ISSN 2785-7727

Erasmus Mundus Joint Master Degree
Economics of Globalisation and European Integration

Economics of Global Interactions
EGEI - Working Paper 3-2023

Economic Impacts of Overseas Labor Migration on Household Income and Expenditure in the Philippines

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This work draws from the Master Thesis submitted to the EMJMD in Economics of Globalisation and European Integration (EGEI)

Suggested Citation: Koriukina P. (2023): Economic Impacts of Overseas Labor Migration on Household Income and Expenditure in the Philippines, EGEI WP Series, 3/2023 https://www.master-egei.eu/egei-working-paper-series/

ACKNOWLEDGMENTS

By writing this thesis, I have officially concluded the chapter of my life dedicated to obtaining a master's degree in economics. Being part of the Economics of Globalization and European Integration (EGEI) program was a difficult yet fulfilling journey, and I am honored to have had this opportunity in the first place. After completing this dissertation, I am now certain that I want to continue in academia, so my next step is to obtain a Ph.D. in economics. I am thrilled to start this new chapter of my life, but before that, I would like to express my gratitude to the people who have helped me get to the place where I am right now.

First and foremost, I would like to thank my supervisor, Prof. Dr. Ilse Ruyssen. For the majority of the EGEI program, I have worked as her research assistant on different projects in the field of migration and development, one of which inspired this dissertation. Thank you, Ilse, for always having faith in me and giving me complete freedom while continuously providing me with support and feedback. Along with Ilse, I would like to thank her Ph.D. student Alix Debray, who always has very insightful comments and inspired me to be curious yet thorough in all my research endeavors.

Secondly, I would like to thank all the professors who were part of the EGEI program. In particular, Prof. Nicola Daniele Coniglio and Prof. Hubert Jayet, who guided us throughout this entire program. Thank you for fostering our interest in scientific research and giving us the knowledge and skills to do it. I also thank Prof. Andres Võrk and Prof. Ruben Dewitte, who made econometrics and R-Studio exciting rather than intimidating. To them, I owe my love for this discipline and the confidence to use its tools to produce robust research.

There are two people whose help was vital for the completion of this thesis, for it has not all been smooth sailing. Mechelle M. Viernes, the Chief Statistical Specialist at the Philippines Statistics Authority, and Prof. Geoffrey M. Ducanes of the Ateneo De Manila University, the Philippines, provided me with invaluable clarifications regarding the data. Moreover, the research done by Prof. Ducanes on emigration from the Philippines was the main inspiration for my dissertation.

Finally, I would like to thank my friends and family for their unwavering support throughout this journey. They believed in me and encouraged me to keep going when I was crumbling under the pressure. I will keep striving for excellence to always make you proud.

LIST OF ABBREVIATIONS

APIS – Annual Poverty Indicators Survey

FIES – Family Income and Expenditure Survey

HSW – Household Service Workers

LFS – Labor Force Survey

NCO – Negative Control Outcome

OFW – Overseas Filipino Worker

POEA – Philippines Overseas Employment Administration

PSA – Philippines Statistics Authority

PSU – Primary Statistical Unit

SOF – Survey on Overseas Filipinos

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1. INTRODUCTION

In this dissertation, I study the local community-level effects of Filipino labor migration on the income and expenditure of households.

Over the last forty years, there has been a significant rise in the number of Filipino migrant workers who leave their homeland in pursuit of improved employment prospects and higher income levels. The government plays a pivotal role in promoting labor exports since labor migration in the Philippines has evolved into a national thrust for economic growth, accounting for up to 10% of the country's GDP and making it a role model in regulating migration (IOM, 2022).

The economic effects of overseas migration and remittances on the Philippine economy and the welfare of Philippine households have been studied in many different dimensions, including the effect of migration on poverty and inequality, household consumption and investment, education, and labor supply (IOM & Scalabrini Migration Center, 2013; Ducanes, 2015). Migration of overseas Filipino workers (hereinafter OFWs) may have a large developmental impact not merely due to its scale, but also because of the strong commitment labor migrants retain to their families left behind and their home communities. As a result, they tend to remit a higher proportion of their income than permanent settlers (Yang, 2008; Hugo, 2009).

Nevertheless, the impact of overseas labor migration on Filipino families remains uncertain. The Philippines is one of the most studied cases of an interventionist labor-sending state, and empirical literature has reported plenty of conflicting evidence. Some studies provide compelling accounts of migration and remittances lifting recipient households out of poverty (Ducanes & Abella, 2008b; Ducanes, 2015; Yang & Martinez, 2006), while others report insignificant effects of migration on the poverty status of families left behind (Garcia et al., 2022). Several studies show that having a family member working abroad is associated with increased investment-type spending such as education, medical care, consumption of durable goods, housing, and land (e.g., Yang, 2008; Tabuga, 2007), while others find such an association insignificant (Ang et al., 2009). In many instances, the acquisition of a migrant had a negative effect on the domestic wages of other family members, indicating that it may act as a moral hazard (Pernia, 2008; Cabegin, 2006); however, there is also evidence of increased labor force participation and wages after a family member leaves to work abroad (Shrestha,

2017; Mu & van de Walle, 2011). One study reported that households that experienced positive shocks to remittances were more likely to engage in capital-intensive entrepreneurial activity and self-employment (Yang, 2008), while several others found no association between having an OFW and being an entrepreneur/self-employed (OECD/Scalabrini Migration Center, 2017; Ducanes, 2015; Bird, 2009).

Despite the vast differences in reported outcomes, all empirical studies concerned with the economic effects of labor migration from the Philippines – including mine – share two characteristics. First, they face serious data availability constraints. The necessary data comes from household-level surveys conducted by the Philippines Statistics Authority (PSA) using a rotating panel of dwellings, which prevents tracking observations over time. Therefore, apart from two lucky instances when delays in rotation schedules caused an overlap in household samples, allowing for the creation of micro-panels, scholars either conducted cross-sectional household-level studies – often pooled over several years – or aggregated the data at the regional level. Inference was made to the short-term effects of migration on overseas workers' own households in the case of micro-panels (Ducanes, 2015; Yang, 2008), or to the regional income/expenditure distribution and regional development (Garcia et al., 2022; Pernia, 2008) in case of region-level panels.

However, besides the effects at the household and regional level, migration was hypothesized and actually shown to create spillovers within local communities, in particular, among households without any migrant members (Ang et al., 2009; de Brauw & Giles, 2018; Yang & Martinez, 2006). These spillover effects may be relevant for policymaking, especially because some interventions concerned with labor migration are implemented at the local (municipal, district) level; yet they are designed without prior knowledge of the underlying dynamics (Hugo, 2009). Furthermore, without district-level data, there is no way to evaluate if the policies that manage migration at municipal/district levels are effective. Luckily, in 2003, the PSA introduced a new Primary Statistical Unit (PSU), which roughly corresponded to a barangay (district) comprised of 100-400 households. Aggregating the data over this statistical unit allowed for capturing the effects of migration on local communities that OFWs left behind, which was the first such case when district-level analysis was applied to Filipino labor migration.

The second common characteristic among all studies I build upon is the issue of endogeneity, which often plagues causal inference in migration literature. It has been

demonstrated both theoretically and empirically that people self-select into migration, and that the migration decision is made under the same socio-economic constraints that govern migrants' families' economic behaviors (Hoddinott, 1994; Viet Cuong & Mont, 2012). Any estimated coefficients cannot be interpreted as causal effects unless endogeneity is properly addressed (Singh et al., 2017; Cunningham, 2021). Many different approaches have been used in the literature to tackle endogeneity, depending on the type of data and the relationship in question.

Following Pajaron et al. (2020), Lokshin et al. (2010), and Cortes (2013), I use historical migration rates in a PSU as an Instrumental Variable (IV) for present levels of migration. Including regional controls as a proxy for the effects of past migration/remittances on present levels of regional income and infrastructure development is an additional measure to remedy endogeneity. As a falsification test, I use a Negative Control Outcome (NCO) that is determined before present and even past migration rates and therefore independent of them, conditionally on observed covariates. Yet, it is subject to the same unobserved confounding as the outcomes of interest – household income and expenditures.

Using the IV method, I examine the effects of district-level migration rates on fifteen different categories of household income and expenditure, which all together form the core of household income and expenditure structure. One may hypothesize that the effects will be much less pronounced than when the study is performed directly on households, which is indeed the case. Migration is shown to have no significant impact on families' total income or expenditure. However, it is negatively associated with the wages and salaries of families left behind. The effect on receipts from abroad is, expectedly, positive and significant. Concerning household expenditure by category, no significant effect of migration was detected, except for migrants' educational attainment and age, which positively influence investment-type expenditure items.

The main contribution to the literature is that, for the first time, the relationship between labor migration and economic outcomes has been analyzed at the district level. Aggregation by PSU entails that the empirical estimation can pick up the effects of migration far beyond the recipient households while still looking at highly localized effects compared to regional or national estimates. And, based on all diagnostic tests including the NCO falsification test, one can be quite assured that the IV estimation strategy with regional controls is endogeneity- and heteroscedasticity-robust, which means that asymptotically correct inference is possible.

Therefore, the findings of this exploratory analysis can be used to identify promising directions for future research and inform migration-related policymaking that can amplify the benefits of overseas migration for local communities.

The remainder of this dissertation is organized as follows. Section 2 presents an overview of the literature on migration that the present study builds upon. Section 3 describes the Filipino migrant population. Section 4 shows the data and describes the aggregation procedure and variable choices. Section 5 contains a detailed description of the empirical methodology applied. Section 6 presents the empirical results and conducts a falsification test to check their robustness. Section 7 concludes.

2. LITERATURE REVIEW

2.1. Philippines as a labor-sending state

The Philippine state – in the way it has approached emigration since the 1970s until the present day – is one of the most studied cases of an interventionist sending state (Lee, 2016).

In broad academic circles, there is some uncertainty regarding the concept of a "sending state" – sometimes it is used synonymously with 'sending country" (Lee, 2016). In the dedicated sending-state literature, however, the term specifically indicates institutions and/or political projects that explicitly orient around labor migration or export (Gamlen, 2011; Ruiz, 2008; Lawless & Seccombe, 1984). That is the definition I will be referring to in this study.

Until recently, migration economics paid little attention to sending states, their emigration policies, and the development effects of these policies (Clemens, 2011; Biao, 2003). It has focused elsewhere — on immigration. However, new branches of academic literature emerged that opened a discussion around emigration policy and its implications. Within this literature, South and East Asia became the most studied region of migrants' origin in the Global South. Partially, sending-state interventions by Southeast Asian governments started being discussed in the development and policy-oriented literature (Hugo 2009; Rajan & Mishra, 2010; UN, 2013).

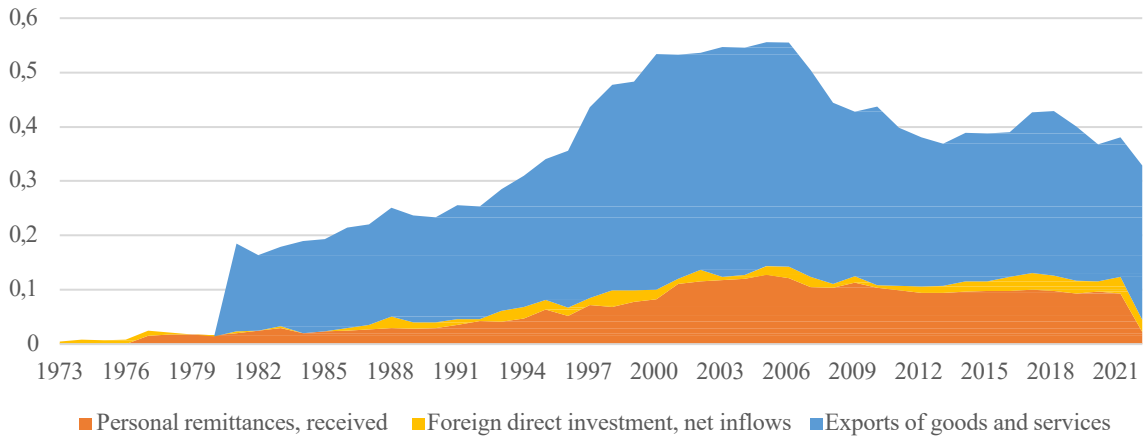
However, the transnationalism literature has opened much more ample space for discussing the sending-state perspective (Lee, 2016). Some of the papers focus on ex-ante policies – mainly those promoting temporary labor migration or labor export – within a broader framework of sending state policy that also includes diaspora management programs (e.g., Biao, 2003 – on China; Fitzgerald, 2009 – on Mexico; Iskander, 2010 – on Morocco and Mexico). Others have a narrower focus on labor export policies in the Philippines (Siracusa and Acacio, 2004; Rodriguez, 2011).

In the Philippines, Overseas Filipino Workers (OFWs) have long been regarded as active development agents (Calzado, 2007). Their crucial role in the economy became clear especially after the Asian economic crisis in the late 1990s, when labor-exporting nations like the Philippines, Thailand, and Indonesia faced a sharp decline in foreign investment and a surge of unemployment and underemployment (Garcia et al., 2022). Coupled with a devaluation of local currencies, it created a conducive environment for overseas labor migration, which, as a

source of foreign exchange, became one of the strategies used to cope with the effects of the crisis. International migration was first included in the national Philippine Development Plan of 2011-2016 and since then has remained an important pillar of the country's development policy (NEDA, 2022).

Figure 1 demonstrates the dynamics of remittance receipts vis-à-vis Foreign Direct Investment and Exports. The period from the early 1990s was characterized by the fastest growth of remittances as a share of GDP, after which it stabilized and remained at roughly 10% level until the Covid-19 pandemic. Currently, yearly remittances received by Filipino households are equivalent to nearly 10% of the country's GDP and outperform all export industries in terms of the inflows of foreign exchange they bring into the economy (Garcia et al., 2022).

Figure 1 – Remittances, Foreign Direct Investment, and Exports of the Philippines as % of GDP, 1973-2021



Source: World Development Indicators Databank (2023).

2.2. The Philippines state government – protector or exploiter of OFWs?

The literature is visibly divided concerning the nature of the Philippine government's approach to migration management. On the one hand, the country has earned many accolades as a global model for managing the deployment of workers (Orbeta & Abrigo, 2011; IOM, 2005; Ruiz, 2008). Calzado (2007) stated that the foundation of migration management in the country has always been "the benefit of the migrant workers themselves, their families, and society as a whole".

Throughout its long experience of deploying large numbers of workers, the Philippines has devised an extensive institutional framework for regulating migration, the center of it being the Philippine Overseas Employment Administration established in 1982 (Ruiz, 2008). Over the past five decades, the country has passed over ten migration-centered laws and signed more than 70 Bilateral Labor Agreements with 29 destination countries (O'Steen, 2021). Hugo (2009) argued that the Philippines has developed one of the most effective models for the effective regulation of private recruiters (Hugo, 2009).

The institutional and policy framework of migration management in the Philippines has been analyzed by numerous scholars. One of the frameworks, developed by Lee (2016), classifies states into accommodating, facilitating, and directing regimes, and uses the Philippines as an example of the latter. The distinguishing features of a directing labor-exporting state are, first, being oriented towards market opening or access, and actively seeking out opportunities for its migrant workers. The second type of intervention used by a directing state is measures to support the competitiveness of its migrant workers, such as the development of pre-departure educational and training programs or job-matching services (Lee, 2016).

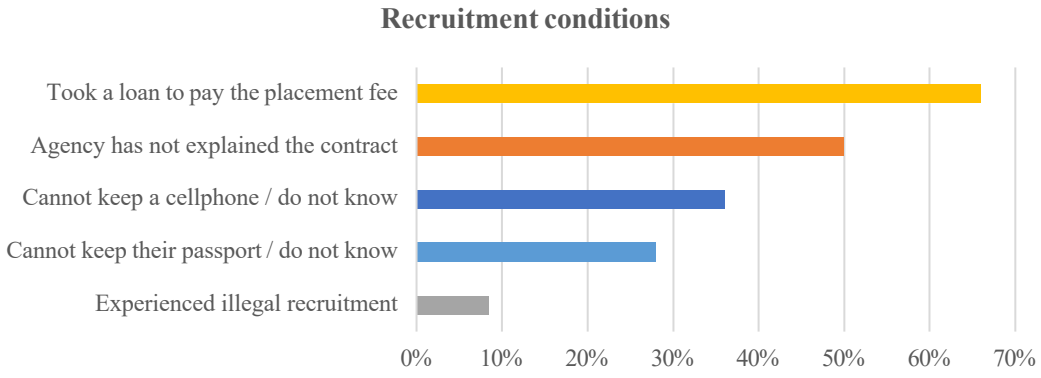
Orbeta & Abrigo (2011) propose a different typology where they classify the Philippine sending-state interventions into three branches: (1) limiting the entry of both agencies and prospective migrants into the overseas employment program, by setting minimum qualifications among the parties involved, (2) regulation on fees and employment standards – e.g., establishing minimum provisions of employment contracts, and (3) monitoring and redress, such as procedures for handling violations of contractual obligations. Ruiz (2009) suggests that the Philippine government operates four sets of resources: regulation of the overseas recruitment industry, a managed deployment process, representation, and protection, and recording mechanisms to obtain information about the country's emigrants and overseas workers. Representation and protection of OFWs by government officials in cases of mistreatment and injustice have been especially recognized in the literature as a sign of a strong commitment to supporting their workers overseas (Hugo, 2009).

The other perspective is less optimistic. The Philippine state is frequently criticized for being a veritable "labor brokerage" state that actively mobilizes workers for export. While overseas migration represents a lucrative strategy for the national government to sustain economic growth and cope with economic downturns, it is also a very costly and emotionally

taxing endeavor for migrants and their families (Rodriguez, 2011). Moreover, it entails a substantial risk of exploitation in the recruitment and preparation for the travel process, en route, at the destination, and upon migrants' return home (Sayres, 2007).

The extensive framework of policies and regulations has plenty of caveats and loopholes that are readily exploited for profit by local private recruitment and manning agencies. Orbeta & Abrigo (2011) demonstrate it using the example of the "Household Service Workers Reform Package" – a series of provisions issued by POEA in 2006. The package was meant to professionalize domestic work and minimize the vulnerability of household service workers (HSWs) and included, among other provisions, waiving the placement fee, enforcing a minimum monthly salary of US$400, and raising the minimum age from 18 to 25 (Calzado, 2007). However, based on focus group discussions and surveys conducted in 2010, the authors reveal frequent violations of the policies (*Figure 2*). In most cases, the no placement fee policy appears to have been either completely ignored or covertly violated through salary deductions. Half of the respondents did not have their contract terms explained to them. A non-negligible share of HSWs could not keep their phones and/or passports. Finally, 9% of respondents experienced illegal recruitment, which may come in the form of contract substitution, inability to leave – sometimes even after paying money, – leaving as tourists, and dealing with unlicensed recruitment agencies.

Figure 2 – Problems faced by Filipina household service workers in overseas deployment



Source: Orbeta & Abrigo (2011).

2.3. Effect of migration on family left behind

The body of literature studying the effects of overseas migration and remittances on the Philippine economy and households has grown almost in synchrony with the growth of the volumes of migration and remittances themselves (Ducanes, 2015). Hugo (2009) argues that the migration of OFWs has a large developmental impact not merely due to its scale, but also because of the strong commitment labor migrants retain to their families left behind and their home communities. As a result, they tend to remit a higher proportion of their income than permanent settlers (Yang, 2008; Hugo, 2009).

Following Garcia et al. (2022), I classify the developmental effects of migration and remittances into three levels: national, community, and household level. At the national level, remittances act as buffers during economic challenges and provide a – relatively – steady flow of hard currency, thereby improving government creditworthiness and supporting local trade and infrastructure (Garcia et al., 2022). Moreover, the multiplier effect of household consumption increases from remittance income can reverberate through the entire national economy (Siddique et al., 2012). At the community level, remittances are often used by households to invest in local micro-enterprises or physical capital such as land, thereby, contributing to the welfare, growth, and development of the local community far beyond the remittance-receiving households (OECD/Scalabrini Migration Center, 2017).

Furthermore, remittances have been called “the world’s largest poverty reduction program” (IFAD & The World Bank Group, 2015). Their significant contributions to poverty alleviation have been documented in countries all around the world (Adams & Page, 2005; Azam et al., 2016; Acosta et al., 2008). In Asia, Yoshino et al. (2017) analyzed 10 migrant-

sending nations from 1981 to 2014 and found that a 1% rise in the remittance share of GDP is associated with a 22.6% decrease in the poverty gap ratio and a 16% decrease in the poverty severity ratio. Thus, the authors deemed international remittance inflows critical in Asia's endeavors to lift people out of poverty.

For the Philippines in particular, research indicates that remittances contribute significantly to poverty reduction. Bird (2009) reports that remittances have reduced the national headcount poverty rate by at least five percentage points. Ducanes & Abella (2008b), Ducanes (2015), and Pernia (2008) show that the gain of an overseas worker considerably raises a poor household's chance of moving out of poverty. Yang & Martinez (2005) demonstrate that the Philippine peso depreciation due to the 1997 Asian financial crisis, which led to increases in household remittance receipts, was associated with reductions in poverty in migrants' origin households but had no definitive impact on inequality. On the other hand, Garcia et al. (2022) in a regional-level analysis found the relationship between migration and poverty to have a low significance level.

In addition to its poverty-alleviating potential, migration has also been shown to affect household consumption and investment. The empirical literature reports diverse and often conflicting findings. There is evidence that remittances are mostly being spent on immediate consumption and necessary goods in low- and lower-middle-income countries (Adams & Page, 2005; Taylor et al., 2005). Calzado (2007) argues that for households that rely on remittances for survival, the basic necessities are the logical destination of remittances. However, in the Philippines, two studies found that migration is negatively associated with the share of food consumption in total spending (Ang et al., 2009; Tabuga, 2007). The most observed relationship, on the other hand, is between migration/remittances and investment-type expenditure items, such as education, medical care, durable goods and equipment, and housing. Bird (2009), Ducanes (2015), Yang (2008), Tabuga (2007), and others report significant positive effects of their migration measure of choice on these spending categories in the Philippines. Ang et al. (2009) theorize that recipient households consider remittances as transitory income and therefore invest a larger share of remittance receipts than other household earnings into real estate, land, durable goods, or human capital development (health and education). However, in their own analysis, the authors found no positive influence of remittances on education and health spending.

Having a migrant worker abroad has also been demonstrated to influence households' income and labor supply. The literature on this matter is quite polarized. On the one hand, remittances may act as a 'moral hazard', causing recipients to be less active in the labor market. This phenomenon has been referred to as the 'complacency effect' or 'leisure effect' of remittances, in which case a negative effect on household domestic wages and salaries and on hours worked by family members (Ducanes & Abella, 2008a; Pernia, 2008; Cabegin, 2006; Lloyd-Sherlock, 2006). However, that is not always the case, e.g., Mu & van de Walle (2011) reported that the migration of a household member contributed to an increased labor supply of female residents remaining behind, in particular, to farm work. Similarly, Shrestha (2017) found that in Nepal, an increase in village migration rates of 10 pp. increases wages by 25%, and labor force participation by 4 pp. Income from entrepreneurial activities is another ambiguous category, where some (e.g., Yang, 2008) document a significant positive effect, while others (e.g., OECD/Scalabrini Migration Center, 2017; Ducanes, 2015; Bird, 2009) do not find any significant association between migration/remittances and business ownership or self-employment in the Philippines.

When studying the effects of overseas migration and remittances, an important consideration is that, if the country is facing out-migration of skilled professionals or 'brain drain' – which has been the case with the Philippines in the last two decades – there is potential for the inflow of remittances to decline. This dynamic has been reported by several influential studies in different country contexts (Faini, 2007; Niimi et al., 2011). The intuition is that, while skilled workers tend to have higher incomes, they also tend to stay in their host countries longer and are more likely to reunite with their close family there, which is why they may be less likely to remit or may remit less if they do. However, other studies found that migrants' education has no impact on the likelihood of sending remittances, but a positive effect on the amount of money sent, conditional on remitting (Bredtmann et al., 2019; Bollard et al., 2011). Furthermore, in the case of the Philippines, Mendoza (2013) employed the data from the Survey of Overseas Filipinos and reported that remittances appear to be increasing with more high-skilled migration.

The studies mentioned above that bear the most relevance to mine are summarized in *Appendix I.* It may be puzzling how diverse and often contradictory the evidence from the literature is, especially given that most studies on the Philippines used the same data source – the official statistics published by the Philippines Statistics Authority – and, in most cases, a

roughly similar time frame. Naturally, different estimation strategies produced different results. An alternative explanation is that, depending on the level of data aggregation, the studies captured the effects of migration at different levels – individuals, households, villages, and regions. In most cases, the household effects were quite pronounced, and migration was found to significantly affect many outcomes of interest, including total and per capita income and expenditure (e.g., Ducanes, 2015; Bird, 2009; Pernia, 2008).

However, in studies that aggregated the raw data at village or regional level, the effects of migration/remittances appear to be less pronounced or insignificant for most outcomes of interest (e.g., Garcia et al., 2022; Yang & Martinez, 2006; De Brauw & Giles, 2018). It is to be expected, because remittances accrue directly to families with migrant members, while households that do not receive remittances mostly benefit from these transfers indirectly, through spillovers (Ang et al., 2009). Nevertheless, Ducanes (2015) argues that valuable inference can be drawn from studying how overseas workers and remittances affect community-level outcomes, for instance, at the district or municipal levels.

To the best of my knowledge, in the existing literature on the migration–household welfare nexus in the Philippines, the unit of observation has been either an individual, a household, or a region. However, in 2003, the PSA introduced a Primary Statistical Unit (PSU) as the smallest unit of household-level statistics aggregation. The National Master Sample is comprised of about 2,900 PSUs, which is far more disaggregated than regional data used, for example, by Pernia (2008) and Pajaron et al. (2020). On the other hand, it is far more aggregated than household-level data, with every PSU consisting of 100-400 households. Therefore, the PSU classification can be an ideal way to capture the effects of migration at the level of local communities, rather than households or regions.

While the local community effects remain essentially unexplored, they may have important policy implications for the Philippines as a labor-sending state, considering that the country's government prioritizes having a holistic migration policy framework that operates efficiently at all levels of governance, from supranational to local (Lee, 2016; Orbeta & Abrigo, 2011). An example of a policy implemented at the municipal or district level is the establishment of Migrant Resource Centres in origin areas which inform potential migrants about the recruitment process and costs (Hugo, 2009). Without properly understanding the effects of migration on communities left behind, migration policy cannot be optimally designed to amplify the positive and ameliorate the negative spillover effects of migration and

remittances. I address this lacuna in empirical literature by aggregating the PSA data on migration, family income, and expenditure at the PSU level to obtain unique estimates of the local community effects of labor migration from the Philippines. This exercise is largely exploratory, aimed at forming a general idea of the directions in which migration affects communities left behind, rather than obtaining precise estimates of the effects.

3. MIGRATION PROFILE

This section briefly describes the profile of overseas Filipino workers and how it has evolved over time, using data from the Philippine National Statistics Office. It does not include seafarers because they are subject to a different branch of emigration legislation and labor law in the Philippines than land-based workers (Hugo, 2009; Calzado, 2007). Besides, the Survey on Overseas Filipinos does not include information on sea-based workers. Any referrals to OFWs implicitly mean land-based workers. For further research, though, it could be interesting to explore the effects of migration (or migration regulations) of Filipino seafarers on the economic outcomes of families left behind.

Figure 3 presents the numbers of deployed overseas Filipino workers by major world groupings from 1996 to 2014. The data is compiled by PSA based on reports from POEA's Labor Assistance Center on the actual departure of OFWs at international airports (Philippine Statistics Authority, 2015). The graph demonstrates how, within the 1996-2014 period, labor migration flows from the Philippines to all destinations increased threefold. The most rapid growth took place in 2003-2012. Since the beginning of the 21st century, the Philippines has had labor migrants in every corner of the world (Calzado, 2007).

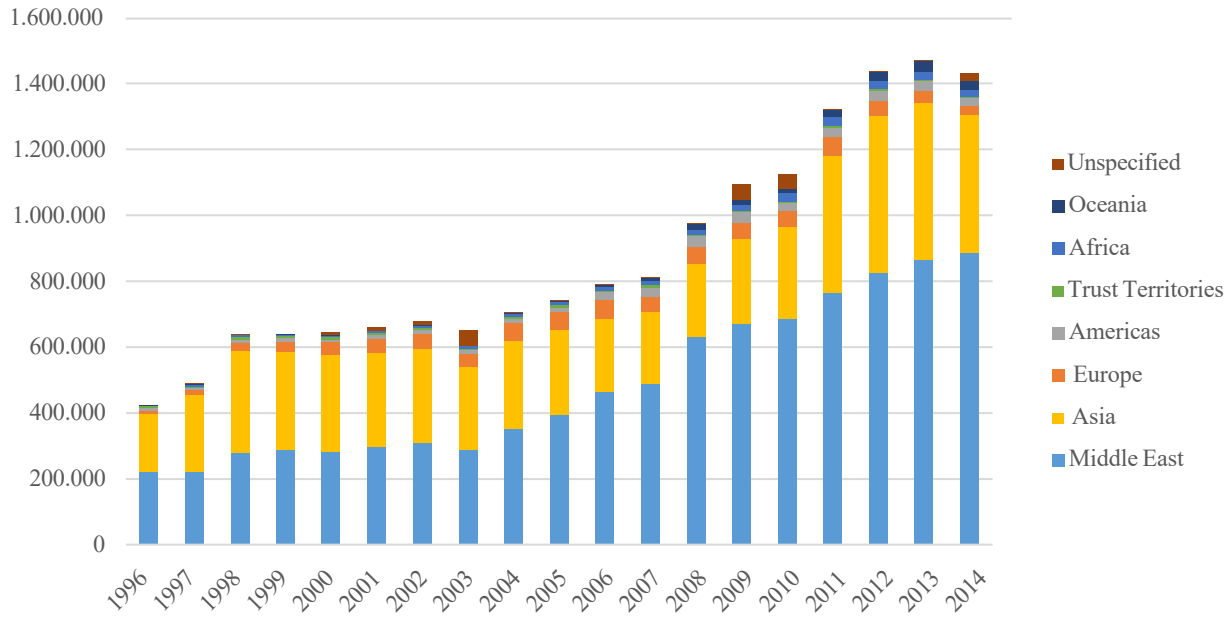
At the regional level, before 2003, the Middle East and Asia jointly accounted for about 82% of total OFW deployment (Rodriguez, 2011). From 2004, migration flows to the Middle East started rapidly growing in absolute and relative terms, and by 2014 the number of Filipino work migrants in the region was four times larger than in 1996. So, since 2004, Middle Eastern countries continued to be the leading destination of OFWs, and in 2014, the Middle East alone hosted 62% of overseas Filipino workers. At the same time, the occupational profile of Filipino migrants in the region changed a lot. The first surge in migration towards gulf countries back in the 1970s was in response to oil industry expansion that created thousands of jobs in heavy construction and drilling filled by – predominantly male – Filipino workers (Orbeta & Abrigo, 2011). But since the 1980s and until the present day, the rapid expansion of the service industry has been attracting female Filipino workers, thereby changing both sectoral and gender composition of migration flows to the Middle East (Willis, 2022).

Migration to Asia, on the other hand, saw the first substantial increase after the financial crisis of 1997. Then it remained at a steady level until 2010 – with a small dip around the global

financial crisis of 2008. In 2011 migration to Asia jumped up 1.5 times compared to the year before, then grew even more, before returning to 2011 level in 2014.

Among other destinations, Europe started with just 2% of Filipino labor migration, then started growing until it reached about 7-8% in 2002 and remained at this level for a few years. Then it started declining again, by 2014 reaching its 1996 level of 2%. North and South America together started at the same level as Europe and remained roughly there throughout the observed period. As for Africa, in 1996 it hosted less than 1% of overseas Filipinos; then in 2003-2004, the flows to the continent doubled and then remained around 1.6% until 2014. Labor migration to Oceania was practically non-existent until 2006, then it started growing, and by 2014 Oceania even surpassed Europe as a destination.

Figure 3 - Deployed land-based overseas Filipino workers by major world groupings, 1996 to 2014



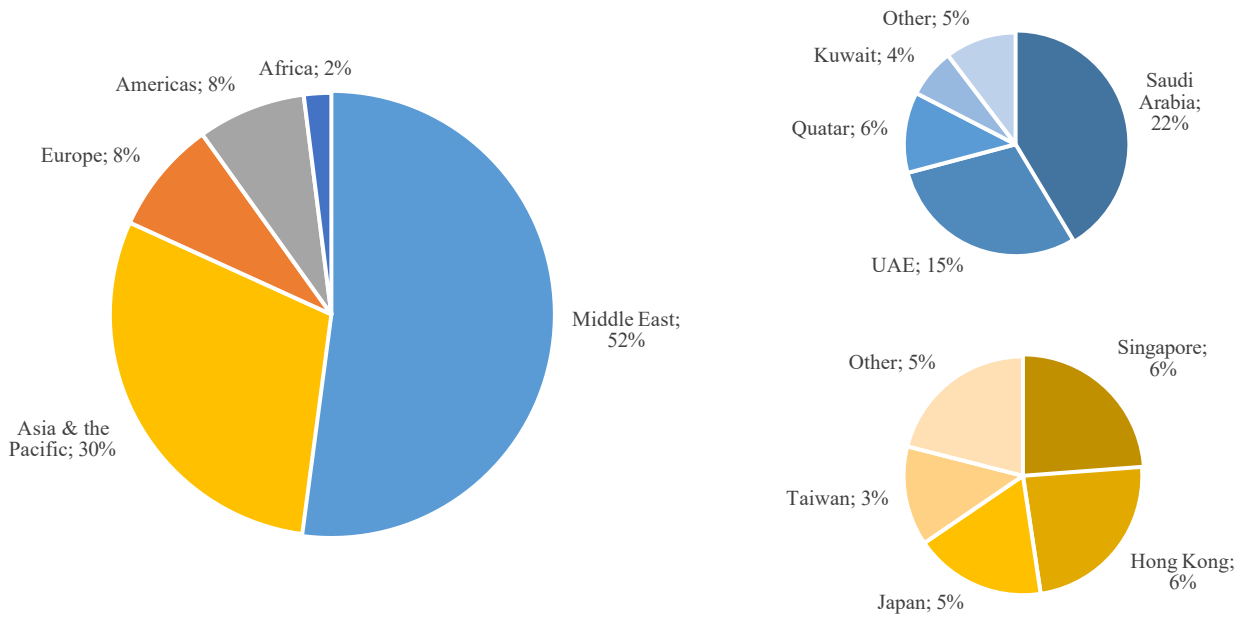
Source: Philippine Statistics Authority, 2015.

At the country level, there are some extremely prominent destinations. *Figure 4* shows the distribution of OFWs by world region and country in 2009; the individual shares of all countries displayed on the graphs remained roughly the same until 2015. During the observed period, almost one in every four OFWs worked in Saudi Arabia. The Philippine government has long prioritized this destination, as it hosts up to 700,000 Filipino workers of all skill levels annually (Rodriguez, 2011; De Layola, 2023). The relationship between the two states

regarding Filipino workers' rights and obligations in Saudi Arabia has been turbulent, with both sides issuing deployment bans that sometimes lasted for years (see *Appendix II*).

The second destination in the world for Filipino jobseekers after Saudi Arabia is the United Arab Emirates, attracting about 16% of overseas Filipinos annually (Guéraiche, 2016). The sectoral distribution of OFWs has changed significantly over the years. In 1993, there were 15 thousand Filipinos in the UAE, two-thirds of whom worked in unskilled or semi-skilled positions in the services industry, mostly as domestic helpers, thereby comprising more than half of the local Filipino workforce (Guéraiche, 2016). The rapid development of the service industry in the UAE altered this dynamic. Domestic helpers remained a prominent category, but their share declined a lot compared to other occupations – engineering, tourism, customer service, health and medical services, and marketing and advertising (Jimenez, 2021). Presently, educated Filipino migrants comprise more than half of the total OFW population in the United Arab Emirates, while domestic helpers account for only 10% of all occupations (Khalil, 2021; Guéraiche, 2016).

Figure 4 - Percentage Distribution of Overseas Filipino Workers by Place of Work, 2009

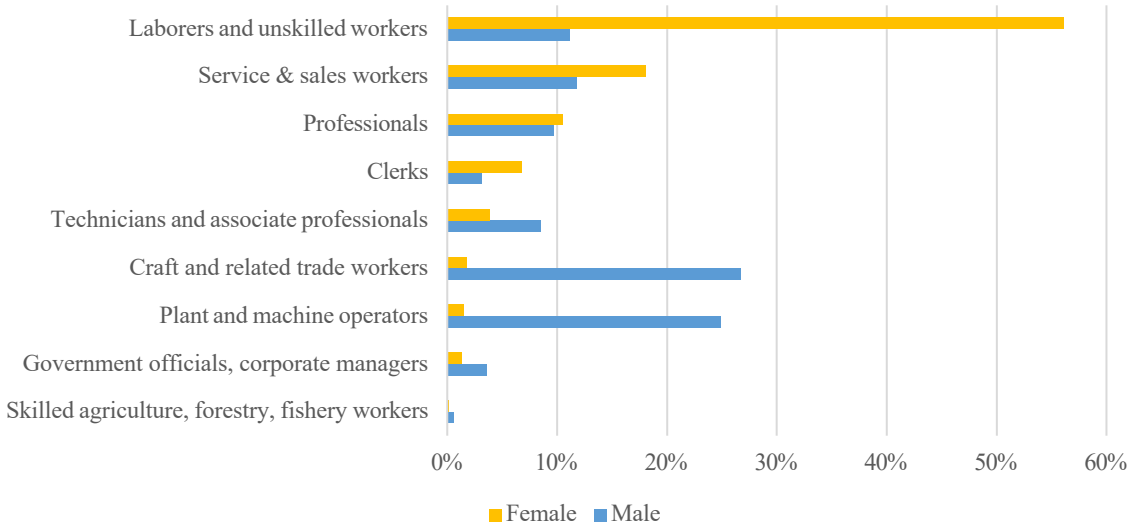


Source: Philippine Statistics Authority, 2009a.

As for the occupational structure of the migrant population, in the observed period, OFWs who were laborers or unskilled workers (such as sales and services, elementary workers, laborers in mining, construction, manufacturing, transport, agricultural, forestry, fishery and

related laborers), comprised about two-thirds of the total OFWs (Bird, 2009; Philippine Statistics Authority, 2009a). The categories of trade and related workers, service and sales workers, and plant and machine operators and assemblers comprised about 15% of overseas workers each. Workers' occupation choices appear to be highly gendered, with elementary workers being overwhelmingly female vs. craft, trade, and factory workers being almost exclusively male (*Figure 5*).

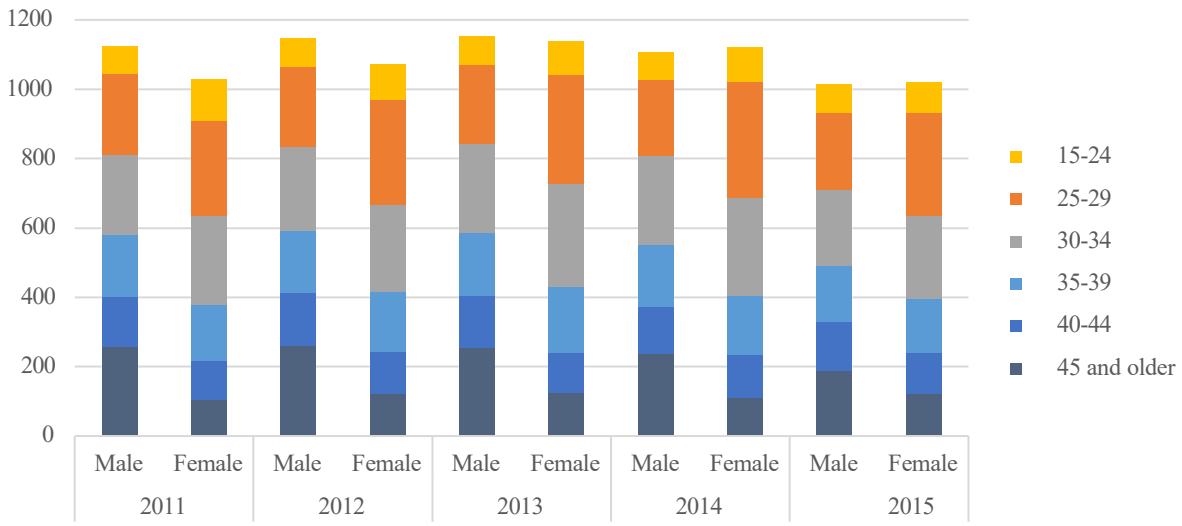
Figure 5 - Percentage Distribution of Overseas Filipino Workers by Major Occupation Group and Sex, 2009



Source: Philippine Statistics Authority, 2009a.

Throughout the observed period, the share of female OFWs was slowly but steadily increasing (*Figure 6*). By 2015, there were more females than males among the OFWs, with the former comprising 51.1% of the total OFWs (compared to 48.8% in 2011). The female overseas workers were on average younger than the males. The age group 25 to 39 years was consistently larger among female OFWs than their male counterparts, with about 10 pp. difference. From 2011 through 2015, the share of this age category slightly increased, reaching 59.4% and 68% for men and women respectively. Overseas workers aged 45 and above were men more than twice as often as women in 2011; however, by 2015, their share fell under 20% among males and 12% among females. The age group that saw the biggest decline among female OFWs was the youngest – 15 to 25 years old – and in the observed period it declined from 12% to 8%, so now it equaled the share among men.

Figure 6 - Number of overseas Filipino workers by age group and by sex, 2011 to 2015



Source: Philippine Statistics Authority, 2015.

4. DATA DESCRIPTION

The empirical analysis uses data from three linked household surveys conducted by the National Statistics Office of the Philippine government, covering a nationally representative household sample: the Labour Force Survey (LFS), the Survey on Overseas Filipinos (SOF), and the Family Income and Expenditure Survey (FIES).

The LFS is administered quarterly to inhabitants of a rotating panel of dwellings in January, April, July, and October, and the other three surveys are administered with lower frequency as riders to the LFS (Yang, 2008). For information about the general characteristics of the surveys, see *Table 1*.

Table 1 – Summary of household surveys used in the study

Survey		Frequency	Years	OFW	Obs / Wave
Labour Force Survey	LFS	Monthly	1991-2021	yes	≈ 45000
Survey on Overseas Filipinos	SOF	Annual	1993-2021, some years missing	yes	≈ 4500
Family Income and Expenditure Survey	FIES	Triannual	1991-2021	no	≈ 45000
Labor Force Survey merged with FIES	FIES x LFS	Triannual	2003-2021, year 2012 is missing	yes	≈ 45000

Source: Philippine Statistics Authority database.

Concerning administering SOF to LFS respondents, the statistics office first identifies households that reported having an Overseas Filipino abroad in the last 6 months before the LFS survey. Then these households receive the SOF form, which asks about members of the household who left for overseas within the last five years (Philippines Statistics Authority, 2016).

4.1. Data aggregation and linking surveys

While the three surveys are, theoretically, linked, SOF and FIES are conducted during different waves of the LFS, therefore, they use different samples. In two lucky instances, there was a non-negligible overlap in LFS sample households due to delays in dwelling panel rotation; Yang (2008) and Ducanes (2015) seized these opportunities and managed to obtain household-level panels from PSA data. Yang (2008) explored how overseas members' economic shocks such as peso depreciation during the 1997 Asian financial crisis affected

household income, consumption, and labor supply, while Ducanes (2015) examined the effect of gaining/losing an overseas worker on certain household income and expenditure categories, as well as the household's placement along the income distribution. However, since the overlaps only existed for one or two years, both analyses were limited to studying short-term effects.

As an alternative approach to his, Ducanes (2015) suggested using the national census, which, like the LFS, has a variable that tags the OFW members of a household: "Examined over time (1990, 2000, 2007), and using other census information, this may yield valuable insights into how overseas workers and remittances have affected community-level outcomes; for instance, at the barangay (district) or municipal levels". While the census does have the advantage of having an immensely big and highly representative sample a.k.a. the population itself, it only covers the most essential questions and does not provide much insight into respondents' socio-economic welfare.

Still, I followed the intuition of Ducanes (2015) to explore how overseas workers have affected district-level outcomes. But instead of using the census, I focused on linking the three surveys by aggregating the household data at the lowest possible classification level, to preserve the sample size and variation to the highest possible extent. In the case of the Philippines statistics nomenclature, the primary sampling unit (PSU) is the district or barangay with about 100 to 400 households (Philippines Statistics Authority, 2016). From all relevant PSA data, I identified the two years when the PSU classification was perfectly consistent – 2009 and 2015. In *Appendix III* I justify the choices made in this regard. All variables are taken as averages over the households in a given PSU.

4.2. Selection of variables

To construct the main regressor – average migration rates per PSU – I used the dummy in the Labor Force Survey indicating if a household has an Overseas Filipino Worker. Note that while using the full LFS sample would have been ideal, the PSU codes followed an entirely different system than in SOF or FIES, so that only a subset of the LFS sample could be merged. The version that I could match by PSU was the publicly available FIES-LFS merge, which had as many observations as any FIES, around 45,000 – much less than in the LFS, but still a large

and representative sample. This overseas worker dummy then allowed to compute the percentage of households that had a Filipino working abroad for each PSU.

Concerning the outcome variables, FIES has a rich selection of household income and expenditure indicators. The outcomes used in this study are the following:

- Eight income indicators: total income, salaries and wages, agricultural income, non-agricultural income, income from entrepreneurial activities, total receipts, receipts from abroad, and receipts from domestic sources.
- Seven expenditure indicators: total expenditure, expenditure on food, non-food, education, health, durable goods and equipment, and housing and utilities (water, gas, electricity, etc.).

Their descriptive statistics are presented in *Appendix IV*. The outcomes that have been selected appeared in similar studies on the economic effects of migration and migrants' earnings in different Southeast Asian countries (e.g., Yang, 2008; de Brauw & Giles, 2018; Viet Cuong & Mont, 2012). Altogether, they provide a comprehensive overview of the core elements of household income and expenditure structure, which allows to explore different facets of how migration affects local communities of recipient families. All household outcomes are continuous variables. Most of them have undergone a logarithmic transformation because their original distributions were significantly skewed to the left. *Appendix V* presents frequency plots for all outcomes before and after taking logarithms.

Evidently, there is a large variation among the sampled households within each income and expenditure category. On average, non-agricultural income sources by far exceed agricultural income. Earnings from entrepreneurial activity represent a non-negligible part of total family income. As for household spending, food and non-food expenditures are comparable in volume in the first three quartiles of distribution; however, food spending caps at a much lower level than non-food expenditure, which is consistent with macroeconomic theory. Among more specific non-food spending categories, housing and utilities account for twice as much as education, health, and durable goods altogether.

Besides migration rates, I identify other factors that could potentially impact household earnings and spending, thereby acting as observed covariates. First, the economic impact of migration may depend on characteristics of migrants such as sex, age, marital status, and level of educational attainment. Several relevant empirical studies deemed these characteristics of

migrants important for their and their families' economic behavior (e.g., de Brauw & Giles, 2018; Viet Cuong & Mont, 2012; Shrestha, 2017). Descriptive statistics for migrant characteristics are shown in *Table 2*.

Table 2 – Summary statistics of migrant controls in 2015

	Min.	1st quartile	Median	Mean	3rd quartile	Max
Sex (1 Female)	0.00	0.25	0.50	0.54	1.00	1.00
Age	17.00	31.00	35.83	36.56	41.00	81.00
Marital status (1 Married)	0.00	0.30	0.5714	0.5667	1.00	1.00
Education level (0-5)	0.00	3.00	3.25	3.23	3.667	4.333

Notes. Source: author's own estimations. Metadata is presented in *Appendix VIII*.

In the sample, female overseas workers outnumber their male counterparts by about 4%, which corresponds to the official statistics reported in the "Migration Profile" section. Migrants' age distribution is widely dispersed, but an average migrant in the sample is in their 30s, which aligns with the common perception that foreign employers prefer experienced but relatively young workers (Ducanes, 2015). Furthermore, the bulk of OFWs in the sample are married. The average level of migrants' educational attainment is a high school/post-secondary non-tertiary/technical-vocational graduate, which is reflected in the skill and occupational structure of the OFW population (*Figure 5*).

Second, the characteristics of the household head may also affect the economic outcomes of having a migrant overseas for the household. In addition to the same socio-demographic characteristics as of the migrant, household controls include dummies for whether the household head and his/her spouse are employed or run a business *(Table 3*). Additionally, following Yang (2008), Kangmennaang et al. (2017), and Shrestha (2017), I use three controls that proxy the primary economic characteristics of a household: its size, income per capita, and position in the regional income distribution (regional per capita income decile).

Table 3 – Summary statistics of household controls

	Min.	1st quartile	Median	Mean	3rd quartile	Max
Sex (1 Female)	0.00	0.14	0.22	0.24	0.32	0.83
Age	32.00	49.06	51.95	52.03	55.00	72.67
Marital status (1 Married)	0.00	0.65	0.75	0.74	0.83	1.00
Education level (0-5)	0.11	1.53	2.00	1.97	2.44	3.61
H. head has a job	0.00	0.71	0.81	0.79	0.89	1.00
Spouse has a job	0.00	0.30	0.41	0.41	0.52	1.00
Household size	2.00	4.08	4.53	4.59	5.04	7.88
H. income p.c.	13004	43275	61557	70225	86137	575304

Regional income decile	1.22	4.67	5.08	5.06	6.82	9.74

Notes. Source: author's own estimations. Metadata is presented in *Appendix VIII.*

Only a quarter of households in the sample have a female head. The household heads are on average in their early 50s and likely married. They tend to be less educated than migrants, with the average educational attainment of a secondary graduate, or a high school/post-secondary non-tertiary/technical-vocational undergraduate. In 79% of households, the head is employed or has a business; for the head's spouse, this share is 41%. An average household has about 5 members. Average household income per capita varies greatly across the sample. In the literature, this variable has often been used as an outcome to proxy for poverty incidence and severity (Ducanes, 2015; Garcia et al., 2022). However, numerous studies focused specifically on household income and expenditure mostly employed it as a control to account for endogeneity and migrant self-selectivity, which is the approach I follow (Yang, 2008; Viet Cuong & Mont, 2012; de Brauw & Giles, 2018).

Lastly, I include a vector of controls that capture regional income and infrastructure characteristics: average annual household income and savings, Gini coefficient poverty gap, number of hospitals, road density, and labor force participation rate. The data is presented in *Appendix VI*. All indicators vary considerably across regions and can be useful for addressing endogeneity and migrant selectivity concerns. That was the strategy employed by Pajoran et al. (2020) and Cortes (2013), who also worked with the household-level PSA data aggregated over some larger statistical unit, in their case a region. I further elaborate on the usefulness of regional controls in this study in the "Methodology" section.

From the list of all potential regressors, I selected those for which correlations with other independent variables did not exceed 0.4 in absolute terms, to prevent the lack of unique information about the regression model (see *Appendix VII* for a full matrix of pairwise correlations). For this study, most of the control variables from SOF and FIES have been recoded compared to the original survey data. The metadata – original and recoded – for all migrant and household controls is presented in *Appendix VIII.*

5. METHODOLOGY

5.1. Baseline model formulation

Building upon the theoretical and conceptual frameworks outlined above and conditional on data availability, I formulate the following baseline model to examine the impact of migration on household income and expenditure:

$$Y_{it} = \beta 0 + \beta 1\ OFW_{it} + \beta 2\ X_{it} + \beta 2\ M_{it} + \beta 2\ H_{it} + \beta 3\ R_{i,\ 2015} + u_{it} \quad (1)$$

where Y_{it} is the average household outcome in ith PSU in year t and OFW_{it} pertains to the migration rate in ith PSU in year t. The primary economic characteristics of households averaged per PSU – their size, income per capita, and position in the regional income distribution – are represented by X_{it}. Vectors M_{it} and H_{it} comprise socio-demographic characteristics – sex, age, marital status, and educational attainment – of migrants and household heads respectively. In addition, H_{it} includes the employment status of the household head and his/her spouse. All three vectors are composed of household-level data averaged at the PSU level.

$R_{i,\ 2015}$ denotes a vector of 2015 regional income and infrastructure characteristics (average annual household income and savings, Gini coefficient poverty gap, number of hospitals, road density, and labor force participation rate); and u_{it} is the structural error term.

The baseline model in Equation (1) is estimated using Ordinary Least Squares, first without any controls, then adding the four control vectors one by one. Since my estimates are likely to suffer from heteroscedasticity, I test for it – graphically and using the Breush-Pagan test (see *Appendix IX* for the chart of residuals vs. fitted values, the chart of standardized residuals, and the test output). Heteroskedasticity reveals itself both visually – in the curvature of the regression line and the distribution of observations along the X-axis – and through the very small p-value of the Breusch-Pagan test. Therefore, I employ a heteroskedasticity-consistent variance-covariance matrix estimations and report Huber-White standard errors in this and all subsequent estimations (White, 1982).

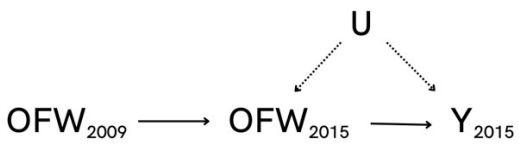
Naturally, outcomes of estimating a simple OLS model – even with a wide array of migrant and household controls – cannot be interpreted as a causal impact of migration. One

of the main concerns is that PSUs with a higher concentration of migrants are likely to be different from those with low or non-existent migration. It is an axiom in migration literature that people self-select into migration for many reasons, some of which are directly related to the very outcomes being studied (Viet Cuong & Mont, 2012). As Hoddinott (1994) argues, the migration decision can be seen as a utility maximization problem solved by the prospective migrant and other household members. Lauby and Stark (1988), in a similar fashion, state that migrants are affected by all kinds of constraints – "in particular, by the needs and resources of their families".

Therefore, migrants and resultingly remittances are not randomly distributed across households (Duman, 2022).

This can be demonstrated through a Directed Acyclic Graph (DAG) in *Figure 7*. All arguments in the DAG are made implicitly conditional on measured covariates (C) pertaining to observed migrant and household characteristics. In this thesis, I am interested in the causal effect of PSU-level migration rates in 2015 (OFW_{2015}) on a given household outcome (Y), subject to confounding by unmeasured socio-economic behavior (U). This behavior can manifest itself both in migration decisions and in all other economic choices – from labor supply to consumption and investment, etc. Are people in a given PSU more entrepreneurial and likely to take upon higher-risk and higher-reward jobs and businesses, both in their home country and overseas? Are they mostly engaged in subsistence agriculture or high-volume international trade operations (if this PSU happens to be a big port city)? Countless unobserved mechanisms like this populate the open backdoor path between OFW_{2015} and Y: $OFW_{2015} \leftarrow U \rightarrow Y$. So, when OLS is employed, even controlling for the observable characteristics of migrants and households (C) cannot satisfy the backdoor criterion (Cunningham, 2021).

Figure 7 – Directed Acyclic Graph of the empirical model



Source: constructed by the author.

A common way to proceed from an OLS model that is likely plagued by endogeneity is by applying panel data estimation techniques that allow to exploit changes within units over

time to tackle unobserved time-invariant heterogeneity, which may effectively reduce the risk of confounding (Allison, 2009; Wooldridge, 2010; Leszczensky & Wolbring, 2022). My dataset is a micro-level panel dataset with a large sample size, but only two points in time – 2009 and 2015. Hence, it is possible to make use of the time dimension *t* in *Equation 1* via the pooled OLS model, which maps the outcome Y_{it} as an additive linear function of the time-varying variables OFW_{it}, X_{it}, M_{it}, and H_{it}, a vector of 2015 regional controls $R_{i,\,2015}$, and an error term u_{it}. Unbiased and consistent estimation is achieved if the structural error term is contemporaneously exogenous, i.e., only if the model adequately captures all variables that simultaneously affect migration and household income or expenditure (Brüderl & Ludwig, 2015). However, I just demonstrated on the DAG above how this strong assumption is likely to be violated, therefore putting the pooled OLS estimates at risk of severe bias due to unmeasured unit-specific confounders. Nevertheless, I do report pooled OLS results, but as a way to maintain methodological order, rather than to derive causal inferences.

The next natural step in the case of panel data would be to mitigate the uncontrolled influences of unit-specific confounders using the Fixed Effects approach. This approach decomposes the error term u_{it} into a unit-specific part and an idiosyncratic part, allowing the former to be correlated with the independent variables (Leszczensky & Wolbring, 2022). The unit-specific error term then fully captures all time-invariant unobserved heterogeneity, leading to unbiased estimates. However, while effectively handling unobserved heterogeneity, the FE model still rests on the assumption of strict exogeneity, which is unfeasible if migration is the main regressor (Reed, 2015; Bellemare et al., 2017; Viet Cuong & Mont, 2012). And, having a micro-panel dataset, the FE approach could not be applied anyway because the resulting within-transformed model is empty. Therefore, a solution for endogeneity had to be found outside of panel data estimation techniques.

5.2. Instrumental Variable as a remedy for endogeneity

The strategy I eventually used to tackle this issue of the main regressor – OFW_{2015} – being endogenously determined is to instrument the PSU-level migration of 2015 with migration rates of the same PSUs observed in 2009. Historical migration rates have been used as an instrument in several research papers considering the effects of Filipino labor migration on the welfare of households left behind which I built upon in this study (Shrestha, 2017;

Pajaron et al., 2020; Cortes, 2013). Migration literature at large argues that it reflects regional and local socio-economic networks developed between migrants and their relatives and friends at home (Lokshin et al., 2010). Such networks facilitate present labor migration by lowering its costs via providing information about overseas employment opportunities, assistance with securing jobs, relocation, housing search, etc. (Munshi, 2003; McKenzie & Rapoport, 2011; Hu, 2013; Botezat & Pfeiffer, 2014; Cortes, 2013).

Taylor et al. (2005) argue that, especially in the case of international migration, which usually entails high transportation and entry costs and risks, remittances have a larger poverty-reducing effect as the share of households with access to remittance income increases. In a survey conducted in the Philippines in 2004, two-thirds of people who were preparing to migrate for the first time reported knowing a friend or relative in their destination country (Philippine Migrants Rights Watch, 2005). Notice that, since it was not possible to obtain PSU-level historical migration rates before 2009, I do not have an instrument for this year. Therefore, within the whole IV framework, I am using the 2015 cross-sectional data.

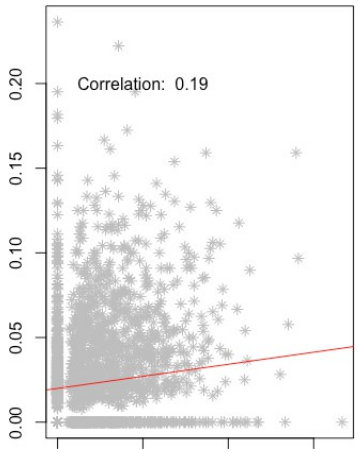
Revisiting the DAG above, we can see that the only pathway from OFW_{2009} to Y is mediated via OFW_{2015}, which illustrates two crucial features of OFW_{2009} as an instrumental variable (hereinafter IV). First, if the conjectures about migration networks from the previous paragraph are true, it likely induces a considerable amount of variation in OFW_{2015}. Second, it may not affect the outcome Y other than through its influence on OFW_{2015}. Let me ponder over these assumptions a little longer.

The graph depicts OFW_{2009} as independent from U since OFW_{2015} acts as a collider along the $OFW_{2009} \rightarrow OFW_{2015} \leftarrow U$ path. That is the "exclusion restriction" of an IV estimator, which assumes that OFW_{2009} is independent of the variables that determine Y except for OFW_{2015}.

However, the exclusion restriction is only a necessary condition for IV to work; it is not a sufficient condition. The instrument OFW_{2009} also needs to be a relevant explanatory variable for the endogenous regressor OFW_{2015}. *Figure 8* demonstrates the correlation between past and present migration rates. A correlation of 0.19 is not extremely strong, but not negligible either. In any case, as long as the instrument is shown to have a significant effect on present-time migration in the first stage of 2SLS, it should be strong enough for identification (Cunningham, 2021). As for the second stage, OFW_{2009} should be correlated with Y through –

and only through - OFW_{2015}'s effect on Y, because, once again, OFW_{2015} is a collider along the path $OFW_{2009} \rightarrow OFW_{2015} \leftarrow U \rightarrow Y$.

Figure 8 – Correlation between migration rates in 2009 (Y-axis) and 2015 (X-axis)



Source: constructed by the author.

The two-stage least squares (2SLS) model is as follows:

$$Yi = \beta 0 + \beta 1 \widehat{OFW}i + \beta 2\, Xi + \beta 2\, Mi + \beta 2\, Hi + \beta 3\, Rj + ui \quad (2)$$

$$OFWi = \gamma 0 + \gamma 1\, OFW_{hist}i + \gamma 2\, Xi + \gamma 3\, Mi + \gamma 4\, Hi + \gamma 5\, Rj + \varepsilon i \quad (3)$$

where $OFW_{hist}i$ is the historical migration rate in ith PSU in 2009. The rest of the variables are similar to those in the baseline specification. Estimating the first stage in Equation (3) produces fitted values of the endogenous regressor OFW_{2015} that are used as an input in the second stage in Equation (2). These fitted values $\widehat{OFW}i$ are based on all variables used in the model, including the instrument $OFW_{hist}i$. And, as all these variables are exogenous in the original model, in the main stage I am using only the variation in present migration that is exogenous.

Concerning the 2SLS model, the assumptions can be formulated as follows:

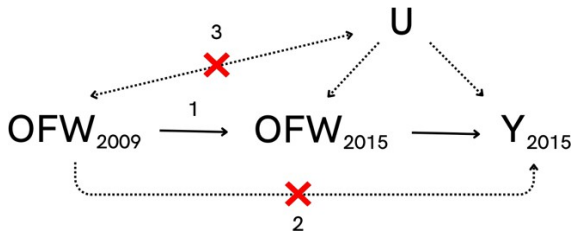
1) Exclusion restriction entails that $Corr(OFWhist_t, ui) = 0$, and

2) Relevance assumption (also known as the non-zero first stage) requires that $Cov(OFWhist_t, OFW) \neq 0$, or that $\gamma 1 \neq 0$ (Wooldridge, 2015; Singh et al., 2017).

Often in the literature, the exclusion restriction entails that IVs are both related to the outcome only through the treatment and independent of unmeasured covariates. However,

some recent studies separate the latter assumption into the third condition of Independence (Danieli et al., 2022; Orihara, 2022; Shi et al., 2020; Keele et al., 2020). I demonstrate the three conditions on the updated DAG (see *Figure 9* below).

Figure 9 – 2SLS model assumptions



Source: constructed by the author.

The 2SLS model setup can be summarized as follows. First, I assume that the historical migration networks of 2009 caused people who live in the same locations to migrate for work in 2015. That is independent of unobserved present characteristics of migrants and households and of the structural error term u_i. Second, the historical migration networks of 2009 are not associated with the economic outcomes of interest, except through present-day migration flows. Third, they are not associated with any unobserved determinants of household incomes and expenditures in 2015. If all three assumptions hold in the data, the problem of endogeneity due to unobserved confounding will be ameliorated. Then the 2SLS results should be consistent and the efficiency loss held to a minimum by reducing bias and the root mean square error (RMSE) relative to OLS for common ranges of parameter values (Reed, 2015; Singh et al., 2017).

5.3. Methodological concerns of IV validity

To prove that endogeneity is a real concern to begin with, I use Hausman's test (also known as the Hausman Specification test or Durbin, Hausman, and Wu Test). It allows to test the exogeneity of regressors and determine if it is necessary to use an instrumental variables method (2SLS) rather than a more efficient OLS estimation (Wooldridge, 2002; Angrist and Pischke, 2014; Maciejewski & Brookhart, 2019). While this diagnostic is only valid asymptotically, which may be a problem in small samples, it should not be a concern in this

study (the 2SLS is performed on 1858 observations). The Wu-Hausman test does not indicate, however, whether the instrument is valid, i.e., if both assumptions hold.

Fortunately, the relevance assumption is immediately testable using observational data (Keele et al., 2020). One way is looking at the significance of $\gamma 1$ in the first stage estimation. If the coefficient is significant – and, ideally, positive, as we argue in favor of historical migration networks facilitating present migration – then the instrument is relevant. Another important consideration is for the entire model to have enough explanatory power, i.e., account for a good share of variance in the present migration rate because only this exogenous variation will be carried over to the second stage.

Another way to prove the relevance of my instrument is via the Weak Instruments diagnostics of the second stage. A rule of thumb proposed in the literature is that the weak instruments problem is a non-issue if the F statistic of the regression in the reduced form equation exceeds 10 (Hahn & Hausman, 2003; Singh et al., 2017). If my model does not pass, it means that historical migration as an instrument has a low correlation with the endogenous explanatory variable – present migration. This could result in a larger variance in the coefficient and severe finite-sample bias.

The true challenge, however, lies in proving that the exclusion restriction and the independence assumption hold. In cases when there are more instruments than endogenous regressors, an overidentifying restrictions test (also known as the Sargan test) can be used to test the null hypothesis that the instruments are jointly valid (Sargan, 1958). For instance, Cortes (2015) employs two instruments (even more, considering they are interacted with year dummies), so she can use the Sargan test of overidentifying restrictions. However, my 2SLS model is just identified, as it has exactly as many instruments as endogenous regressors. In that case, there is no way to test for IV validity (Baum et al., 2003; Singh et al., 2017).

The reason to be concerned with breaking the exclusion restriction and the independence assumption is that I am using a lagged endogenous regressor (migration rates of 2009) as an – arguably – exogenous instrument. The argument that is typically made in such cases is that, since lagged $x_{i,t-1}$ precedes x_{it} in time, the causality runs entirely from $x_{i,t-1}$ to x_{it}, and, since there is presumably a high degree of autocorrelation in x, $x_{i,t-1}$ should be a valid IV for x_{it} (Bellemare et al., 2017). However, just like any other IV, a lagged endogenous regressor $x_{i,\,t-1}$ only solves the problem of endogeneity between Y and x if $x_{i,t-1}$ satisfies the exclusion

restriction (no direct causal impact on the dependent variable), the independence condition (no effect of the unobserved covariates) and is a strong enough instrument (Reed, 2015).

In general, when confronted with the necessity to use lagged endogenous regressors as internal instruments, empirical researchers apply the Generalized Method of Moments (GMM), introduced by L. Hansen (1982). In fact, 2SLS is but a special case of the Generalized Method of Moments IV (IV-GMM) estimator (Baum, 2014). When the errors satisfy classical assumptions, in particular, homoscedasticity, IV-GMM and 2SLS are equivalent. However, in the presence of heteroskedasticity, the IV estimator is inefficient but consistent, and the standard estimated IV covariance matrix is inconsistent. Luckily, asymptotically correct inference is still possible, since I am using the Eicker–Huber–White "sandwich" variance-covariance matrix for the IV estimator when reporting standard errors (Baum et al., 2014). This method produces an estimated variance-covariance matrix that is robust to the presence of heteroskedasticity, which leaves endogeneity the only major concern.

One way of capturing the unobserved confounding between historical migration rates and present outcomes that have previously been employed in the literature on Filipino labor migration is to use regional controls. Pajaron et al. (2020) argue that one possible channel of exclusion restriction violation is that remittances sent by migrants in year *t-1* improved the economic situation and infrastructure in a given region, thereby affecting the outcomes of interest in year *t*. To account for these effects, following Pajaron et al. (2020) and Cortes (2013), I control for variables that measure regional infrastructure and income level (vector *Rj, 2015*).

Still, even with regional controls, my 2SLS model may not be completely immune to unobservable influences that bias the results. For instance, as Shrestha (2017) suggested, PSUs with a higher degree of entrepreneurial individuals may have developed migration networks early (in 2009), and also have better outcomes in 2015 – not necessarily due to the impact of migration. Alternatively, villages that consistently have low labor demand (due to the rough geography, or local political institutions) could have witnessed higher early migration in 2009 and also very different labor outcomes in 2015. To this end, he employs a Difference-in-Difference on two waves of village-level data on migration and poverty and then compares the results of DiD and IV. While that would have certainly been very beneficial for my analysis here, it was not an option. The reason is that there is no (publicly available) data on household income and expenditure at the PSU level before 2009 (see the section on matching surveys).

Therefore, the parallel trends assumption that is a cornerstone of the DiD design could not be proven.

Besides Shrestha (2017), several other studies faced the problem of addressing endogeneity when working with pooled cross-sectional migration data. I summarize the essentials of several relevant studies in a table format in *Appendix X*.

5.4. Falsification tests of IV validity

Not being able to find an alternative econometric methodology or any diagnostic test for IV endogeneity that would be applicable to my data in economic literature, I turned to another discipline where IV design is common, namely medicine and, in particular, epidemiology and health services research. Prominently, epidemiological and biomedical studies have adopted the IV method from economics. The motivation of scholars in the medical and economic fields to prove IV validity is alike: (i) because instrumental variable analyses are less precise, and (ii) because regulators and policymakers find it difficult to interpret conflicting evidence from IV method compared with conventional regression analyses (Keele et al., 2020; Sanderson et al., 2021). And, although one cannot escape relying on unverifiable assumptions when estimating causal effects with IV analyses, epidemiologists insist that falsification strategies are vital to "avoid settings that demonstrably violate a core condition for valid inference" (Labrecque & Swanson, 2018). So, it may be reasonable to bring what medical studies developed back to the economic field.

The way these studies approach the dilemma of inability to prove IV validity is through falsification tests. They are applied to provide evidence for the Exclusion restriction and the Independence assumptions; importantly, a falsification test cannot prove the assumptions hold, but it can provide decisive evidence when they fail (Keele et al., 2020; Davies et al., 2017).

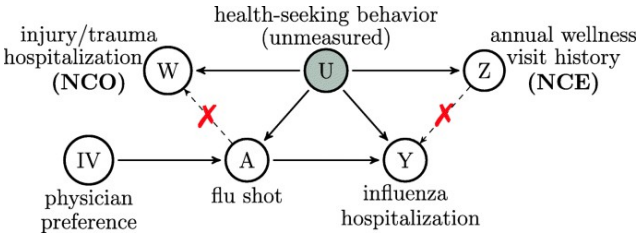
One type of falsification test uses a negative control outcome (NCO), which is a variable known not to be causally affected by the treatment of interest (Shi et al., 2020; Sanderson et al., 2020; Davies et al., 2017). A valid NCO must satisfy three conditions:

- It is determined before the exposure and outcome (in our case, the present levels of migration, income, and expenditure).

- It is likely to be subject to the same confounding as the exposure or outcome of interest.
- It has sufficient variation to have adequate power.

By using NCOs, the covariances between IVs and latent outcomes or unmeasured covariates can be detected all at once; non-zero covariances constitute compelling evidence of residual confounding bias and thereby prove the failure to meet both the exclusion and the independence restrictions (Shi et al., 2020; Sanderson et al., 2021). Conversely, the absence of such an association implies no empirical evidence of residual confounding bias (Orihara, 2022; Tchetgen, 2014). For instance, in a study about the impact of influenza vaccination on influenza hospitalization among the elderly, Jackson et al. (2006) used injury or trauma hospitalization as an NCO, because it cannot be causally affected by flu vaccination, but may be driven by the same confounding mechanisms as influenza hospitalization, such as similar health-seeking behaviors (*Figure 10*). The authors found that despite efforts to control for confounding, influenza vaccination appeared to reduce the risk of not only influenza hospitalization but also injury/trauma hospitalization. This was interpreted as an indication of bias due to inadequately controlled confounding (Shi et al., 2020; Jackson et al., 2006).

Figure 10 – Example of an NCO in epidemiology



Source: from Jackson et al. (2006).

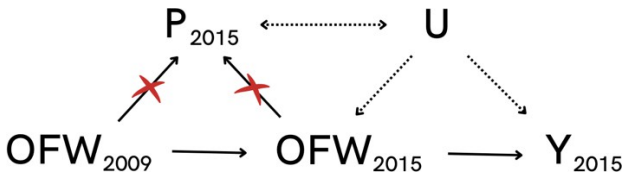
In my analysis, in line with the framework proposed by the influential paper by Davies et al. (2017), I employ the NCO in three different applications:

- Test if the IV is associated with the NCO. Such association can be tested using linear regression and, if present, indicates that there may be residual confounding and that assumptions 2) and 3) of the IV analysis have been violated. Naturally, if the historical migration rate is even a remotely suitable IV, it is unlikely to affect the NCO.
- Test if the endogenous regressor is associated with the NCO. Same as the previous one, it can be tested with an OLS, and the same interpretation of the results applies.

- Test if the regressor is still associated with the NCO if I employ 2SLS and use only the exogenous variation from IV and observed covariates. If the association becomes insignificant, the simplest explanation is that the conventional regression analysis suffers from residual confounding and the 2SLS does not. In other words, in that case, historical migration as an instrument is not associated with potential confounders and has more potential to be valid.

Given the required conditions for a valid NCO and the data availability constraints, my NCO of choice was $PENSION_{it}$ – total pension and retirement benefits received by a household, aggregated at the PSU level. The positioning of the NCO concerning the IV model elements is demonstrated in *Figure 11*.

Figure 11 – Pensions as a Negative Control Outcome



Source: constructed by the author.

The NCO of choice complies with all three conditions outlined above. I elaborate and present the descriptive statistics that pertain to testing this in *Appendix XI*.

6. RESULTS AND DISCUSSION

6.1. Effects on Income

To lay the foundation of the empirical analysis, I estimate the baseline model specified by Equation (1) with the log of household total income as the outcome of interest. In this and all subsequent estimations, both OLS and IV methods are employed for the data from 2015 (apart from the lagged main regressor), to enable comparison across different specifications.

Column 1 of *Table 4* shows the results of the OLS regression without any control variables, which indicates that migration rate has a strong, positive, and highly significant effect on household total income. However, the coefficient shrinks tenfold in magnitude as soon as we add the primary controls – household size, income per capita, and regional per capita income decile (*column 2*). Still, it remains significant at least at a 95% confidence level even after adding migrant and household controls (*columns 3* and *4* respectively). After including regional controls, on the other hand, the coefficient further decreases in magnitude and becomes insignificant. It reappears in the pooled OLS estimation, although at a low significance level. Still, since regional controls were introduced as a remedy for endogeneity along with the IV, it is to be determined whether it is a real threat. If not, the estimated positive effects of migration on total income reported in *column 4* may be true, conditional on observed confounders.

Table 4 – OLS and Pooled OLS Estimates of the Effect on Household Income

Model	OLS model. Dependent Variable: Log of Household Total Income					Pooled OLS
	Naive	+ Main Controls	+ Migrant Controls	+ Household Controls	+ Regional Controls	All controls
	(1)	(2)	(3)	(4)	(5)	(6)
Intercept	12.1972 *** (0.0114)	1.2818 *** (0.0803)	1.3239 *** (0.0825)	1.6808 *** (0.1038)	2.699 *** (0.1649)	2.68 *** (0.139)
Migration rate	3.0952 *** (0.2727)	0.3166 *** (0.1105)	0.3098 *** (0.1107)	0.2803 ** (0.1106)	0.1707 (0.1125)	0.188 * (0.110)
HH size		0.1964 *** (0.0036)	0.1963 *** (0.0036)	0.1924 *** (0.0036)	0.1961 *** (0.0037)	0.19 *** (0.004)
Log HH income per capita		0.9194 *** (0.0077)	0.9143 *** (0.0081)	0.8898 *** (0.0093)	0.7549 *** (0.0138)	0.76 *** (0.013)
Regional per capita income decile		0.0154 *** (0.0026)	0.0157 *** (0.0026)	0.0154 *** (0.0025)	0.0596 *** (0.0043)	0.06 *** (0.004)
Migrant controls	No	No	Yes	Yes	Yes	Yes
Household controls	No	No	No	Yes	Yes	Yes
Regional controls	No	No	No	No	Yes	Yes
Observations	1858	1858	1858	1858	1858	1858

Adjusted R-squared	0.0332	0.9444	0.9445	0.946	0.9504	0.951
F-statistic	128.8 ***	7892 ***	3954 ***	2506 ***	1718 ***	1891 ***

Notes. Heteroskedasticity-robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Source: author's own estimations. Data source: National Statistics Office, the Philippines. Currency unit: expenditure and income are in Philippine pesos. For metadata see *Appendix VIII*.

Next, I turn to the 2SLS model analysis, using migration rates observed in 2009 as an instrument for migration in 2015. The estimation results are presented in *Table 5*. This time the first stage is not reported. The Weak Instruments test confirms that the instrument is highly relevant, and the Wu-Hausman test statistic is significant at least at a 90% confidence level for all models. I am willing to accept this level of significance; the appropriateness of using 2SLS as a remedy for potential OLS endogeneity will be further checked using a falsification test.

With respect to the main variable of interest – migration, similar to the OLS model with the full set of controls, including proxies for regional income and infrastructure levels, there is no significant effect on total income (*column 1)*, nor on total receipts (*column 6*). However, migrants' marital status seems to have a significant positive effect on both measures, indicating that, ceteris paribus, households with married migrants have higher total income than with migrants of any other marital status. Migrants' age, on the other hand, has a small, but significant negative impact on total income. A test of adding migrants' age squared to capture possible non-linearities resulted in coefficients for both age variables being insignificant. We could imagine a situation where the effect of migrants' age on household income was, indeed, linear and negative. A potential mechanism described, for example, by Lauby & Stark (1998) is that for younger migrants (in the paper, only women were studied), migration was more of a family-dominated decision compared to a purely individual one. Therefore, they were more willing to accept jobs that afforded steady short-term income even at the expense of little long-term stability.

Table 5 – 2SLS Estimates of the Effect on Household Income

	2nd stage of 2SLS. Dependent Variable: Log of Household Income (Total & by category)							
	Total	Salaries, Wages	Agriculture	Non-Agriculture	Entrepre-neurship	Total Receipts	Foreign Receipts	Domestic Receipts
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Intercept	2.75 ***	4.465 ***	1.526 ***	1.950 ***	-0.3449	2.164 ***	-0.450	9.593 ***
	(0.2856)	(0.7902)	(0.3756)	(0.4639)	(1.1736)	(0.3092)	(2.147)	(1.178)
Migration rate 2015	-0.7929	-10.62 **	0.8787	-4.0220	1.2064	0.2392	57.73 ***	-8.723
	(1.1280)	(4.650)	(2.2479)	(2.6746)	(6.7575)	(1.2577)	(14.811)	(7.854)
Migrant								
Sex (0 Male; 1 Female)	-0.0035	-0.010	-0.0084	-0.0272 *	0.0565	-0.0055	0.025	-0.018
	(0.0079)	(0.0289)	(0.0149)	(0.0152)	(0.0456)	(0.0088)	(0.093)	(0.051)
Age	-0.001 *	0.001	-0.0006	0.0005	-0.0052 **	-0.0009 **	-0.001	-0.003
	(0.0003)	(0.0013)	(0.0007)	(0.0007)	(0.0023)	(0.0003)	(0.004)	(0.002)

Marital status (1 Married)	0.018 ** (0.0080)	0.0018 (0.0297)	0.0158 (0.0144)	0.0152 (0.0172)	0.0614 (0.0476)	0.0151 * (0.0086)	0.061 (0.091)	0.057 (0.052)
Education	0.0026 (0.0053)	0.0177 (0.0212)	-0.0107 (0.0106)	0.0209 * (0.0121)	0.0016 (0.0316)	0.0075 (0.0058)	0.053 (0.067)	0.015 (0.036)
Household								
HH head's sex	-0.0261 (0.0367)	0.095 (0.132)	-0.1286 * (0.0709)	0.225 *** (0.0758)	-0.2932 (0.2095)	-0.0742 * (0.0419)	-0.637 (0.416)	0.671 *** (0.229)
HH head's age	-0.0012 (0.0008)	-0.013 *** (0.003)	0.007 *** (0.0019)	-0.0007 (0.0015)	0.015 *** (0.0046)	-0.0007 (0.0009)	0.000 (0.009)	0.004 (0.005)
HH head's education	0.0124 * (0.0072)	0.152 *** (0.024)	-0.093 *** (0.0123)	0.1552 *** (0.0158)	-0.176 *** (0.0404)	0.0064 (0.0083)	0.079 (0.078)	-0.168 *** (0.045)
HH head has a job	-0.0515 (0.0372)	-0.220 * (0.130)	0.1040 (0.0867)	-0.226 *** (0.0766)	1.252 *** (0.2342)	-0.0059 (0.0404)	-0.315 (0.445)	-0.571 ** (0.238)
Spouse has a job	0.07 *** (0.0238)	0.234 ** (0.088)	0.134 *** (0.0485)	0.031 *** (0.0526)	0.2783 ** (0.1389)	0.088 *** (0.0264)	-0.709 ** (0.294)	-0.056 (0.161)
HH size	0.19 *** (0.0040)	0.270 *** (0.014)	-0.022 *** (0.0078)	0.225 *** (0.0083)	0.143 *** (0.0267)	0.197 *** (0.0046)	0.231 *** (0.046)	0.072 *** (0.026)
HH p.c. income	0.76 *** (0.0301)	0.389 *** (0.052)	0.124 *** (0.0274)	0.781 *** (0.0432)	0.876 *** (0.1092)	0.793 *** (0.0318)	0.697 *** (0.163)	0.126 (0.096)
Regional controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1858	1858	1858	1858	1859	1858	1726	1794
Adjusted R-squared	0.9464	0.6394	0.136	0.8787	0.2297	0.9319	0.2754	0.0358
Diagnostic tests								
Weak instruments	37.72 ***	12.28 ***	39.59 ***	46.28 ***	12.72 ***	37.72 ***	10.14 **	12.54 ***
Wu-Hausman	3.036 *	4.12 **	3.18 *	7.09 **	2.731 *	4.664 *	16.61 ***	0.995
Sargan	NA	NA	NA	NA	NA	NA	NA	NA

Notes. Heteroskedasticity-robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Source: author's own estimations. Data source: National Statistics Office, the Philippines. Currency unit: expenditure and income are in Philippine pesos. For metadata see *Appendix VIII*.

While there is no significant effect of migration on total income, I do find a significant negative impact on salaries and wages (*column 2*). This result is consistent with the literature; specifically, panel studies by Yang (2008) and Ducanes (2015) both have reported a significant reduction in household wages and salaries following an acquisition of an overseas worker or an increase in remittance income. Ducanes (2015) suggests that it represents the foregone income from the migrants themselves who no longer receive domestic wages. For the family members left behind, having an overseas migrant may create a moral hazard problem, acting as a work disincentive (Farrington and Slater, 2006; Lloyd-Sherlock, 2006). Another explanation is that having a family member working abroad gives others an opportunity to step away from full – or any – paid employment, potentially taking on the household responsibilities left by the departed worker, such as taking care of their children or elderly left behind (Ducanes, 2015; Pajaron et al., 2020). No other migrant characteristics appear to affect this income indicator.

One income channel that may take the place of salaries and wages is income from entrepreneurial activities, which entails a higher risk than salaried employment and is therefore less common. Households with migrants abroad may see remittances as a way to relax some

of the constraints faced by aspiring entrepreneurs. However, the IV estimation results do not give any indication that migration increases income from entrepreneurial activity (*column 5*). This result corresponds to the findings of the OECD/Scalabrini Migration Center (2017) and Bird (2009), which reported no significant association between migration, remittances, and business ownership or self-employment in the Philippines. Yang (2008), however, did report that positive shocks to migrants' income led to enhanced entrepreneurship, more hours in self-employment, and a higher likelihood of starting relatively capital-intensive household enterprises in origin households. Migrants' age, on the other hand, has a significant negative impact on income from entrepreneurship. As with total income, adding migrants' age squared produces insignificant coefficients. In this case, it is quite intuitive that younger migrants may advocate more strongly in favor of their families engaging in entrepreneurship and encourage innovation, and that relationship is likely to be linear.

When it comes to agricultural versus non-agricultural income (*columns 3* and *4*), migration does not seem to have a significant effect. I do find significant positive effects for the latter for households where migrants are female or have a higher education level. Since I do not observe any negative impact on agricultural income, it indicates that households with female migrants and higher-educated migrants develop non-agricultural income streams as an addition rather than a substitution. Similar results have been reported in China by de Brauw & Giles (2018), although in that study the positive effects of remittances on recipient households' labor supply to local non-agricultural activities and investment in non-agricultural productive assets have only been observed in the upper tercile of the households' consumption distribution.

Finally, there is a large – in comparison with the effect on other income categories – and highly significant positive impact of migration on receipts from abroad (*column 7*). While this result is intuitive, it can serve as evidence in favor of the IV model effectively capturing the underlying real-world dynamics. Additionally, I could follow Ducanes (2015) and infer that, since the positive coefficient for foreign receipts is larger in magnitude than the negative effect on salaries and wages (*column 2*), migrants' contribution to the household income in remittances far exceeds their foregone domestic wages. However, unlike in this study, I do not find any significant positive effect of migration on total household income, so it remains unclear where the gains from foreign receipts net of losses in wages went. As for receipts from

domestic sources, neither migration nor migrant characteristics appear to have any significant effect (*column 8*).

6.2. Effects on Expenditure

I proceed with estimating the effect of migration on the second indicator of household outcomes, this time pertaining to expenditure. *Table 6* presents the results of OLS models regressing total household expenditure on migration while adding vectors of control variables one by one. Unlike the OLS models for total income, where the coefficient for migration remained positive and significant up until adding household controls, the significant positive effect on total expenditure observed in the naïve OLS disappears as soon as I include the primary control variables (*columns 2-5*). The pooled OLS estimation also yields an insignificant effect of migration on total income (*column 6*).

Table 6 – OLS Estimates of the Effect on Household Expenditure

Model	OLS model. Dependent Variable: Log of Household Total Expenditure					Pooled OLS
	Naive	+ Main Controls	+ Migrant Controls	+ Household Controls	+ Regional Controls	All controls
	(1)	(2)	(3)	(4)	(5)	(6)
Intercept	12.024 *** (0.0106)	1.9729 *** (0.1277)	2.1138 *** (0.1303)	3.256 *** (0.1594)	5.206 *** (0.2232)	5.13 *** (0.191)
Migration rate	2.8126 *** (0.2525)	-0.0029 (0.1759)	-0.0126 (0.1748)	-0.0961 (0.1699)	-0.0631 (0.1522)	0.028 (0.151)
HH size		0.1844 *** (0.0058)	0.1850 *** (0.0057)	0.1772 *** (0.0056)	0.1843 *** (0.0050)	0.18 *** (0.005)
Log HH income per capita		0.8531 *** (0.0123)	0.8344 *** (0.0127)	0.7483 *** (0.0144)	0.4581 *** (0.0186)	0.48 *** (0.018)
Regional per capita income decile		-0.0036 (0.0041)	-0.0024 (0.0041)	-0.0039 (0.0039)	0.0926 *** (0.0057)	0.08 *** (0.006)
Migrant controls	No	No	Yes	Yes	Yes	Yes
Household controls	No	No	No	Yes	Yes	Yes
Regional controls	No	No	No	No	Yes	Yes
Observations	1858	1858	1858	1858	1858	1858
Adjusted R-squared	0.032	0.8399	0.8425	0.8553	0.8952	0.894
F-statistic	124.1 ***	2439 ***	1243 ***	845.4 ***	765.8 ***	822 ***

Notes. Heteroskedasticity-robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Source: author's own estimations. Data source: National Statistics Office, the Philippines. Currency unit: Expenditure and income are in Philippine pesos. For metadata see *Appendix VIII*.

Endogeneity of the main regressor is a likely concern again, so we turn to the IV method. As it may be expected given the OLS results, the 2SLS estimation rendered the effect of migration rate insignificant for total income and all the categories. Regression results are

presented in *Table 7*. Diagnostic tests for all models indicate that the historical migration as an instrument is still relevant, and the problem of main regressor endogeneity is still present. However, in that case, OLS and 2SLS reach a similar conclusion that, conditional on observable covariates, migration does not have a significant impact on household spending.

Among migrant characteristics, the level of educational attainment appears to have significant positive effects on three expenditure categories: education, durable goods and equipment, and housing including utilities like water, gas, electricity, etc. (*columns 5, 7,* and *8* respectively). Housing expenditure is also higher for households with older migrants. These results stand in stark contrast with literature focused on the poverty-alleviating aspect of migration and remittances, which argues that remittances are mostly spent on immediate consumption and necessary items (e.g., Adams & Page, 2005; Taylor et al., 2005; Adams et al., 2008; Acosta et al., 2007). However, several studies have reported the opposite and exactly what I observe, at least for higher-educated and older migrants: receiving households tend to spend the received remittances on education, housing, and land instead of food and other necessary non-food items (de Brauw & Giles, 2018; Viet Cuong & Mont, 2012; Ducanes, 2015; Taylor et al., 2005). These results are not surprising: education, durable goods, and housing represent the internal long-term investments of a household, so higher-educated and older migrants may advocate in favor them over other household spending trajectories. De Brauw & Giles (2018) argue that the remittances spent on these expenditure categories contribute sufficiently to the local economy beyond recipient households by increasing returns to local activity related to, for instance, residential construction and home renovation.

Table 7 – 2SLS Estimates of the Effect on Household Expenditure

	1st stage	2nd stage. Dependent Variable: Log of Household Expenditure (Total & by category)						
	Migration in 2015	Total	Food	Non-Food	Education	Health	Durable Goods	House & Utilities
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Intercept		5.168 ***	8.666 ***	1.438 ***	-4.176 **	-3.966 **	-7.006 ***	3.178 ***
		(0.3030)	(0.2559)	(0.4102)	(1.3545)	(1.4771)	(1.9583)	(0.4840)
Migration rate 2015		0.6724	-0.6042	1.2066	11.8109	-9.7544	-0.1129	0.2548
		(1.5267)	(1.7432)	(2.0074)	(8.8259)	(9.2856)	(12.7140)	(2.6001)
Migration rate 2009	0.076 ***							
	(0.017)							
Migrant								
Sex (0 Male; 1 Female)	0.017	-0.0083	0.0015	-0.0081	0.0384	-0.0252	0.1658	-0.0283
	(0.002)	(0.0101)	(0.0108)	(0.0137)	(0.0563)	(0.0584)	(0.0880)	(0.0172)
Age	0.000	0.0004	0.0006	0.0004	0.0032	-0.0044	-0.0016	0.0021 ***
	(0.0000)	(0.0004)	(0.0005)	(0.0006)	(0.0027)	(0.0027)	(0.0041)	(0.0008)
Marital status (1 Married)	0.001	-0.0010	-0.0022	0.0040	0.0874	0.0590	0.1023	-0.0109
	(0.0016)	(0.0106)	(0.0114)	(0.0141)	(0.0589)	(0.0589)	(0.0894)	(0.0173)
Highest grade completed	-0.001	0.0043	0.0001	0.0067	0.0974 **	-0.0334	0.102 **	0.0324 **
	(0.0010)	(0.0075)	(0.0078)	(0.0098)	(0.0440)	(0.0414)	(0.0633)	(0.0132)

Household (HH)								
HH head's sex	0.027	-0.0642	-0.0329	-0.0588	-0.2528	0.0548	0.1434	0.0722
	(0.0047)	(0.0480)	(0.0512)	(0.0646)	(0.2786)	(0.2785)	(0.4121)	(0.0806)
HH head's age	-0.000	-0.0015	-0.005 ***	0.0004	0.0024	0.0117 **	-0.023 ***	0.0018
	(0.0001)	(0.0010)	(0.0010)	(0.0014)	(0.0056)	(0.0056)	(0.0083)	(0.0017)
HH head's highest grade	0.004 ***	0.061 ***	0.0300 ***	0.0951***	0.1867 ***	0.0631	0.1168	0.1470 ***
	(0.0011)	(0.0097)	(0.0100)	(0.0129)	(0.0534)	(0.0514)	(0.0805)	(0.0151)
HH head has a job	-0.022 ***	-0.0290	-0.0429	-0.0403	0.2854	-0.5077 *	0.3895	-0.3345 ***
	(0.0049)	(0.0474)	(0.0507)	(0.0626)	(0.2724)	(0.2917)	(0.3891)	(0.0760)
Spouse has a job	0.014 ***	0.0159	-0.0062	0.0413	0.2738	0.1775	0.2555	-0.2155 ***
	(0.0037)	(0.0337)	(0.0358)	(0.0449)	(0.1897)	(0.1913)	(0.2759)	(0.0565)
HH size	-0.001 **	0.185 ***	0.1774 ***	0.1929 ***	0.2871 ***	0.186 ***	0.213 ***	0.1653 ***
	(0.0008)	(0.0055)	(0.0054)	(0.0074)	(0.0309)	(0.0314)	(0.0449)	(0.0088)
Log HH p.c. income	0.0027	0.456 ***	0.1223 ***	0.6858 ***	0.6260 ***	0.960 ***	1.0921***	0.4092 ***
	(0.0029)	(0.0278)	(0.0212)	(0.0375)	(0.1111)	(0.1224)	(0.1579)	(0.0432)
Regional p.c. income decile	0.0026	0.090 ***	0.1036 ***	0.0869 ***	0.0933 **	0.0954 **	0.0521	0.0047 ***
	(0.0009)	(0.0093)	(0.0082)	(0.0127)	(0.0423)	(0.0462)	(0.0590)	(0.0004)
Regional controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1801	1858	1858	1858	1859	1858	1859	1858
Adjusted R-squared	0.3556	0.8522	0.7825	0.878	0.3028	0.2948	0.1899	0.8502
F-statistic	19.43 ***							
Diagnostic tests								
Weak instruments		49.75 ***	23.662 ***	37.724 ***	37.785 ***	36.13 ***	27.72 ***	37.724 ***
Wu-Hausman statistic		12.68 ***	8.09 **	6.493 **	7.431 **	4.16 *	2.731 *	4.816 **
Sargan	NA	NA	NA	NA	NA	NA	NA	NA

Notes. Heteroskedasticity-robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Source: author's own estimations. Data source: National Statistics Office, the Philippines. Currency unit: expenditure and income are in Philippine pesos. For metadata see *Appendix VIII*.

The overarching conclusion from estimating the effects of migration on household income and expenditure is that, besides the expected positive and significant effect on receipts from abroad, the only other category migration affects is salaries and wages. A likely mechanism is that, in the presence of an overseas worker, other household members get a chance to be more selective with whether and how much they engage in paid employment (Cabegin, 2006; Ducanes, 2015). However, I do not observe any significant effects on any other income or expenditure categories of migration per se. As for migrants' characteristics, households with more highly educated migrants appear to invest more in education, durable goods, and housing, all else held constant.

Before discussing these results any further, one must address the pressing issue of whether using the IV method was necessary and whether the instrument was chosen appropriately. To that end, I employ a falsification test design that involves an NCO – a variable that should be independent of the endogenous regressor or its instrument.

6.3. Falsification Test via a Negative Control Outcome

As explained in Section 5.4, I investigated whether present-day migration was associated with the NCO – pensions – since historical migration as an IV is unlikely to affect pensions. I first prove the absence of association between the instrument and the NCO (*column 1* of *Table 8*). Then, I test if the endogenous regressor is associated with the NCO when employed as is (*column 2*) and fitted on the IV and observed covariates (*column 3*). The conventional regression analysis suggests that high rates of migration in 2015 had a strong negative effect on pensions. However, the analysis performed using historical migration as an instrument provided no significant evidence of such an association.

The same falsification method could be useful to test the appropriateness of not only the IV but also the other strategy we used to mitigate unobserved confounding, i.e., regional controls. So, by intention, they serve the purpose of closing the backdoor path from historical migration to present-day outcomes. However, empirically, they do not bear much explanatory power in any of the estimations. Moreover, the 2SLS models without the vector of regional controls consistently outperform those with them in both the Weak Instruments and the Wu-Hausman test (see *Appendix XII*). So, I had reasons to question their presence in the model.

The same three-step NCO procedure was applied to the full set of regressors. First, the OLS model of the historical migration–pensions relationship showed a significant negative effect, which means that without regional controls, the IV strategy would be invalid in the first place (*column 4* of *Table 8;* full results are presented in *Appendix XIII*). The effect of present-day migration on pensions measured via OLS is, again, significant and strongly negative (*column 5*). However, when the 2SLS is applied, the coefficient explodes in magnitude, remaining negative and significant.

Table 8 – Results of the Negative Control Outcome test

	Dependent Variable: Log of Pension & Retirement Benefits					
	With regional controls			Without regional controls		
Model	Ordinary Least Squares		2SLS	Ordinary Least Squares		2SLS
	(1)	(2)	(3)	(4)	(5)	(6)
Intercept	-5.3861 ** (2.0082)	-5.2430 *** (2.0006)	-5.2518 *** (2.1149)	-2.7790 ** (1.2746)	-3.0158 ** (1.2720)	-3.9235 ** (1.5351)
Migration rate 2015		-3.6422 *** (1.3404)	-3.4483 (16.8721)		-4.8794 *** (1.2967)	-18.1483 ** (75136)
Migration rate 2009	-0.1894 (0.9847)			-1.8729 * (0.9564)		0.0276 (0.0970)
Migrant controls	Yes	Yes	Yes	Yes	Yes	Yes
Household controls	Yes	Yes	Yes	Yes	Yes	Yes
Regional controls	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1394	1394	1394	1394	1394	1394

Adjusted R-squared	0.366	0.3694	0.3694	0.344	0.3489	0.2998
F-statistic	41.21 ***	41.79 ***		57.64 ***	58.86 ***	
Diagnostic tests						
Weak instruments			5.46 *			19.369 ***
Wu-Hausman statistic			0.00			2.222
Sargan			NA			NA

Notes. Heteroskedasticity-robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Source: author's own estimations. Data source: National Statistics Office, the Philippines. Currency unit: expenditure and income are in Philippine pesos. For metadata see *Appendix VIII*.

The simplest explanation of these results is that, first, the conventional regression analysis certainly suffers from residual confounding. Second, using historical migration as an IV brings more harm than good when controlling only for migrant and household characteristics. Third, the potentially valid solution is combining the IV method with regional controls that seem to effectively capture the residual confounding between past migration and present economic outcomes.

One must be cognizant of the caveats of this approach, the main one being our inability to directly measure all confounders. So, the results of the NCO falsification test do not constitute conclusive proof that the instrument in combination with regional controls is a valid strategy against endogeneity. However, they gave no indication that it is an invalid strategy either, which is comforting.

7. CONCLUSION

Although the present analysis may suffer from a few methodological concerns, the estimation results are indicative of several important patterns. First, naive OLS estimates suggest there is a positive association between district-level migration rates and the total income of households left behind. In contrast to the naive OLS estimates, once I add the controls that proxy regional income and infrastructure development, the positive association becomes invisible. The 2SLS estimations with historical migration as an IV yield similar insignificant results for total income. There is a positive and highly significant effect on receipts from abroad – an intuitive result, suggesting that the insignificance of other coefficients is not due to aggregation mistakes or an improperly specified model.

There is also a significant negative effect of migration on wages and salaries earned by families left behind, which is consistent with the literature. Determining whether this result reflects the moral hazard problem or the takeover of the departed migrant's household chores by another family member (or any other explanation) is beyond the scope of this dissertation. However, it may be fruitful to explore the local labor market implications of migration using the PSU disaggregation level. Spillover effects are quite likely because migration-induced changes in labor supply may affect the local labor market equilibrium and therefore the non-migrant household labor supply.

Second, concerning the effects of migration on household expenditure, the estimated coefficient becomes insignificant as soon as migrant controls enter the equation. Again, the IV reaches the same conclusion as the OLS model with a full set of controls: for every expenditure category, the PSU-level migration rate is not a significant determinant. Migrants' educational attainment, however, has a positive and significant effect on education spending, which together with medical care spending is sometimes referred to as households' 'investments in human capital' (Ang et al., 2009). It is also positively associated with expenditures on durable goods and equipment, as well as housing and utilities. This finding is also consistent with the literature, where these three expenditure categories are often listed as investment-type items and reported to be higher for migrant households.

Third, the NCO falsification test performs exactly as expected, which indicates that both the IV and the regional controls are indisposable in addressing the endogeneity of present migration flows and that the 2SLS results are likely less biased compared to OLS estimates.

While a handful of the estimated effects of migration are statistically significant, the majority of them are not. This stands in contrast with most studies on Philippine overseas

migration; e.g., Ducanes (2015), Yang & Martinez (2006), and Yang (2008) reported far more significant beneficial effects. However, as Ducanes (2015) explains, their findings exhibit the short-term economic benefits for overseas workers' own households. Although he does touch upon the multiplier effect, the bulk of the results are focused on within-family dynamics. Having that in mind, it is less puzzling why the effects I observe are so much smaller in magnitude and lower in significance. The impact of overseas labor migration and remittances on local communities, however large, can only be a fraction of the effect on the recipient households themselves.

At the same time, the fact that neither total income nor expenditure is affected by the rate of local communities' migration might entail that, at this level of governance, the Philippine migration policy framework is lacking. However, understanding the community level is crucial, because that is where the private recruitment agencies and the public Migrant Resource Centers operate. Debonneville (2021) underscores the role of such meso-level actors that shape Filipino workers' mobility when it comes to "where, when, and how to migrate". Moreover, during this time of recruitment and deployment, workers are highly dependent on recruitment agencies. While most of these services are provided in good faith, this dependency creates a dynamic where recruitment-related abuses and workers' rights violations may take place (Agunias, 2013; Orbeta & Abrigo, 2011).

A thorough understanding of the interrelationship between migration and household economic outcomes at the local community level can inform migration policy that provides sufficient protection to OFWs during the recruitment and deployment process while cultivating the enabling environment that would maximize the benefits of remittances flowing into the country. Considering the well-documented positive effects of Filipino overseas migration on various dimensions of household welfare at the level of individual households, regions, and the whole nation, one can expect that the benefits of migration and remittances would also materialize at the level of local communities.

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APPENDIX I

Empirical findings from the literature

Author, year, title	Data	Relationship	Method	Results
		Findings in the Philippines		
Ducanes, G. (2015). The welfare impact of overseas migration on Philippine households: Analysis using panel data.	Linked 2006 FIES, the 2007-2008 APIS, and 2007-2008 LFS Household level Panel	Getting an OFW → income, expenditure, poverty	Fixed Effects	Gaining an OFW results in a windfall in remittances but a decline in household wages and salary income. + Increased spending on food, clothing, education, house-related expenditures, medical care, and even recreation. + Increased chance of moving out of poverty
Yang, D., & Martinez, C. (2006). Remittances and poverty in migrants' home areas: Evidence from the Philippines.	The FIES-LFS-SOF for 1997-1998 Household/ regional level Panel	Rainfall shocks to remittances → poverty incidence	DiD	Positive shocks to remittance receipts are associated with reductions in poverty in migrants' origin households. + Spillovers to households without migrant members. No strong evidence of effects on region-level inequality
Yang, D. (2008). International migration, remittances, and household investment: Evidence from Philippine migrants' exchange rate shocks.	The FIES-LFS-SOF for 1997-1998 Household level Panel	Rainfall shocks to remittances → income, expenditure, and labor supply	DiD	Positive migrant shocks lead to enhanced human capital accumulation and entrepreneurship in families left behind. + More hours in self-employment and higher likelihood of starting capital-intensive household enteprises.
Garcia, K., et al. (2022). The Effects of Labor Migration and OFW Remittances on the Level of Poverty in the Philippines.	Philippine Statistical Yearbooks of 2006-2018 (triannual) Regional level Panel	Volume of remittance → poverty Level of labor migration → poverty	Fixed Effects GLS	No significant relationship
Pernia, E. M. (2008). Migration remittances, poverty, and inequality: The Philippines.	The FIES-LFS-SOF for 1994, 1997, 2000, and 2003 Regional level Panel	Volume of remittance → poverty and household income	3SLS	Remittances have a positive and significant effect on family spending per capita (in the bottom quintile) + contribute to regional development through increased spending for consumption, education, healthcare, and housing, and multiplier effects

Ang, A., Sugiyarto, G., & Jha, S. (2009). Remittances and Household Behavior in the Philippines.	The FIES of 2000, 2003, and 2006 Household level Pooled CS	Volume of remittance → household expenditure by category	IV	The share of food expenditure is on average lower for remittance-receiving households. No significant effect on investment spending – education, health care, and durable goods
Bird, K. (2009). Philippines: Poverty, employment and remittances – some stylized facts.	The FIES of 2006 Household level CS	Volume of remittance → poverty, household consumption & investment	OLS	Remittances reduced the national headcount poverty rate by at least 5 pp., not considering multiplier or second round effects of remittances on growth and poverty
Cabegin, E. (2006). The Effect of Filipino Overseas Migration on the Non-Migrant Spouse's Market Participation and Labor Supply Behavior.	The FIES-LFS-SOF of 2003 Household level CS	Partner's overseas migration → other partner's labor supply	Multi-nomial Probit model	Stronger conjugal home time effects for married women. Larger remittance income effects for married men
Lauby, J., & Stark, O. (1988). Individual Migration as a Family Strategy: Young Women in the Philippines.	The National Demographic Survey of 1973 The Status of Women Survey of 1976 Individual level CS	Family features → migration of Filipinas → Occupation and income	OLS	Familial nature of the migration decision of Filipinas. Migration is a solution to underemployment in rural areas (not higher wages but more working hours)
	Findings in other Asian countries			
De Brauw, A., & Giles, J. (2018). Migrant Labor Markets and the Welfare of Rural Households in the Developing World: Evidence from China.	China's Ministry of Agriculture household surveys of 1986 through 2002 Village level Panel	Out-migration → consumption (by type) and income (by source)	Fixed Effects IV	With increased out-migration, poorer households invested more in housing and durable goods than rich ones and reduced labor days in agriculture.
Viet Cuong, N., & Mont, D. (2012). Economic impacts of international migration and remittances on household welfare in Vietnam.	Vietnam Household Living Standard Surveys 2006 and 2008 Household level Pooled CS	Remittances → spending on production and consumption, assets, durable goods, reservation wages	Fixed Effects	Most of remittances are spent on housing and land, debt repayment and saving. They are not spent on production or living consumption. The effect on consumption-based poverty is very limited.

APPENDIX II

Chronology of bans on OFW deployment to Middle East

Date	*Law*	*Sending-state intervention*
06/2014	Article	Impose a ban on deployment of HSWs in the United Arab Emirates
2016	Article	Impose a ban for newly hired HSWs and skilled workers in Saudi Arabia
02/2018	No. 1	Impose a ban for new hires in Kuwait
05/2018	No. 7	Enable deployment of all new hires (including professionals, seafarers, skilled, semi-skilled and domestic workers in Kuwait
01/2020	No. 1	Impose a ban on newly hired HSWs in Kuwait
03/2021	No. 6	Lift the ban on deployment of HSWs in Saudi Arabia
03/2021	Article	Lift the ban on deployment of HSWs in the United Arab Emirates
11/2021	Article	Impose a ban on deployment of OFWs in Saudi Arabia
11/2022	DMW Order No. 4	Lift the ban on newly hired HSWs in Saudi Arabia

Notes. Source: Department of Migrant Workers, 2023. HSW – household service workers. OFW – overseas Filipino workers.

APPENDIX III

On Primary Statistical Unit (PSU) and the aggregation procedure.

In the case of the Philippines statistics nomenclature, the smallest unit of aggregation is the PSU (Philippines Statistics Authority, 2016).

While, unlike households, the PSU sample has been almost perfectly consistent throughout the last three decades, it has still undergone two changes – in 2003 and 2013. In both cases, the LFS Master Sample (MS) was enlarged, and the PSU definition changed, restricting data comparability across years (Ducanes, 2013). While MS 2003 was in use, the PSUs were defined as a barangay or a combination of barangays with at least 500 households (Philippines Statistics Authority, 2009a). By contrast, in the 2013 MS design, each sampling domain (i.e., a province or a highly urbanized city) is divided into PSUs with about 100 to 400 households (Philippines Statistics Authority, 2016). Thus, a PSU can be a barangay or a portion of a large barangay or two or more adjacent small barangays. The difference between the two Master Samples is shown in *Table 2* below.

Table 2 – LFS Master Sample design

MS change	*PSUs*	*MS Design title*
LFS April 2016	2 979	Master Sample Design 2013
LFS July 2003	2 835	Master Sample Design 2003

It is important to note that, according to the 2009 FIES Manual, the PSU stratification procedure involved grouping PSUs that were not large enough to stand on their own concerning three socio-economic variables related to poverty incidence: (a) the proportion of strongly built houses; (b) an indication of the proportion of households engaged in agriculture; and the per-capita income (Philippines Statistics Authority, 2009a).

From July 2003 until April 2016, therefore, LFS and all its rider surveys used MS Design 2003, which means that – theoretically – the PSU classification should have been consistent. In practice, while the underlying sample of PSUs stayed the same throughout different surveys and years, the way PSU codes were reported varies considerably. *Table 3* presents the ranges of PSU codes in all years between MS changes for three surveys of interest.

Table 3 – PSU codes in 2003-2013

Year	SOF	FIES	FIES-LFS

	min	*max*	*min*	*max*	*min*	*max*
2003	101000000	9804000000	101000000	9804000000	101000000	9804000000
2006	No SOF	No SOF	1	214	1	214
2009	10	16581	10	16581	10	16581
2012	No PSU	No PSU	100010	416581	1001	98008
2015	10	16569	10	16581	10	16581

Notes. Source: Philippines Statistics Authority, 2016.

Evidently, 2009 and 2015 are the only years for which it was possible to use PSUs for data aggregation through all three surveys, which is why I rely on data for these two years in the end. All variables are taken as averages over the households in a given PSU. Performing the same aggregation procedure on the data that employed an even older MS Design than MS 2003 to have two non-overlapping periods for analysis could be very valuable. However, before 2003, none of the surveys reported the PSU variable at all; possibly, 2003 was the year when this unit of classification was ever used.

APPENDIX IV

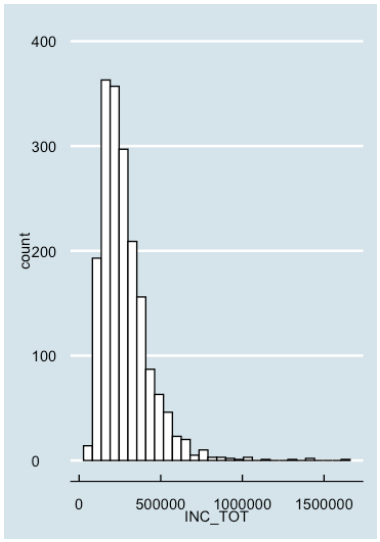
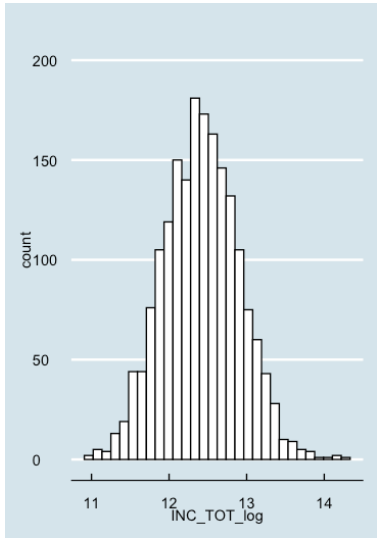
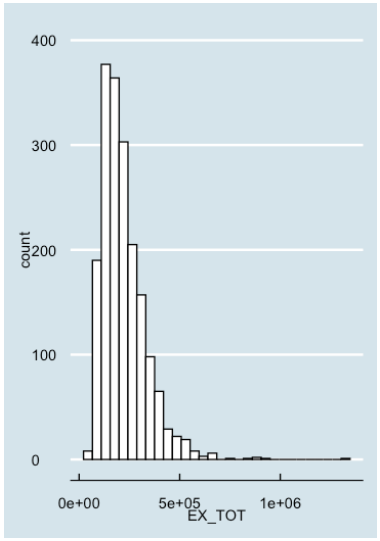
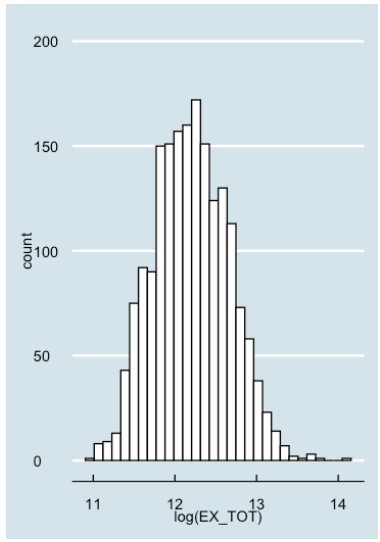
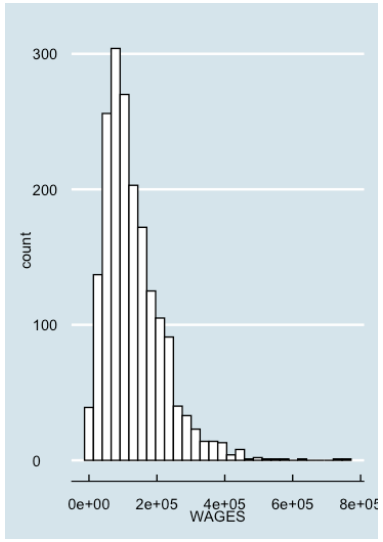
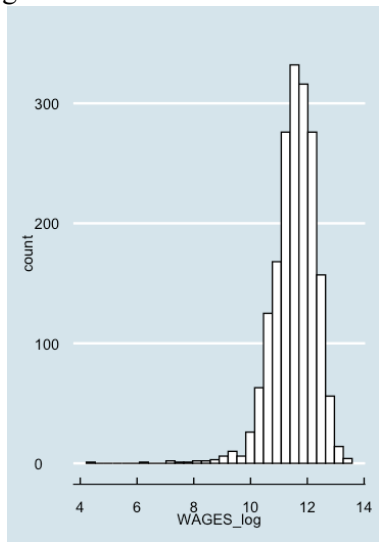
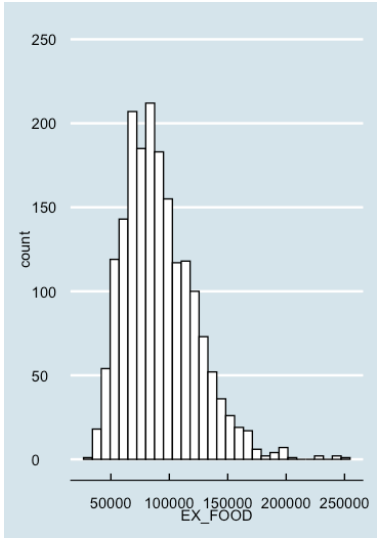
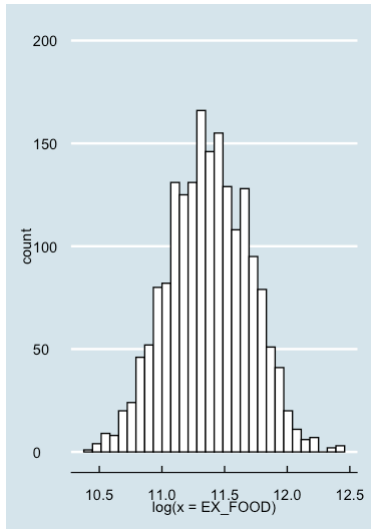
Summary statistics of household-level outcome variables in 2015

	Min.	1st quartile	Median	Mean	3rd quartile	Max
Average Household Income						
Total Income	59,662	176,849	245,297	277,920	343,450	1,637,524
Wages & Salaries	0	67,722	109,969	129,602	173,041	758,817
Agricultural Income	1.291	8.755	10.015	9.434	10.722	12.568
Non-Agricultural Income	15,062	132,902	221,180	249,924	328,227	1,523,019
Income from Entrepreneurial Activities	0	28,028	43,507	55,796	67,874	1,290,872
Total Receipts	61,499	186,478	258,493	295,076	361,654	1,668,114
Receipts from Abroad	0	7,232	20,812	29,739	40,000	520,000
Receipts from Domestic Sources	0	6,448	11,000	12,933	17,074	76,600
Average Household Expenditure						
Total Expenditure	57,559	143,052	197891	221439	276,430	1,338,130
Food Expenditure	34,006	69,221	87,093	91,731	110,333	254,513
Non-Food Expenditure	17,807	72,627	109,308	129,708	165,292	1,097,217
Education Expenditure	0	3,261	6,016	8,713	10,837	84,597
Medical Care Expenditure	59	2,818	5,788	8,574	10,493	207,049
Durable Goods & Equipment Expenditure	0	1,033	3,001	5,663	6,590	115,988
Housing & Utilities Expenditure	6,358	22,265	35,413	44,408	55,696	543,340

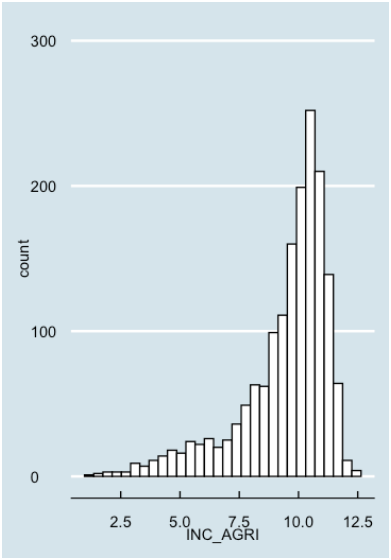
Notes. Source: author's own estimations. Currency unit: Philippine pesos (2015).

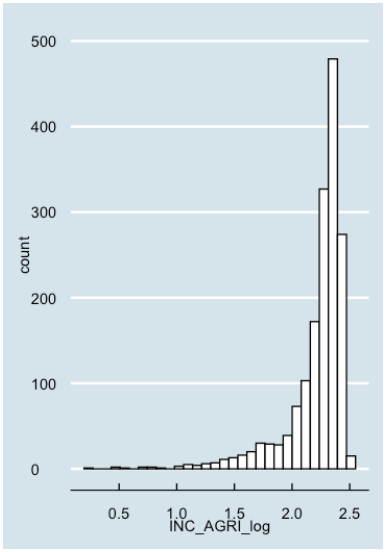
APPENDIX V

Frequency plots of outcome variables before and after logarithmic transformation

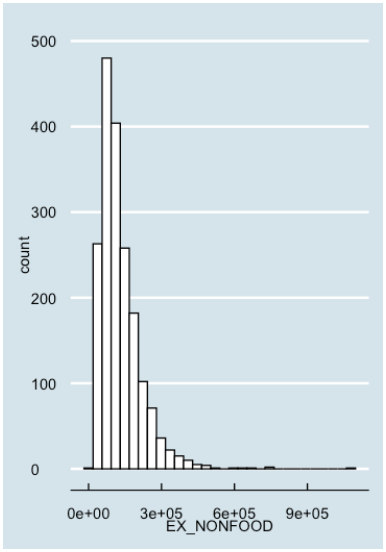
Original distribution	Distribution after log transformation	Original distribution	Distribution after log transformation
Total Income		Total Expenditure	
			
Salaries & Wages		Food Expenditure	
			

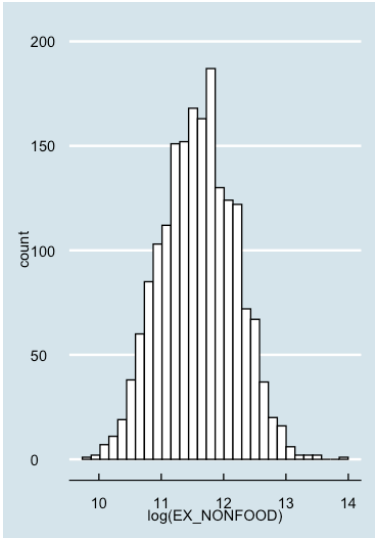
Income from Agricultural Activities



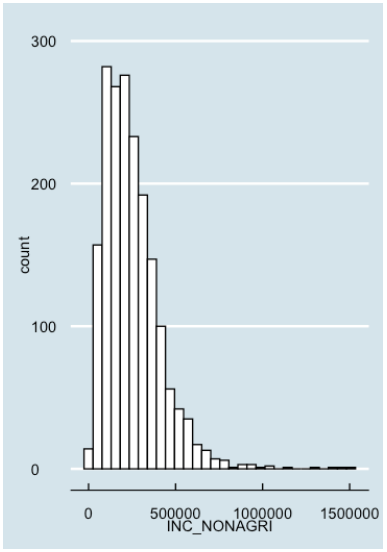


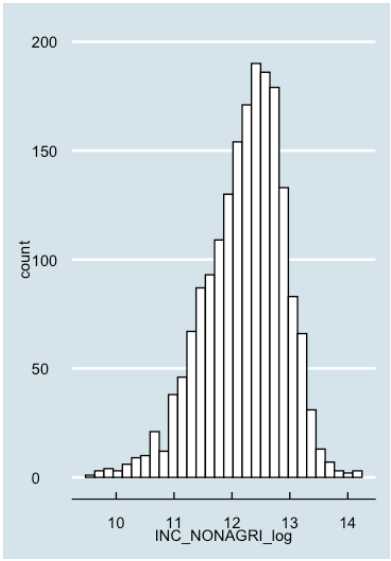
Non-Food Expenditure



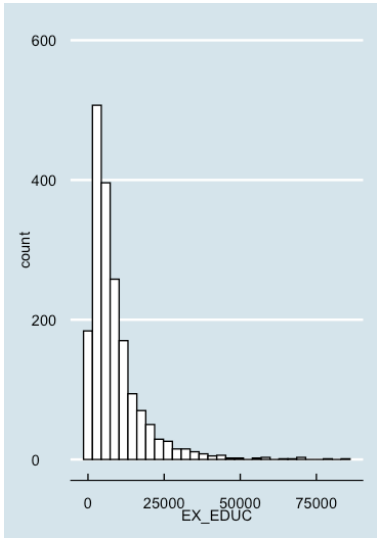


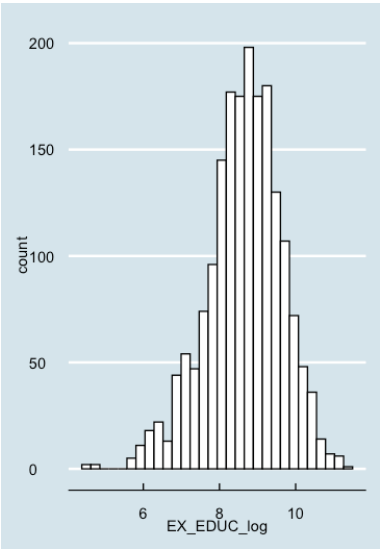
Income from Non-Agricultural Activities





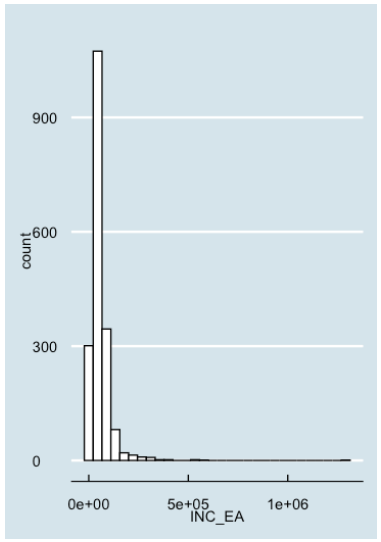
Education Expenditure

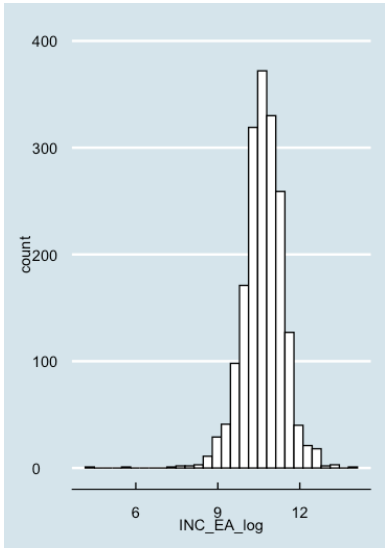




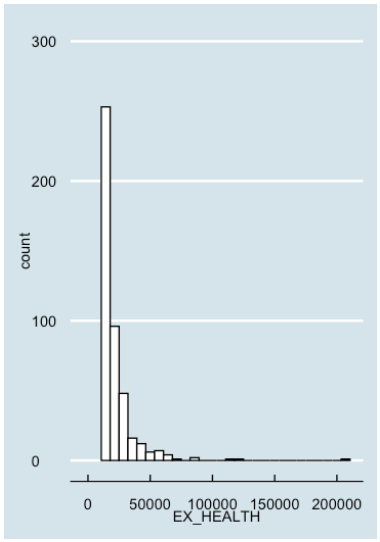
Income from Entrepreneurial Activities

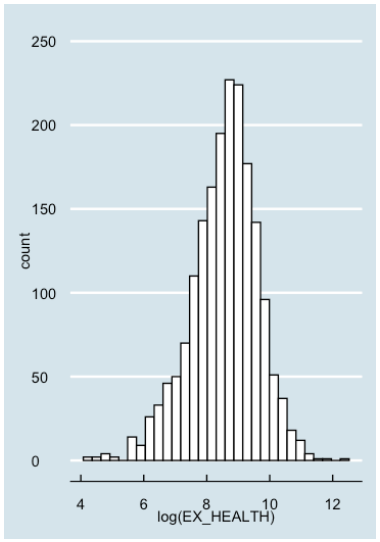
Health Expenditure



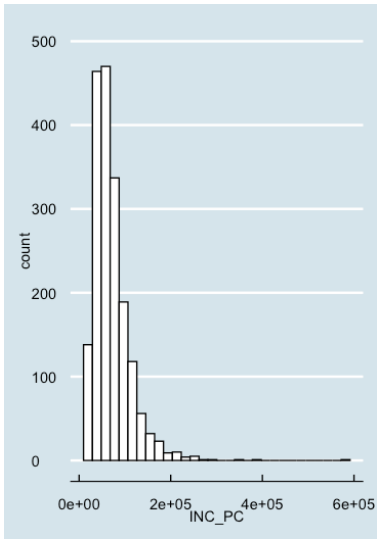


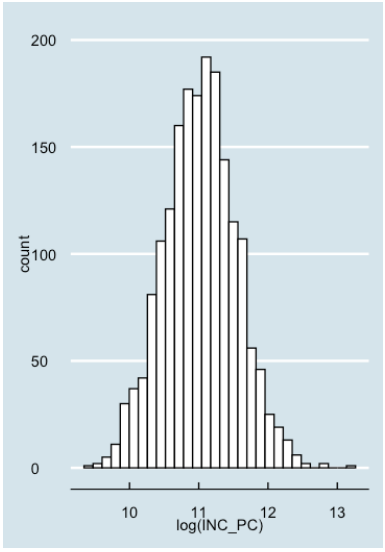
Per Capita Income



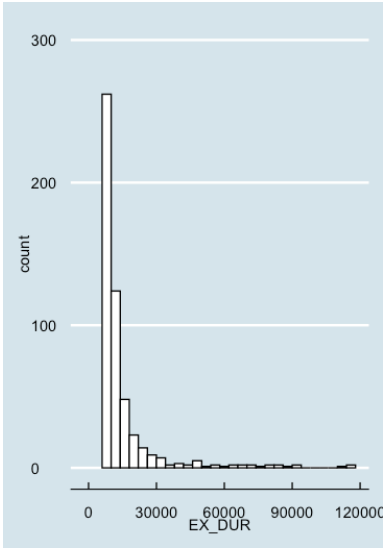


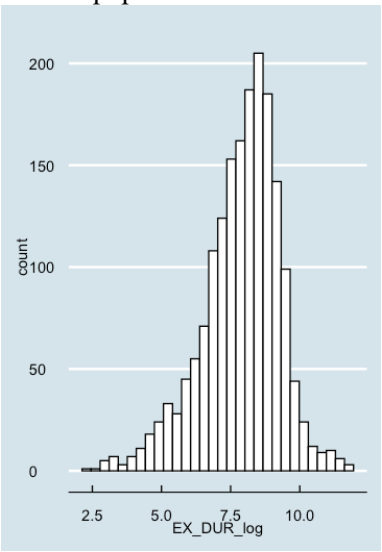
Expenditure on Durable Goods & Equipment



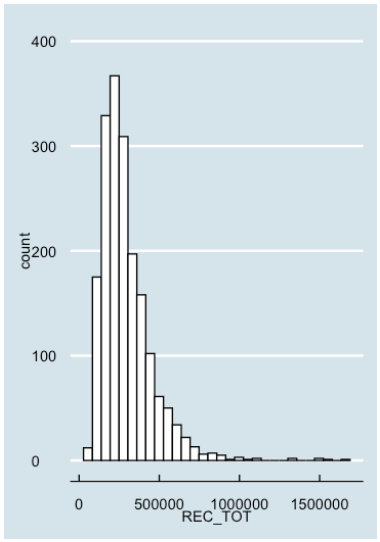


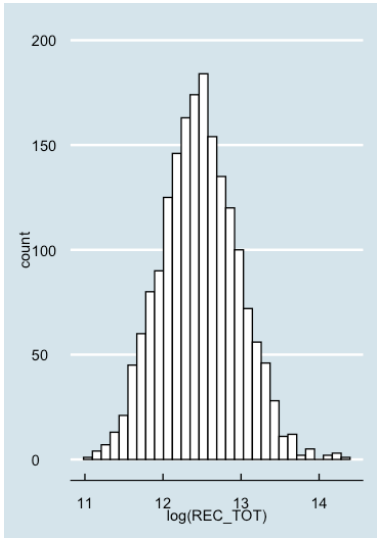
Total Receipts



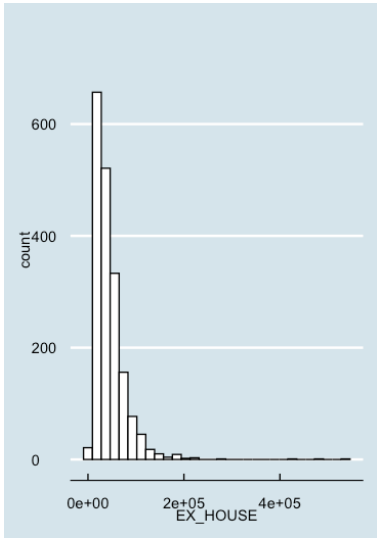


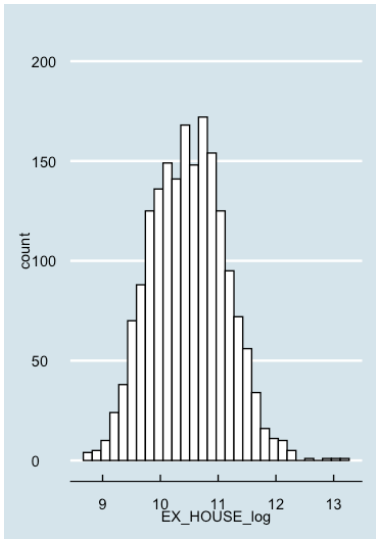
Expenditure on Housing and Utilities



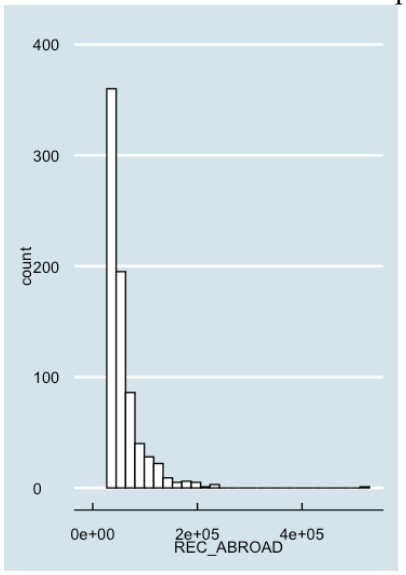


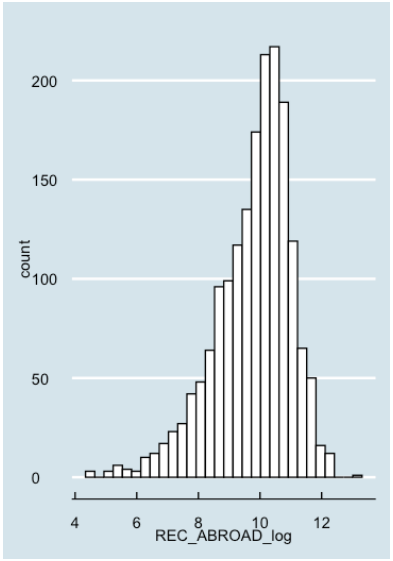
Receipts from Abroad



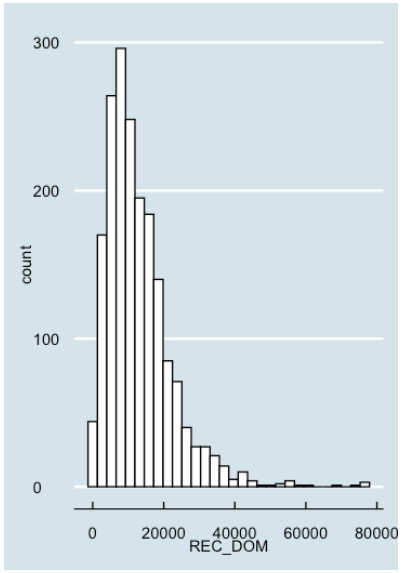


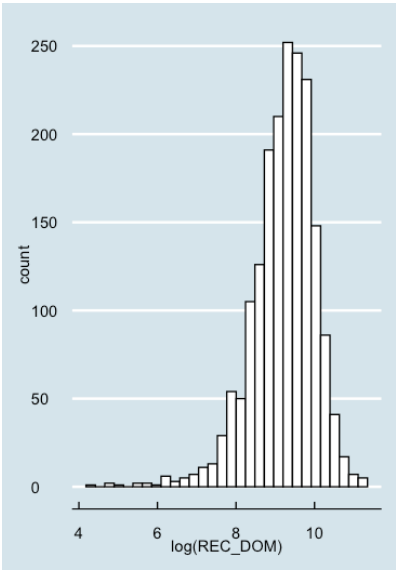
Receipts from Domestic Sources

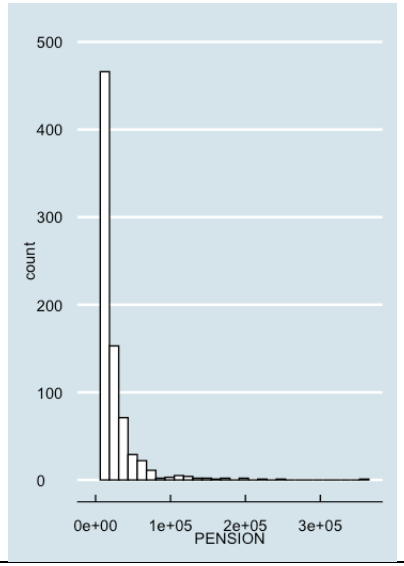




Pension and Retirement Benefits



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100
0
count
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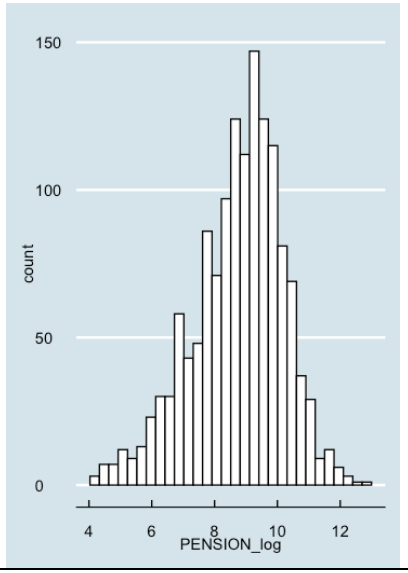
1e+05
2e+05
3e+05
PENSION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100
50
0
count
4
6
8
10
12
PENSION_log

APPENDIX VI

Regional controls

Region	*PSA Code*	*Annual HH Income*	*Annual HH Savings*	*Gini Coefficient Ratio*	*Poverty Gap*	*No. of Hospitals*	*Road Density*	*Labor Force Participation*
National Capital Region	13	425	76	0,39	0,5	160	146,1	65,5%
Cordillera	14	282	73	0,42	4,0	23	9,7	68,0%
Ilocos	1	238	56	0,40	2,8	86	13,2	65,1%
Cagayan Valley	2	237	75	0,41	2,4	59	6,8	69,9%
Central Luzon	3	299	60	0,40	1,7	168	9,4	64,0%
Calabarzon	41	312	43	0,40	2,0	208	14,1	66,8%
Mimaropa	42	222	61	0,46	4,4	23	7,5	69,8%
Bicol	5	187	27	0,40	7,1	51	12,4	68,2%
Western Visayas	6	226	50	0,44	4,2	62	14,3	68,7%
Central Visayas	7	239	46	0,46	7,2	57	11,9	65,4%
Eastern Visayas	8	197	41	0,46	9,2	43	10,1	73,2%
Zamboanga Peninsula	9	190	46	0,44	7,7	44	6,2	65,7%
Northern Mindanao	10	221	60	0,46	9,4	65	8,0	74,5%
Davao	11	247	57	0,43	4,2	54	7,2	68,7%
Socsksargen	12	188	26	0,46	10,0	56	6,2	69,1%
Caraga	16	198	39	0,43	8,3	17	6,4	70,1%
Autonomous Region in Muslim Mindanao	15	139	28	0,28	14,1	19		57,0%

Notes. Source: Philippine Statistical Yearbook of 2015.

APPENDIX VII

Matrix of pairwise correlations

	M_SEX	M_AGE	M_MSTAT	M_EDUC_5	M_HEAD	M_SPOUSE	M_HEAD_CHILD	TMSLEFT	MSTAY	URBAN	REG_PC	H_SEX	H_AGE	H_MSTAT	H_EDUC	H_HAS_JOB	SP_HAS_JOB	FAM_TOT	UNDER_15	OVER_60	EMP_TOT	EMP_SHARE	INC_PC
M_SEX	1,00	-0,15	-0,24	-0,13	-0,43	0,24	0,18	-0,20	0,12	-0,14	-0,10	-0,15	0,00	0,07	0,00	0,11	0,02	0,00	0,08	0,36	0,03	0,00	-0,19
M_AGE	-0,15	1,00	0,42	0,03	0,40	0,25	-0,52	0,20	-0,07	0,17	0,15	0,16	0,09	-0,11	0,09	-0,17	0,02	-0,12	-0,05	-0,51	-0,01	0,08	0,20
M_MSTAT	-0,24	0,42	1,00	-0,07	0,32	0,43	-0,69	0,11	-0,04	0,14	0,07	0,09	-0,02	-0,04	-0,04	-0,06	0,04	-0,06	0,18	-0,54	0,02	0,05	0,10
M_EDUC_5	-0,13	0,03	-0,07	1,00	0,02	-0,14	0,08	0,17	-0,12	0,13	0,19	0,13	0,16	-0,12	0,24	-0,15	0,05	-0,06	0,82	-0,31	0,11	0,13	0,24
M_HEAD	-0,43	0,40	0,32	0,02	1,00	-0,24	-0,47	0,17	-0,13	0,18	0,10	0,13	-0,07	-0,06	0,02	-0,08	-0,01	-0,06	0,48	-0,63	-0,03	0,04	0,16
M_SPOUSE	0,24	0,25	0,43	-0,14	-0,24	1,00	-0,47	-0,02	0,00	0,03	0,00	-0,04	-0,02	0,03	-0,02	0,01	0,03	-0,06	-0,35	-0,36	-0,01	0,03	-0,01
M_HEAD_CHILD	0,18	-0,52	-0,69	0,08	-0,47	-0,47	1,00	-0,12	0,07	-0,18	-0,08	-0,12	0,03	0,06	-0,01	0,08	-0,01	0,08	0,03	0,73	0,01	-0,05	-0,12
TMSLEFT	-0,20	0,20	0,11	0,17	0,17	-0,02	-0,12	1,00	-0,22	0,11	0,10	0,09	0,05	-0,04	0,11	-0,10	0,00	-0,02	-0,49	-0,23	-0,01	0,01	0,11
MSTAY	0,12	-0,07	-0,04	-0,12	-0,13	0,00	0,07	-0,22	1,00	-0,09	-0,07	-0,06	-0,04	0,04	-0,11	0,05	-0,02	0,05	0,05	0,83	-0,05	-0,08	-0,10
URBAN	-0,14	0,17	0,14	0,13	0,18	0,03	-0,18	0,11	-0,09	1,00	0,38	0,24	-0,12	-0,13	0,41	-0,32	-0,07	-0,04	0,10	NA	0,07	0,07	NA
REG_PC	-0,10	0,15	0,07	0,19	0,10	0,00	-0,08	0,10	-0,07	0,38	1,00	0,24	0,10	-0,18	0,15	-0,24	0,01	-0,26	-0,66	0,09	-0,05	0,12	0,66
H_SEX	-0,15	0,16	0,09	0,13	0,13	-0,04	-0,12	0,09	-0,06	0,24	0,24	1,00	0,24	-0,67	0,12	-0,40	-0,22	-0,17	0,05	-1,00	-0,03	0,10	0,29
H_AGE	0,00	0,09	-0,02	0,16	-0,07	-0,02	0,03	0,05	-0,04	-0,12	0,10	0,24	1,00	-0,36	0,17	-0,37	-0,08	-0,11	-0,46	-0,72	0,16	0,22	0,13
H_MSTAT	0,07	-0,11	-0,04	-0,12	-0,06	0,03	0,06	-0,04	0,04	-0,13	-0,18	-0,67	-0,36	1,00	-0,15	0,31	0,36	0,25	-0,06	0,84	0,01	-0,22	-0,21
H_EDUC_5	-0,19	0,24	0,16	0,22	0,21	0,00	-0,18	0,12	-0,07	0,56	0,57	0,28	-0,06	-0,15	0,16	-0,35	-0,01	-0,14	-0,19	0,70	-0,06	0,00	0,62
H_HAS_JOB	0,11	-0,17	-0,06	-0,15	-0,08	0,01	0,08	-0,10	0,05	-0,32	-0,24	-0,40	-0,37	0,31	-0,12	1,00	0,20	0,07	0,19	-0,70	0,13	0,18	-0,26
SP_HAS_JOB	0,02	0,02	0,04	0,05	-0,01	0,03	-0,01	0,00	-0,02	-0,07	0,01	-0,22	-0,08	0,36	0,03	0,20	1,00	0,02	0,05	-0,63	0,44	0,37	-0,07
FAM_TOT	0,00	-0,12	-0,06	-0,06	-0,06	-0,06	0,08	-0,02	0,05	-0,04	-0,26	-0,17	-0,11	0,25	-0,12	0,07	0,02	1,00	0,90	0,27	0,32	-0,45	-0,26
UNDER_15	0,08	-0,05	0,18	0,82	0,48	-0,35	0,03	-0,49	0,05	0,10	-0,66	0,05	-0,46	-0,06	-0,32	0,19	0,05	0,90	1,00	NA	0,50	-0,79	NA
OVER_60	0,36	-0,51	-0,54	-0,31	-0,63	-0,36	0,73	-0,23	0,83	NA	0,09	-1,00	-0,72	0,84	0,73	-0,70	-0,63	0,27	NA	1,00	NA	NA	NA
HH_TYPE	-0,04	0,07	0,04	0,12	0,00	-0,03	-0,01	0,03	-0,05	0,14	0,10	0,24	0,31	-0,21	0,13	-0,24	-0,03	0,28	-0,04	0,84	0,26	-0,01	0,03
EMP_TOT	0,03	-0,01	0,02	0,11	-0,03	-0,01	0,01	-0,01	-0,05	0,07	-0,05	-0,03	0,16	0,01	0,08	0,13	0,44	0,32	0,50	NA	1,00	0,59	-0,08
EMP_SHARE	0,00	0,08	0,05	0,13	0,04	0,03	-0,05	0,01	-0,08	0,07	0,12	0,10	0,22	-0,22	0,16	0,18	0,37	-0,45	-0,79	NA	0,59	1,00	0,11
INC_PC	-0,19	0,20	0,10	0,24	0,16	-0,01	-0,12	0,11	-0,10	NA	0,66	0,29	0,13	-0,21	0,66	-0,26	-0,07	-0,26	NA	NA	-0,08	0,11	1,00
OFW	-0,06	0,06	0,07	-0,02	0,07	0,02	-0,07	0,02	-0,01	0,10	0,19	0,21	0,02	-0,03	-0,09	-0,20	0,03	-0,09	-0,41	-0,93	-0,03	0,00	0,23

Source: author's own estimations. Data source: National Statistics Office, the Philippines.

APPENDIX VIII

Metadata

Variable	Label	Categories	Original values		Recoded values	Recoded categories
		Survey on Overseas Filipinos				
REG	**Region**					
		National Capital Region	13			
		Cordillera Administrative Region	14			
		Region I - Ilocos Region	1			
		Region II - Cagayan Valley	2			
		Region III - Central Luzon	3			
		Region IVA - CALABARZON	41			
		Region IVB - MIMAROPA	42			
		Region V- Bicol	5			
		Region VI - Western Visayas	6			
		Region VII - Central Visayas	7			
		Region VIII - Eastern Visayas	8			
		Region IX - Zamboanga Peninsula	9			
		Region X - Northern Mindanao	10			
		Region XI - Davao	11			
		Region XII - SOCSKSARGEN	12			
		Region XIII - Caraga	16			
		Region XIII - Autonomous Region in Muslim Mindanao	15			
M_SEX	**Sex**					
		Male	1	0		
		Female	2	1		
M_AGE	**Age**					
			0	98		
			99			
TMSLEFT	**Times left**					
			1	60		
			99			
M_MSTAT	**Marital status**					
		Single	1			
		Married	2			
		Widowed	3			
		Separated/Divorced	4			
		Unknown	5			
		Annulled	6			
M_HGRADE	**Highest grade completed**				M_HGRADE_5	
		No Grade Completed	0		0	No Grade
		Elementary Undegraduate	1		0	Completed
		Elementary Graduate	2		1	Elementary Graduate
		Highschool Undergraduate	3		2	Secondary Graduate
		Highschool Graduate	4		3	Highschool Graduate
		Post-Secondary Non-Tertiary/Technical-Vocational Undergraduate	5		2	Secondary Graduate
		Collge Undergraduate	6		3	Highschool Graduate
		College Graduate	60	68	4	College Graduate
			70	76	4	
			78		4	
		Post Baccalaureate	90		5	Post Baccalaureate

		Post Secondary	50	58	3	Post Secondary
		Not reported	99		0	No Grade Completed
MSTAY	**Months planning to stay**					
			0	60		
			88			
			99			

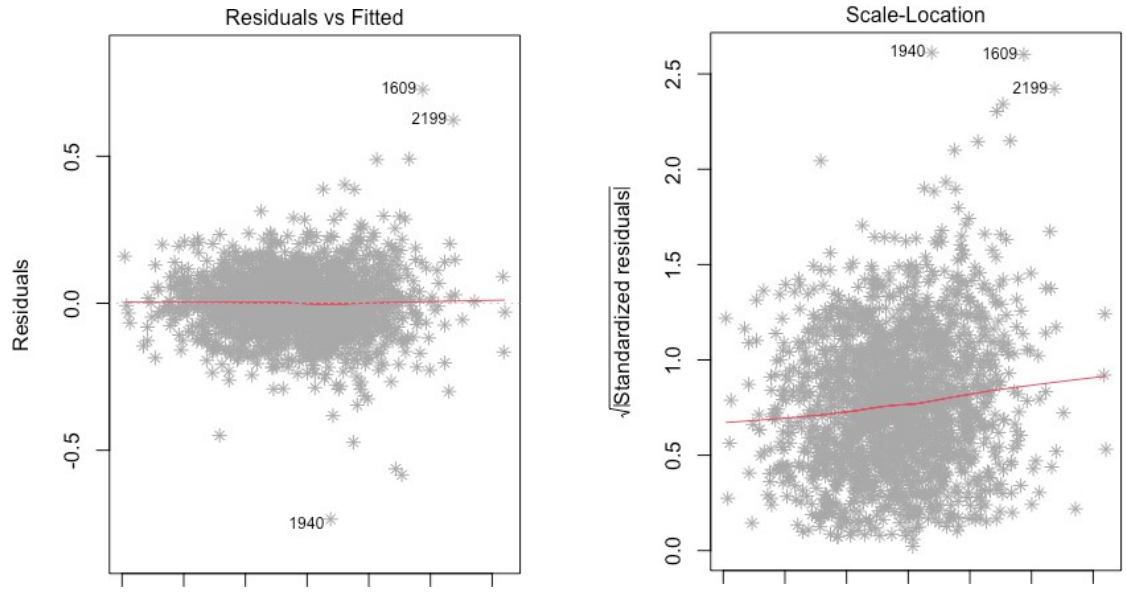
Family Income and Expenditure Survey

Household head characteristics – sex, age, marital status, and education level – are defined the same way as respective migrant characteristics above.

H_HAS_JOB	**Household head Job/Business indicator**			
		With Job/Business	1	
		No Job/Business	2	
SP_HAS_JOB	**Household head's spouse employment indicator**			
		Employed	1	
		Not employed	2	
EMP_TOT	**Household Employed members**			
			0	99
REG_PC	**Regional per capita income decile**			
		First Decile	1	
		Second Decile	2	
		Third Decile	3	
		Fourth Decile	4	
		Fifth Decile	5	
		Sixth Decile	6	
		Seventh Decile	7	
		Eight Decile	8	
		Ninth Decile	9	
		Tenth Decile	10	

APPENDIX IX

The plot of residuals vs. fitted values and the plot of standardized residuals



Studentized Breusch-Pagan test output:
BP = 86.992, df = 20, p-value = 0.0000.

APPENDIX X

Summary of estimation methodologies from the empirical literature

Author, year, and title	Data	Estimation strategy
Shrestha, M. (2017). The Impact of Large-Scale Migration on Poverty, Expenditures, and Labor Market Outcomes in Nepal.	The Housing and Population Censuses of 2001 and 2011 + Nepal Living Standards Survey (NLSS-III) Pooled CS	2SLS (2001 migration rates as an IV) DiD
Kangmennaang, J. (2017). Impact of migration and remittances on household welfare among rural households in Northern and Central Malawi.	Household survey in 2014 CS	Remittance receiving and non-receiving households – PSM
Marjorie, P., et al. (2020). The children are alright: Revisiting the impact of parental migration in the Philippines.	The Survey on Children of 2011 The SOF of 2004 The APIS of 2011 Philippine Statistical Yearbooks of 2011 and 2014 Pooled CS	2SLS (2003 migration rates as an IV + regional controls) Children of migrants and non-migrants – PSM Combined PSM-IV
Cortes, P. (2015). The Feminization of International Migration andits Effects on the Children Left Behind: Evidence from the Philippines.	The Philippines Census of 1990, 1995, 2000, and 2007 The SOF and LFS of 1993-2000 The confidential dataset about all legal land-based migrants by the Philippines Oveseas Employment Administration Pooled CS	2SLS (province-level share of female migrants per destination as an IV; expected salary for a female migrant as an IV)
Lokshin, M., et al. (2010). Work-Related Migration and Poverty Reduction in Nepal.	Nepal Living Standard Survey (NLSS) of 1996 and 2004 Nepal Census of 2001 Pooled CS	FIML (2001 share of migrants in a ward as an IV; 1995 share of domestic migrants in a district as an IV)
McDonald, J. T., & Valenzuela, M. R. (2017). How Does Skills Mismatch Affect Remittances? A Study of Filipino Migrant Workers.	Linked FIES-SOF dataset of 1997, 2000, 2003 Pooled CS	2SLS (education profiles in host countries as an IV for skills mismatch -> effect on remittance behavior)

Notes. Pooled CS – pooled cross-sectional data. IV – instrumental variable. PSM – propensity score matching. DiD – difference-in-difference. SOF – survey on overseas Filipinos. APIS – annual poverty indicators survey. LFS – labor force survey.

APPENDIX XI

According to the literature (Shi et al., 2020; Sanderson et al., 2020; Davies et al., 2017), a valid NCO must satisfy three conditions:

- It is determined before the exposure and outcome (in our case, the present levels of migration, income, and expenditure).
- It is likely to be subject to the same confounding as the exposure or outcome of interest.
- It has sufficient variation to have adequate power.

'Pensions and retirement benefits' as an NCO complies with all three conditions outlined above:

1. It is determined before the exposure and outcome. Pension benefits are calculated based on the entire employment history, and in the Philippines, the retirement age was 60 for the entire examination period (Republic of the Philippines SSS, 2021). Given that in 2009, 75% of the migrants and the household heads were under 41 and 54 years old respectively, it is unlikely that either of them could retire before 2015, even if becoming/acquiring a migrant induced it. One could argue that other household members could retire besides the migrant and the household head. It is a reasonable assumption; however, in both waves, in about 80% of households, the household head was employed. At the same time, in 75% of households in 2015, 2 members or less were employed – so chances are that in many cases it was the migrant and the household head. I also briefly scanned the literature and have not found the migration–pensions relationship to be a topic of discussion. While, obviously, imperfect, this reasoning is sound enough to consider the first NCO condition satisfied.

2. It is likely to be subject to the same confounding as the exposure or outcome of interest. This is intuitive because pensions reflect people's entire employment histories, so one may reasonably expect them to be a good proxy for unobserved socio-economic confounders that govern households' present income and expenditure outcomes. Empirically, I demonstrate it by comparing the effects of observed covariates on pensions vis-à-vis the other outcomes of interest. Assuming that the observed covariates are effective proxies of the unobserved ones, sufficient similarity in the estimates will indicate that the second NCO condition is also satisfied.

3. It has sufficient variation to have adequate power. The frequency plots of *PENSIONit* presented in *Appendix VI* before and after logarithmic transformation show that, while the distribution is considerably skewed to the left (just like almost all other outcomes of interest), the variation is sufficient. The descriptive statistics that pertain to testing this and the other two conditions are presented below.

Table 8-1 – Summary statistics related to pensions

	Min.	1st quartile	Median	Mean	3rd quartile	Max
Pensions (2015)	0.0	118.8	4113.5	11003.0	12933.3	358666.7
Migrant's age (2009)	17.00	30.00	35.00	35.88	40.50	77.00
Household head's age (2009)	29.60	47.16	50.46	50.38	53.50	71.00
Employed HH members (2009)	1.000	1.667	1.900	1.892	2.111	3.000

Notes. Source: author's own estimations. Metadata is presented in *Appendix VIII*.

APPENDIX XII

2SLS results without regional controls

Dependent Variable	Migration rate 2015	Log of Household Total Income	Log of Household Total Expenditure
2SLS stage	1st stage	2nd stage	2nd stage
	(1)	(2)	(4)
Intercept	-0.050 *	1.701 ***	3.415 ***
	(0.022)	(0.110)	(0.179)
Migration rate 2015		0.673	3.027 ***
		(0.682)	(0.867)
Migration rate 2009	0.115 ***		
	(0.016)		
HH size	-0.001	0.193 ***	0.181 ***
	(0.001)	(0.004	(0.006)
Log HH income per capita	0.009 ***	0.886 ***	0.720 ***
	(0.002)	(0.011)	(0.017)
Regional per capita income decile	0.001	0.015 ***	0.006 ***
	(0.001)	(0.003)	(0.004)
Migrant controls	Yes	Yes	Yes
Household controls	Yes	Yes	Yes
Regional controls	No	No	No
Observations	1858	1858	1858
Adjusted R-squared	0.227	0.946	0.829
F-statistic	20.578 ***		
Diagnostic tests			
Weak instruments		36.13 ***	34.417 ***
Wu-Hausman statistic		10.359 ***	12.916 ***
Sargan	NA	NA	NA

Notes. Heteroskedasticity-robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Source: author's own estimations. Data source: National Statistics Office, the Philippines. Currency unit: expenditure and income are in Philippine pesos. For metadata see *Appendix VIII*.

APPENDIX XIII

Results of the Negative Control Outcome test

	Dependent Variable: Log of Pension & Retirement Benefits					
	With regional controls			Without regional controls		
Model	Ordinary Least Squares		2SLS	Ordinary Least Squares		2SLS
	(1)	(2)	(3)	(4)	(5)	(6)
Intercept	-5.3861 **	-5.2430 ***	-5.2518 ***	-2.7790 **	-3.0158 **	-3.9235 **
	(2.0082)	(2.0006)	(2.1149)	(1.2746)	(1.2720)	(1.5351)
Migration rate 2015		-3.6422 ***	-3.4483		-4.8794 ***	-18.1483 **
		(1.3404)	(16.8721)		(1.2967)	(75136)
Migration rate 2009	-0.1894			-1.8729 *		0.0276
	(0.9847)			(0.9564)		(0.0970)
Migrant						
Sex (0 Male; 1 Female)	0.0088	0.0050	0.0052	0.0237	0.0305	0.0276
	(0.0917)	(0.0914)	(0.0987)	(0.0908)	(0.0904)	(0.0970)
Age	0.0065	0.0064	0.0064	0.0055	0.0050	0.0041
	(0.0043)	(0.0043)	(0.0043)	(0.0043)	(0.0043)	(0.0044)
Marital status (1 Married)	0.0211	0.0255	0.0253	-0.0055	0.0086	0.0478
	(0.0948)	(0.0945)	(0.0949)	(0.0953)	(0.0950)	(0.1002)
Highest grade completed	-0.0034	-0.0087	-0.0085	0.0072	-0.0012	-0.0282
	(0.0607)	(0.0606)	(0.0661)	(0.0592)	(0.0591)	(0.0688)
Household						
HH head's sex	-0.1588	-0.0784	-0.0827	-0.1233	-0.0369	0.1848
	(0.2607)	(0.2617)	(0.4606)	(0.2623)	(0.2622)	(0.3149)
HH head's age	0.0568 ***	0.0561 ***	0.0561 ***	0.0573 ***	0.0569 ***	0.0564 ***
	(0.0078)	(0.0078)	(0.0082)	(0.0078)	(0.0077)	(0.0082)
HH head's highest grade	0.7828 ***	0.7767	0.7770 ***	0.6920 ***	0.6796 ***	0.6708 ***
	(0.0793)	(0.0791)	(0.0864)	(0.0774)	(0.0770)	(0.0810)
HH head has a job	-1.1472 ***	-1.2209 ***	-1.2169 ***	-0.9240 ***	-1.0085 ***	-1.3193 ***
	(0.2772)	(0.2777)	(0.4299)	(0.2766)	(0.2769)	(0.3495)
HH head's spouse has a job	-0.7789 ***	-0.7174 ***	-0.7208 **	-0.8131 ***	-0.7470 ***	-0.4979 *
	(0.2159)	(0.2163)	(0.3647)	(0.2145)	(0.2147)	(0.2786)
HH size	0.1309 ***	0.1273 ***	0.1275 ***	0.1733 ***	0.1679 ***	0.1470 ***
	(0.0459)	(0.0458)	(0.0465)	(0.0452)	(0.0450)	(0.0460)
Log HH income per capita	1.2564 ***	1.2736 ***	1.2728 ***	0.5787 ***	0.6148 ***	0.7535 ***
	(0.1632)	(0.1626)	(0.1830)	(0.1122)	(0.1124)	(0.1534)
Regional p.c. income decile	-0.1094 **	-0.1008 **	-0.1013	0.1186 ***	0.1222 ***	0.1254 ***
	(0.0503)	(0.0500)	(0.0683)	(0.0323)	(0.0322)	(0.0335)
Region						
Average annual HH income	0.0023 ***	0.0031 ***	0.0025 ***			
	(0.0002)	(0.0019)	(0.0002)			
Average annual HH savings	-0.0059 **	-0.0053 **	-0.0053 **			
	(0.0028)	(0.0027)	(0.0034)			
Gini ratio	-0.2325	-0.6620	-0.6388			
	(2.4477)	(2.4462)	(3.1740)			
Poverty gap	0.0554	0.0508	0.0511			
	(0.0351)	(0.0349)	(0.0438)			
Number of hospitals	-0.0032 **	-0.0032 **	-0.0032 **			
	(0.0014)	(0.0014)	(0.0014)			
Road density	0.0002	-0.0002	0.0001			
	(0.0019)	(0.0019)	(0.0027)			
Labor force participation	-0.0421 **	-0.0424 **	-0.0424 **			
	(0.0169)	(0.0168)	(0.0168)			
Observations	1394	1394	1394	1394	1394	1394
Adjusted R-squared	0.366	0.3694	0.3694	0.344	0.3489	0.2998
F-statistic	41.21 ***	41.79 ***		57.64 ***	58.86 ***	
Diagnostic tests						
Weak instruments			5.46 *			19.369 ***

Wu-Hausman statistic	0.00	2.222
Sargan	NA	NA

Notes. Heteroskedasticity-robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Source: author's own estimations. Data source: National Statistics Office, the Philippines. Currency unit: expenditure and income are in Philippine pesos. For metadata see *Appendix VIII*.