
	(0.078)
# of Students	-0.562
	(0.630)
Percent of HS+ Graduates	-1.073
	(0.823)
Age of Household Head	-0.230**
	(0.047)
# of Past Migrants	0.528
	(0.303)
Household Income	-0.0332*
(Years)	0.058
Farmland Size	-0.012
	(0.804)
is2007	7.682***
	(0.000)
is2014	4.352*
	(0.067)
cons	1.200
	(0.838)
N	38186
R^2	0.002

$^{***}p < 0.01$, $^{**}p < 0.05$, $^{*}p < 0.1$ Note: 1 unit is 1 million Rupiahs for Household Income (Years) and Amount of Money Transfer.

Table 5: Fixed-Effect 2-Stage Least Square Regression: Second Stage

Variables	(1) Food Consumption (Weeks)	(2) Food Consumption (Months)	(3) Non-Food Consumption (Months)	(4) Non-Food Consumption (Years)
Amount of Money	0.00415*	0.000198	0.161*	0.116
Transfer(Years)	(0.051)	(0.81)	(0.085)	(0.292)
Household Size	0.0517***	0.0291***	0.052	0.67
	(0.000)	(0.000)	(0.916)	(0.247)
# of Children	-0.0167	-0.0114***	-0.374	0.0139***
	(0.138)	(0.009)	(0.448)	(0.981)
# of Elderly People	-0.0449***	-0.00648	-0.419	-0.336
	(0.003)	(0.265)	(0.525)	(0.665)
# of Students	-0.00685	-0.00269	0.309	-0.282
	(0.315)	(0.31)	(0.303)	(0.424)
Percent of HS+ Graduates	0.00515	0.0338***	-1.418	-1.12
	(0.851)	(0.002)	(0.239)	(0.43)
Age of Household Head	0.00145*	0.000801***	0.0469	0.0627
	(0.076)	(0.012)	(0.191)	(0.139)
# of Past Migrants	-0.00109	-0.00133	-0.105	-0.0687
	(0.721)	(0.265)	(0.437)	(0.665)
Household Income	0.000663***	0.000263***	0.00997*	0.0529***
(Years)	(0.000)	(0.000)	(0.062)	(0.000)
Farmland Size	0.0000426	-0.0000138	-0.0019	-0.00251
	(0.869)	(0.89)	(0.867)	(0.852)
is2007	0.0418*	0.0383***	3.026***	3.852***
	(0.037)	(0.000)	(0.001)	(0.000)
is2014	0.0967***	0.0734***	-0.208	4.431***
	(0.000)	(0.000)	(0.766)	(0.000)
cons	0.145***	-0.00354	0.438	0.507
	(0.000)	(0.786)	(0.766)	(0.771)
N	38186	38186	38186	38186
R^2	0.016	0.036	0.006	0.012

$^{***}p < 0.01, ^{**}p < 0.05, ^{*}p < 0.1$

Note: 1 unit is 1 million Rupiahs for Amount of Money Transfer (Years), Household Income (Years), and all outcome variables.

Table 6: Fixed-Effect 2-Stage Least Square Regression: Second Stage cont.

Variables	(5) Non-Food Consumption	(6) Farm Assets (Months)	(7) Non-Farm Assets	(8) Savings
$\widehat{\text{Amount of Money}}$ Transfer (Years)	-0.00238	-0.673	-0.344	-0.0412
	(0.965)	(0.126)	(0.562)	(0.861)
Household Size	1.025***	8.438***	18.03***	1.165
	(0.000)	(0.000)	(0.000)	(0.347)
# of Children	-0.0824	-5.947**	-9.829***	-0.105
	(0.775)	(0.01)	(0.002)	(0.933)
# of Elderly People	0.00126	8.283***	8.152*	-0.994
	(0.997)	(0.008)	(0.052)	(0.55)
# of Students	-0.0595	-1.226	-0.737	-0.326
	(0.734)	(0.385)	(0.699)	(0.666)
Percent of HS+ Graduates	2.187***	11.21**	-1.39	0.563
	(0.002)	(0.048)	(0.856)	(0.853)
Age of Household Head	0.0649***	0.276	1.254***	0.205**
	(0.002)	(0.103)	(0.000)	(0.024)
# of Past Migrants	0.000165	0.305	-1.239	0.339
	(0.998)	(0.631)	(0.148)	(0.319)
Household Income	0.0267***	0.133***	0.373***	0.151***
	(0.000)	(0.000)	(0.000)	(0.000)
Farmland Size	-0.000409	0.171***	-0.00463	-0.0218
	(0.951)	(0.001)	(0.949)	(0.446)
is2007	-0.123	5.501	32.70***	-3.852*
	(0.811)	(0.186)	(0.000)	(0.084)
is2014	1.617***	27.54***	98.37***	4.300**
	(0.000)	(0.000)	(0.000)	(0.015)
cons	0.777	-10.68	-27.94***	0.597
	(0.367)	(0.124)	(0.003)	(0.873)
N	38186	38186	38186	38186
R^2	0.02	0.021	0.093	0.016

$^{***}p < 0.01$, $^{**}p < 0.05$, $^{*}p < 0.1$

Note: 1 unit is 1 million Rupiahs for Amount of Money Transfer (Years), Household Income (Years), and all outcome variables.

5 Conclusion

Using panel data and two stage-least-square regressions, my study has identified that internal migrant's remittances are used for migrant-sending household's daily expenditures. This outcome confirms my initial hypothesis that remittances only affect either short-term or long-term spendings. Furthermore, this outcome confirms findings from past research done by Adams (1998), Cuong et al. (2009), C. Li et al. (2012).

For further research, I am interested to incorporate geographic and community characteristics into the models, as seen in L. Li et al. (2013), Lu (2010), Rozelle et al. (1999), Sindi and Kirimi (2006), Taylor et al. (2003). I have not been able to incorporate them this time due to data and time limitations. Further, I hope to conduct robustness checks and observe how robust my models are.

With these future refinements in mind, I still recognize that this research fills an important gap in the internal migration literature. In the understudied situation of the impressive field of research, I look at the especially ignored part of research - how do households use internal remittances - principally under the NELM theory. These findings would give more ideas to policy makers, especially those in countries with massive internal migration, and an opportunity to re-think ways to bring the best utility for population in both rural and urban area.

References

Adams, R. H. J. (1998). Remittances, investment, and rural asset accumulation in pakistan. *Economic Development and Cultural Change*, *47*(1), 155–173.

Adams, R. H. J., & Cuecuecha, A. (2010). *The economic impact of international remittances on poverty and household consumption and investment in indonesia*. The World Bank.

Clemens, M. A. (2011). Economics and emigration: Trillion-dollar bills on the sidewalk? *Journal of Economic perspectives*, *25*(3), 83–106.

Cuong, N. V. Et al. (2009). Impacts of international and internal remittances on household welfare: Evidence from viet nam. *Asia-Pacific Development Journal*, *16*(1), 59–92.

Li, C., Li, S., Feldman, M. W., Daily, G. C., & Li, J. (2012). Does out-migration reshape rural households' livelihood capitals in the source communities? recent evidence from western china*. *Asian and Pacific Migration Journal*, *21*(1), 1–30.

Li, L., Wang, C., Segarra, E., & Nan, Z. (2013). Migration, remittances, and agricultural productivity in small farming systems in northwest china. *China Agricultural Economic Review*.

Longitudinal survey explores indonesian family life. (n.d.). Retrieved March 19, 2020, from https://www.rand.org/well-being/social-and-behavioral-policy/data/FLS/IFLS.html

Lu, Y. (2010). Mental health and risk behaviors of rural-urban migrants: Longitudinal evidence from indonesia. *Population studies*, *64*(2), 147–163.

Meng, X., & Manning, C. (2010). The Great Migration in China and Indonesia: Trends and Institutions (X. Meng, C. Manning, L. Shi, & T. N. Effendi, Eds.). In X. Meng, C. Manning, L. Shi, & T. N. Effendi (Eds.), *The Great Migration*. Edward Elgar Publishing. https://ideas.repec.org/h/elg/eechap/13619_1.html

Quisumbing, A., & McNiven, S. (2010). Moving forward, looking back: The impact of migration and remittances on assets, consumption, and credit constraints in the rural philippines. *The Journal of Development Studies*, *46*(1), 91–113.

Rozelle, S., Taylor, J. E., & DeBrauw, A. (1999). Migration, remittances, and agricultural productivity in china. *American Economic Review*, *89*(2), 287–291.

Sindi, K., & Kirimi, L. (2006). *A test of the new economics of labor migration hypothesis: Evidence from rural kenya* (tech. rep.).

Stark, O., & Taylor, J. E. (1991). Migration incentives, migration types: The role of relative deprivation. *The economic journal*, *101*(408), 1163–1178.

Strauss, J., Witoelar, F., & Sikoki, B. (2016). The fifth wave of the indonesia family life survey: Overview and field report: Volume 1.

Sukamdi, & Mujahid. (2015). *The monograph series no. 3: Internal migration in indonesia*. Retrieved March 19, 2020, from https://indonesia.unfpa.org/en/publications/monograph-series-no-3-internal-migration-indonesia

Taylor, J. E. (1992). Remittances and inequality reconsidered: Direct, indirect, and intertemporal effects. *Journal of Policy modeling*, *14*(2), 187–208.

Taylor, J. E., Rozelle, S., & De Brauw, A. (2003). Migration and incomes in source communities: A new economics of migration perspective from china. *Economic Development and Cultural Change*, *52*(1), 75–101.

Yang, D. (2008). International migration, remittances and household investment: Evidence from philippine migrants' exchange rate shocks. *The Economic Journal*, *118*(528), 591–630.