Essays on Migration, Remittances and Development in Origin Countries

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Abstract

International migration can potentially improve development and welfare outcomes in developing countries. However, the impact of this powerful force on left behind individuals is increasingly investigated but not fully understood. This thesis contributes to the literature on the effect of international migration and remittances on individuals left behind. It consists of three self-contained essays that address the following: the effect of remittances on households' investment decisions, the effect of remittances on households' labour supply, and the phenomenon of remittance dependency, which is when remittances undercut the incentives for households to generate income.

The first empirical essay "Remittances and Household Investment Decisions: Evidence from Sub-Saharan Africa" provides new evidence on the effect of remittances on households' investment decisions. The chapter uses cross-sectional data from five Sub-Saharan African countries, a recursive bivariate probit model and instrumental variables and imperfect instrumental variable approaches to account for endogeneity concerns. The results show that remittances increase the likelihood of investment in human, physical, and social capital in most of the countries analysed. We also find that remittance sources – whether domestic, within Africa and out-of-Africa – have a marked effect on household investment decisions. Finally, we find that the income effect of remittances mainly drives our key findings. However, we also find evidence of substitution effect by left-behind household members and migration expectations in some countries. This chapter contributes to the ongoing debate on the effect of remittances on capital investments.

The second empirical essay "Migration, Remittances and Labour Force Participation: Evidence from Sub-Saharan Africa" contributes to the nascent literature on the effect of international migration and remittances in Sub-Saharan Africa. The chapter uses cross-sectional data from five Sub-Saharan African countries, instrumental variables and imperfect instrumental variable approaches to account for endogeneity concerns. The results show that the effect of remittances on labour supply in Sub-Saharan Africa differs by country. I find that remittances increase labour supply (at the extensive

margin) in Nigeria and Burkina Faso, no statistically significant effects in Kenya and Uganda, and a negative effect in Senegal. The results in Senegal and Burkina Faso are driven by female left behind household members and are stronger in rural areas. Meanwhile, remittances ease liquidity constraints in Nigeria and facilitates the establishment of small businesses for men. Analysis of mechanisms show that the results are mainly driven by the income effect of remittances and to a lesser extent the liquidity effect of remittances. I do not find evidence of the labour lost effect in any of the countries under review.

The third empirical essay "Remittances and Household Dependence: Evidence from Bangladesh" re-examines the notion in the literature that remittance receipt leads to dependency culture. We use cross-sectional data from Bangladesh, instrumental variable and imperfect instrumental variables approach to account for endogeneity concerns. The results show that remittance receipt increases the probability of households to engage in income generating activities and increase household's non-remittance income. Taken together, our result show that remittances does not lead to remittance dependence, as suggested by the migration and remittance literature. Instead, remittances ease households' liquidity constraints and facilitates investment in capital and other income generating activities that increases households' non-remittance income. We also show that health-productivity and liquidity effect are two main mechanisms through which remittances affect household dependence.

Declaration

I, Adesola Olumayowa Sunmoni, confirm that the work presented in this thesis is my own. Where the research was carried out alongside others, or where information has been derived from other sources, I confirm that this has been indicated in the thesis. This work has not been submitted for any other degree or professional qualification.

ADESOLA OLUMAYOWA SUNMONI

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Chapter 1

Introduction

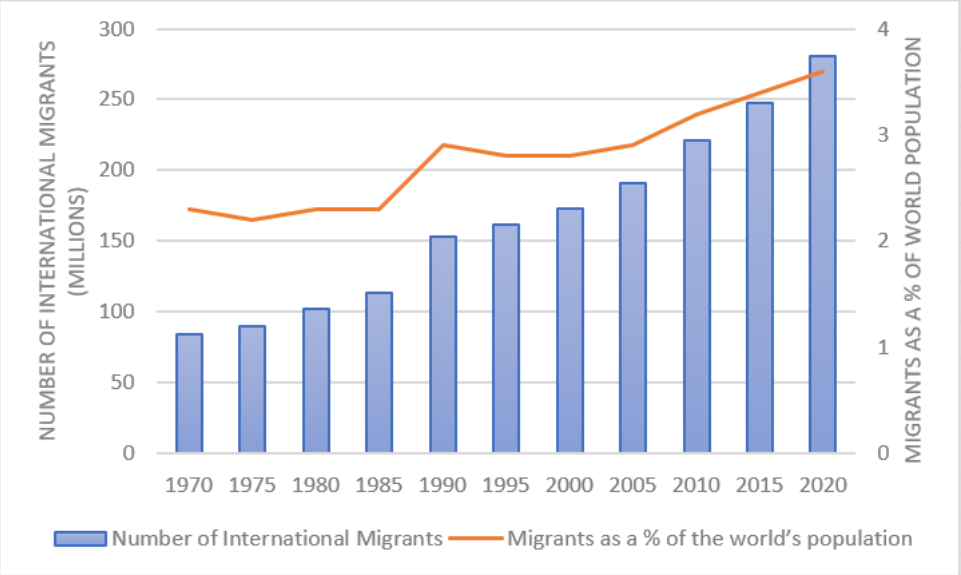
This thesis consists of three independent, empirical papers that investigate the economic impact of migration and remittances on left behind household members in Sub-Saharan Africa (SSA) and South Asia. The thesis refers to and complements a broad strand of empirical literature on the impact of migration and remittances on left behind individuals and households in migrants country of origin. The first paper examines the impact of remittances on households' investment decisions in SSA. The second paper investigates the effect of migration and the inflow of remittances on the labour supply decisions of individuals left behind in SSA. Finally, the third paper moves away from SSA and investigates the phenomenon of remittance dependency, that is, when remittances undercut the incentives for households to generate income, in Bangladesh.

In what follows, I provide a general background on international migration and remittances - outlining the empirical challenges of migration research and stating the methodological contribution of this thesis. I also explore the gap in the literature for each of the empirical chapters and state the contribution of this thesis to the existing literature.

1.1 Overview

International migration is one of the most debated phenomenon in the 21st century[1]. A cursory look at the news today creates the perception that we are experiencing a migration crisis of epic proportions[2]. However, data shows that migrants as a share of the world population has remained relatively stable at about 3% since the early 90s (World Bank, 2018b). As of 2020, the United Nations estimate that about 281 million people, which corresponds to 3.6% of global population, live and work outside their country of birth (IOM, 2022). Although the stock of migrants globally has increased substantially along with population over the past decades, migrants as a share of world population has increased only slightly - see Figure 1.1.

Figure 1.1: International migrants as a share of global population



Notes. This figure was created by the author using international migration data from UNDESA and world population data from the World Bank's World Development Indicators. Data was accessed on June 27, 2022.

International migration has significant implications for both origin and destination countries. There is an extensive body of literature that examines the effect of international migration on destination countries. Researchers have examined the impact of migration on wages and employment (Dustmann et al., 2013; Ottaviano & Peri, 2012; Piyapromdee, 2021), housing (Gonzalez & Ortega, 2013; Mussa et al.,

[1] International migration presents a dilemma for policy makers in developed countries. On one hand, migration helps migrants and their families to improve their quality of life. It also allows people to escape poverty, violence and conflict in their home country. Furthermore, migration has positive direct and indirect impacts in destination countries. However, there is substantial resistance to migrants in destination countries and migrants are usually associated with high crime rates, unemployment and a deterioration in social services.

[2] This is typically driven by refugees and illegal migrants

2017), crime (Bianchi et al., 2012; Chalfin, 2015; Ozden et al., 2018), and social services (Jofre-Monseny et al., 2016). These studies overwhelmingly show that the economic and social benefits of international migration dwarf the costs (Ratha et al., 2019; World Bank, 2018b).

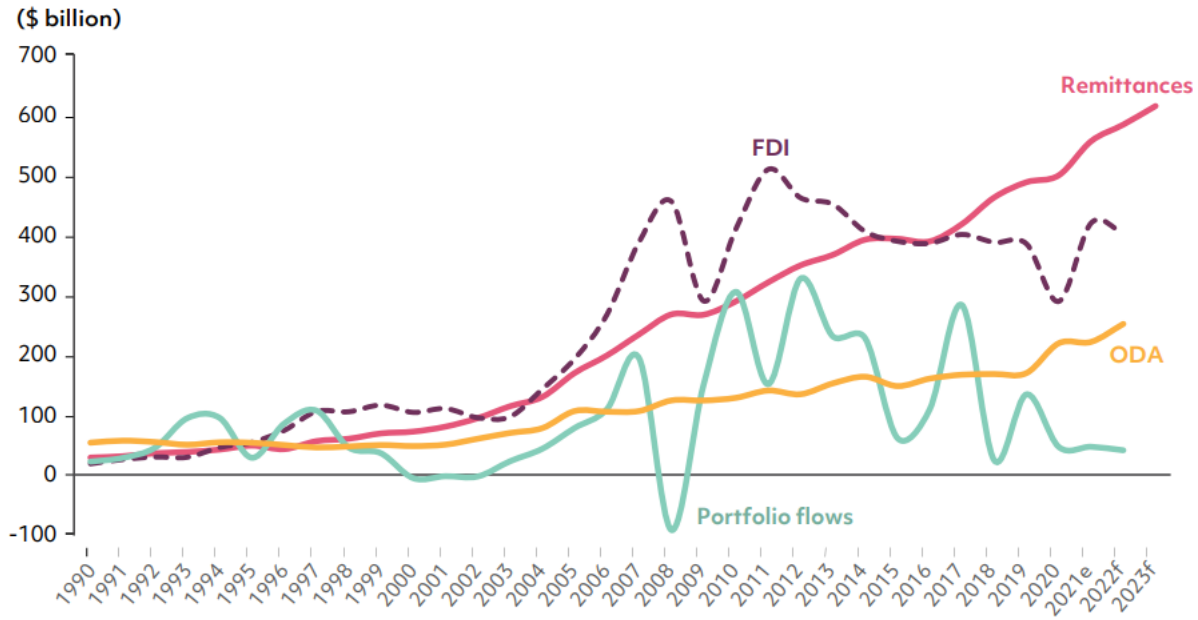
From a development economics point of view, the effect of international migration refers to the impact on origin countries. International migration affects origin countries through different channels such as transfer of knowledge (Dustmann & Kirchkamp, 2002; McCormick & Wahba, 2004; Wahba, 2004), transfer of norms (Docquier et al., 2016; Ferrant & Tuccio, 2015; Tuccio & Wahba, 2018), and establishing trade and investment linkages between origin and destination countries (Docquier & Rapoport, 2012; Fagiolo & Mastrorillo, 2014). However, the most tangible and direct impact of international migration on origin countries is the flow of remittances (Ratha et al., 2011; Ratha et al., 2019) .

Remittance[3] flows to developing countries have increased drastically over the past decade and are estimated to reach $630 billion in 2022 according to the World Bank (World Bank, 2022b). The sharp increase in remittances is partly due to better measurement of remittances and higher emigration rates (Ratha et al., 2011). Remittances are a stable[4] source of external financing in developing countries; they surpassed foreign direct investment (FDI) in recent years and are three times bigger than official development assistance (ODA), see Figure 1.2. Since remittances are person-to-person private transfers, they flow directly to the intended beneficiaries unlike ODA which flow through government agencies (Ratha et al., 2019). Similarly, remittances are counter cyclical; acting as insurance during periods of conflict, natural disasters, economic downturn and pandemics, thus helping to smoothen consumption and sustain macroeconomic stability (Bettin & Zazzaro, 2018; Ratha et al., 2019; World Bank, 2022a).

[3]defined as cross border person to person private transfers. This refers to international remittances as the total level of internal remittances in the developing world is unknown, according to Adams (2011)

[4]Fullenkamp et al. (2008) showed that remittance flows are less volatile than FDI and other capital flows to developing countries.

Figure 1.2: Remittances and other international flows to developing countries, 1990-2023f



Source: World Bank (2022a) page 3. Notes. This figure excludes China as it is the largest recipient of inward FDI in the world. e = estimate and f = forecast.

1.2 Migration and Investment

1.2.1 Summary and gaps in the literature

Remittances can improve the long-term welfare of recipient households by facilitating investment in productive assets such as human and physical capital. Remittances can also act as insurance by helping recipient households smooth consumption during periods of adverse economic shocks. The effect of migration on household investment decisions is ambiguous a priori and must be determined empirically. For example, in the context of rural areas, male migration reduces the total stock of labour available in a household which can stifle farm and non-farm self employment activity, thus dis-incentivising investment in such activities (Ozden & Schiff, 2007). On the other hand, the income effect of remittances increases the resource availability in the household and can facilitate investment in physical capital and farm or non-farm enterprises. This is particularly important when households are credit constrained or when liquidity constraints are binding.

Similarly, empirical evidence on the effect of migration and remittances on physical capital investment and entrepreneurship is mixed. On the optimistic side, an early study by Funkhouser (1992) found evidence that remittances increase self-employment

in Nicaragua. Woodruff & Zenteno (2007) find similar results in Mexico, Adams (1998) in rural Pakistan, Yang (2008) in the Philippines, Giulietti et al. (2013) for return migrants in China, and Bossavie et al. (2021) also for return migrants in Bangladesh. The authors argue that wealth and capital constraints limits investment in physical capital and entrepreneurship. On the less optimistic side, Massey & Parrado (1998) find a negative correlation between migration and enterprise development in Mexico. They argue that migration can leave the household without sufficient labour to undertake risky activities. Also, Amuedo-Dorantes & Pozo (2006b) using data from the Dominican Republic found that recipient households are less likely to invest in family businesses compared to non-recipient households. They argue that this result could be due to an increase in the reservation wage of the household heads, which makes them less likely to invest in a family business. Similarly, Giulietti et al. (2013) found that left behind household members are less likely to be self-employed.

Remittances can also facilitate investment in human capital by easing household liquidity constraints and reducing the need for child labour. However, the absence of an adult household member may mount pressure on children to take up more household chores or work in the family business, thus reducing time available for schooling. In an early study, Cox-Edwards & Ureta (2003) found that children in remittance receiving households in El Salvador are more likely to remain in school, compared to children in non-recipient households. Calero et al. (2009) finds similar results in Ecuador. Furthermore, in Haiti, children in remittance receiving households have higher school attendance rates than their counterparts in non-remittance receiving households (Amuedo-Dorantes & Pozo, 2010). Similar results are found in Asia. For instance, Yang (2008) in the Philippines, De & Ratha (2012) in Sri Lanka and Bansak & Chezum (2009) in Nepal.

Some studies also find a negative effect of migration and remittances on education outcomes. For example, Mckenzie & Rapoport (2011) using data from Mexico find that children in migrant households are 13-15% less likely to complete high school. The authors argue that their result could be driven by migration expectations of the children left behind especially when the returns to origin country human capital is low in the destination country. In the same vein, Acosta (2007), using household level data for 11 Latin American countries found that remittances are associated with higher education attainment in 6 out of the 11 countries surveyed.

In developing countries where credit markets are imperfect and formal insurance mechanisms are largely absent, poor households usually depend on informal networks for support. These networks are utilised to share risks and function as alternative insurance mechanisms during periods of hardship (Fransen, 2015). By investing

in social capital through participating in religious or community organisations or financially supporting weddings, marriages or funerals of family members or friends, remittances receiving households somewhat insure themselves against future risks. There is no consensus in the limited literature on the effect of remittances on social capital investment. While some studies find a positive effect, others find a negative effect. For example, Gerber & Torosyan (2013), using data from Georgia finds that remittances foster the formation of social capital by increasing the amount of money that households give as gifts to family members and friends. Conversely, using data from Rwanda, Caarls et al. (2013) found that remittance-receiving households participate less in community organisations and reported lower levels of reconciliation than non-receiving households. The authors argue that households' reliance on remittances reduced motivations to invest in building social capital.

In light of the summary of relevant literature above, some gaps in the literature emerge. First, most of the studies focus on Latin American countries and Asia, with very little attention on Sub-Saharan Africa countries. This is important because these regions vary significantly in migration patterns, norms and institutions. Furthermore, policies aimed at harnessing the positive impact of migration and reducing the costs of sending remittances should be context specific or corridor specific. Second, most of the studies focus mainly on international remittances, virtually ignoring internal remittances. It is a known fact that internal and international migrant households are systematically different, consequently, internal and international remittances are utilised differently (Wouterse & Taylor, 2008; Adams & Cuecuecha, 2010). Third, most studies investigate only one investment outcome at a time. Consequently, they are unable to provide a comprehensive view on the effect of migration and remittances on household investment decisions. Furthermore, they are unable to explore complementarities and substitutability among investment outcomes. Fourth, a significant proportion of the empirical literature reviewed did not properly correct for selection (as migration is non-random) and endogeneity in the receipt of remittances. Thus the results obtained may be biased. Finally, many of the studies reviewed presented the net effect of migration on household investment decisions. They did not attempt to separate the migration effect from the remittance effect. Furthermore, they did not explore the channels through which migration and remittances affect investment decisions. This is important because the transmission mechanism can help explain the net effect on households investment decisions.

1.2.2 Contribution to the migration and investment literature

It is in the context of the preceding argument that the present thesis contributes to this literature. The first empirical paper "Remittances and Household Investment Decisions: Evidence from sub-Saharan Africa " (Chapter 2) examines the effect of remittances on investment decisions by remittance-receiving households. In particular, this paper answers two questions. First, are remittance receiving households more likely to make investment expenditures than non-remittance receiving households? Second, do the household investment decisions vary by the type of investment expenditure: human capital (i.e., education and health), physical capital, and social capital? We use cross-sectional household level data on five African countries from the Migration and Remittances Survey conducted by the World Bank in 2009/2010. The countries are Nigeria, Kenya, Uganda, Senegal, and Burkina Faso.

To identify the effect of remittances on household investment decisions, we use a recursive bivariate probit model and instrumental variables (IV) approach. We find that remittances increase the likelihood of investment in human, physical, and social capital in most countries under review. Our findings are consistent with past studies that find positive effects of remittances on human capital (Amuedo-Dorantes & Pozo, 2010), physical capital (Jena, 2018), and social capital (Fransen, 2015). However, we find that remittances reduce health and social capital investment in Nigeria and physical capital investment in Burkina Faso. Our results are robust to alternative model specifications, different definitions of our treatment and outcome variables and relaxing the exclusion restriction assumption of the traditional instrumental variables approach.

In terms of heterogeneity of effect, we find that our main results are driven by households with migrants. We also find that internal remittances matter more for education investment, within-Africa remittances are more likely to increase health investment, and out-of-Africa remittances are more likely to increase physical and social capital investment. To explain these findings, we explore three mechanisms - income effect, substitution effect, and migration expectations effect[5]. We find that the income effect of remittances mainly drives the positive effect on capital investment. We find evidence of the substitution effect only in Kenya and Senegal and we do not find evidence of migration expectations.

This paper contributes to the broad literature on the effect of remittances on origin households and communities in the following ways. First, we contribute to the scant but growing literature on the impact of remittances on household investment decisions by providing empirical evidence for the understudied Sub-Saharan Africa

[5]This refers to the intentions to migrate of left behind household members.

region. Second, our study uses a standardised data-set for five SSA countries and dis-aggregates investment expenditure into three categories– human capital, physical capital, and social capital investment. This analysis allows us to compare the effect of remittances across countries and investment types. Past studies only study one type of capital investment and one country at a time. For instance, Jena (2018) and Ajefu (2018) studied only physical capital investment in Kenya and Nigeria, respectively. In addition, addressing the multiplicity of the investment alternatives allows us to explore the heterogeneity among the investment types and check for substitutability. Third, we explore the heterogeneous effect of remittances from internal, within-Africa, and out-of-Africa sources on receiving households' investment decisions; past studies mostly focus on only international remittances or only internal remittances, and a few explore internal and international remittances. Finally, we explore three mechanisms through which remittances affect investment decisions. Existing studies assume that the income effect is the main mechanism; however, they do not demonstrate this empirically.

1.3 Migration and Labour Supply

1.3.1 Summary and gaps in the literature

In the first empirical paper, we found that remittances increase the likelihood of investment physical capital amongst other key results. Physical capital investment in this context comprise of starting a business, purchasing agricultural land and other productive assets. These assets typically need to be complemented with labour to become productive. To this end, the second empirical paper focuses on the effect of migration and remittances on the labour supply of left behind individuals.

The effect of migration and the inflow of remittances on labour supply of left behind household members is ambiguous a priori. On one hand, remittances can allow households to overcome liquidity constraints that hinder self-employment or new enterprise development, thus creating employment opportunities and contributing to local economic development. In this context, it is expected that remittance receiving households invest more in family businesses or micro enterprises and supply more labour in self-employment. On the other hand, remittances - a form of non-labour income - can increase the reservation wage of the left behind individuals, thus reducing their labour supply. Remittances can also reduce the opportunity cost of leisure which will increase the demand for leisure (assuming leisure is a normal good) and reduce the probability of participating in the labour market.

The absence of a member of the household implies that that person's input will be missing in home production and the domestic labour market. If the migrant was economically active, the absence of the person reduces the total stock of labour hours available in the household and household income which may induce the other household members to join the labour force or increase labour supply. Furthermore, if the person had caring responsibilities, their absence might mount greater burden of work on the remaining household members. The absence of a migrant or labour-lost effect is strong in developing countries where imperfect labour markets make it difficult to hire workers to replace the labour lost to migration. Since these mechanisms work in opposite directions, the impact of migration and remittances on left behind family members can only be determined empirically.

The preponderance of evidence in the literature suggest that migration and remittances reduce the labour supply of left behind individuals. This result is usually influenced by the gender and age of the left behind individuals and type of employment (whether paid employment or self employment). Funkhouser (1992) using data from Nicaragua found that remittances decrease labour force participation but increase self-employment of left behind male and female household members. Kim (2007) using data from Jamaica found that international remittances have a negative impact on the labour force participation of left behind members but had a neutral effect on weekly working hours. In a similar study in Mexico, Amuedo-Dorantes & Pozo (2006a) using the number of western union offices in a state as an instrument for remittances found no overall change in male labour supply. However, they found that men in remittance-receiving households switch from formal to informal work whereas the overall labour supply of rural women declines in response to remittance inflows. More recent studies find similar results in different countries. For instance, Lenoël & David (2019) in Morocco, Phadera (2016) in Nepal, Jadotte & Ramos (2016) in Haiti and Vadean et al. (2017) in Tajikistan all find that migration or remittances reduce female labour supply or participation.

While all the preceding studies find that international migration and remittances often lead to a reduction in the labour supply and participation of left behind female household members, some studies found that migration has limited or no significant effect on the labour force participation of left behind members. For instance, Cox-Edwards & Rodríguez-Oreggia (2009) using data from Mexico found that remittances have limited impact on the labour force participation of left behind household members. The authors argue that their result is consistent with the notion that migration is a crucial part of household's income generation strategy. In a more

recent study Mobarak et al. (2021) using data from Bangladesh, found that remittances have no significant effect on the labour supply of left behind household members.

The summary of the literature above reveals a few gaps in our understanding of the effect of migration and remittances and the labour supply of left behind household members. First, little is known about this phenomenon in Sub-Saharan Africa as most of the studies cover Latin America and the Caribbean as well as Asia. Understanding how migration and remittances affect the labour supply of left behind house members can help African governments design context specific policies that maximise the benefits of migration, while minimising the costs. Second, most of the studies present descriptive analysis and should not be interpreted as causal effects. Furthermore, when the studies use instrumental variables to address endogeneity, the exclusion restrictions are difficult to defend. Third, most of the studies surveyed only present results for one country at a time. This makes comparison of results across countries difficult.

1.3.2 Contribution to the migration and labour supply literature

The second empirical paper "Migration, Remittances and Labour Supply: Evidence from Sub-Saharan Africa" (Chapter 3) examines the effect of international remittances on the labour supply decisions of left behind individuals. To account for the endogeneity of remittances, the paper employs the classic instrumental variables approach together with an imperfect instrumental variables approach which allows for the relaxation of the validity assumption of the classic approach and obtains bounds on the endogenous parameter of interest. Using the same dataset as the chapter 2, I find that remittances have a complex impact on the labour supply of the individuals left behind in the countries under review. I find that remittances increase labour force participation in Nigeria and Burkina Faso which is likely driven by the liquidity effect of remittances. I find statistically insignificant effects in Kenya and Uganda and a negative effect in Senegal, which is likely due to the income effect of remittances. The results are robust to relaxing the exclusion restriction of the traditional instrumental variables approach, alternative definition of our treatment and outcome variable, and to alternative model specifications. Analysis of transmission mechanisms show that the results are mainly driven by the income effect of remittances and to a lesser extent the liquidity effect of remittances. I do not find any evidence of the labour lost effect in all the countries under review.

I contribute to the literature in the following ways. First, I use a novel method - the IIV by Nevo & Rosen (2012) - to address endogeneity and check for the sensitivity of the results to violations of the exclusion restriction. Past studies use instrumental variables to identify the effect of remittances on labour supply. However, the adopted

instrument often violates the exclusion restrictions. The IIV method, relies on weaker assumptions in place of the strong exclusion restriction assumption. Consequently, instead of relying on point estimates, it provides a range of values which contain the true effect. Second, I offer a comprehensive view of the effect of remittances on labour supply in Sub-Saharan Africa, a region for which there is little evidence on this phenomenon. I exploit the strengths of cross-country analyses and country-specific analyses to provide a comprehensive view of Sub-Saharan Africa. In the context of country specific analysis, each country is examined in isolation. In terms of the cross-country analysis, five countries in Sub-Saharan Africa are analysed with a standardised data set and methodology. To my knowledge, only Binzel & Assaad (2011) has provided evidence for Africa. However, they focus on Egypt which is different from the rest of Sub-Saharan Africa in many respects, e.g. migration patterns. As a result, the findings from this country cannot be generalised to other SSA countries. Third, I provide comparable estimates for sub-Saharan Africa using a standardised data-set, methodology and assumptions. Past studies only study one country at a time. Furthermore, the estimates are not comparable as the datasets, methodologies and assumptions are different. For instance, Amuedo-Dorantes & Pozo (2006a) studied only Mexico, Binzel & Assaad (2011) studied only Egypt and Jadotte & Ramos (2016) studied only Haiti. Finally, I explore different transmission channels of the effect of migration on labour supply. This is important because the net effect of migration on labour supply is ultimately determined by the relative strength of the opposing forces. Consequently, it is important to examine the specific channels through which the estimated effects are transmitted. Past studies only state that the income effect is the main transmission channel, but they do not empirically prove it. I analyse three different mechanisms – income effect, liquidity effect and labour lost effect – of how remittances affect the labour supply of left behind household members.

1.4 Remittances and Household Dependence

1.4.1 Summary and gaps in the literature

The second empirical chapter shows that the effect of migration on the labour supply of left behind household members differs across the countries studied. I found that remittances increase labour supply in Nigeria and Burkina Faso, but reduces it in Senegal. I also found statistically insignificant effects in Kenya and Uganda. However, the literature overwhelmingly shows that remittances reduce the labour supply of left behind household members. Many authors have interpreted this to mean that remittance receipt could breed a culture of dependence at the receiving household

level (Amuedo-Dorantes, 2014; Démurger, 2015). Lower labour supply in response to inflow of remittances could reduce investment in physical capital and business formation which could lower the rate of capital formation and dampen economic growth. Household dependence on remittances is thus an important topic to explore.

The literature on the effect of remittances on household dependence is virtually non-existent. The closest are studies like chapter 3 of this thesis that examine the effect of remittances on the labour supply of left behind household members. These studies do not fully capture remittance dependence for the following two main reasons. First, migration from developing countries is typically a male phenomenon (BBS, 2016; Ratha et al., 2011), and left behind adult family members are usually female members (i.e., wife) and elderly parents (Démurger, 2015). Following the social norms of developing countries, these left-behind family members are more likely to stay at home and engage in home production rather than participate in the labour market. Second, remittances may facilitate asset accumulation such as agricultural land that generates non-labour income from land rents and crop sharing agreements. Consequently, the labour supply does not capture the extent of remittance dependence.

The third empirical paper "Remittances and Household Dependence: Evidence from Bangladesh" (Chapter 4) examines the effect of remittance receipt on households' dependence on remittances. The chapter uses data from the Bangladesh Survey on the Use of Remittance, 2013. Bangladesh is a suitable context to study this question because it is a major labour exporting country and ranks among the top ten international remittances receiving countries in the world (World Bank, 2020b). Furthermore, there is a sizeable incidence of remittance dependence amongst households in Bangladesh (IOM, 2019). In addition, we are unable to study this phenomenon in SSA because of data limitations[6]. In terms of methodology, this chapter employs instrumental variables and imperfect instrumental variables approaches to identify the effect of remittances on remittance dependence. The results suggest that remittance receipt does not lead to remittance dependence, as suggested by the migration and remittance literature (Amuedo-Dorantes & Pozo, 2006a; Binzel & Assaad, 2011; Mendola & Carletto, 2012). Rather, remittances ease households' liquidity constraints and facilitates investment in capital (Adams & Cuecuecha, 2013; Hossain & Sunmoni, 2022; Yang, 2008) and other income generating activities that increases households' non-remittance income. Our results differs from past studies because we use a novel and more comprehensive definition of remittance dependence. Precisely, we define remittance dependence as a binary indicator variable that equals one if the household

[6]The Migration and Remittance survey does not collect data on household incomes. We therefore cannot study remittance dependence using this data

has no other income except remittances and zero otherwise. We also define remittance dependence as other household income excluding remittances: non-remittance income. The rationale is that the larger non-remittance income is, the less dependent the household will be on remittances.

These results are robust to different model specifications, different definitions of our treatment and outcome variables and violations of the exclusion restriction of the instrumental variables approach. We also show channels through which remittances affect household dependence. Precisely, we explore the health productivity and liquidity effect mechanisms. Our results show that these are important mechanisms through which remittances affects households. Using five different measures of health productivity, we find that remittances ease liquidity constraints thus allowing individuals to purchase better quality food, live in a more sanitary environment, and invest in their health. These factors contribute to the worker's health, thus increasing their productivity and participation in the labour market and income generating activities. Secondly, we find strong evidence for the liquidity effect mechanism. Our results show that remittances ease households' liquidity constraints and facilitate participation in income generating activities such as investment in physical or financial capital, which boosts households' non-remittance income and reduces remittance dependence.

1.4.2 Contribution to the household dependence literature

We make two important contributions to migration and household dependence literature. First, we use a novel approach to explicitly study remittance dependence. To our knowledge, we are the first to explicitly study the effect of remittances on receiving households' dependence. The closest studies to ours are those studying the effect of remittances on left-behind household members' labour supply (Amuedo-Dorantes & Pozo, 2006a;Binzel & Assaad, 2011; Mendola & Carletto, 2012). We argue that labour supply decisions of household members do not fully capture remittance dependence in developing countries. In addition, we offer better indicators of remittance dependence. Second, we highlight important channels through which remittances affect households dependence. In the context of low- and middle-income countries where missing credit and insurance markets are prevalent, the income effect may not be enough to fully capture the effect of remittances on households. We thus, explore two other mechanisms – health productivity and liquidity effect – which better capture the effect of remittances on households. Third, we used a novel method proposed by Nevo & Rosen (2012) to check the sensitivity of our results to violations of the exclusion restriction. Past studies that used instrumental variables approach did not check

the sensitivity of their results to weaker assumptions of the instrumental variables approach.

1.5 Methodological Issues and Contribution

1.5.1 Empirical challenges

Household survey data with information on migration and remittance flows have made empirical studies of the effect of migration on left behind household members possible. The standard methodology is to compare outcomes of interest for households that have at least one migrant member with households that do not have any migrants (Adams, 2011; Antman, 2012; Gibson et al., 2011). One challenge with this approach is that migration itself is a choice. Households choose whether to engage in migration or not, they choose who migrates to which destination and for how long. The migrants also choose whether to return, whether to send remittances, how much to send and how frequently to send remittances. Therefore, given that migration and remittances are not random but are infact choices, it is possible that the factors that affect migration and remittances also affect other outcomes of left behind individuals. Thus, it is difficult to ascertain whether migration and remittances explain the outcome of interest or whether there is some unobserved variable that is correlated with both migration and remittances and the outcome of interest. This is the classical omitted variables bias problem. For example, migration is a costly undertaking and wealthier households may be able to send a worker abroad and still invest in physical capital. In this case, comparing the outcomes of migrant households versus non-migrant households might capture differences in wealth rather than the effect of migration. Furthermore, endogeneity can arise from reverse causality. For example, the income effect of remittances can facilitate investment in human and physical capital. However, it is also possible that the availability of high quality schools or viable investment opportunities in origin countries can lead to the inflow of remittances. Thus, a valid identification strategy is required to tease out the causal effect of migration and remittances on left behind individuals and households.

One of the commonly used methods to address the endogeneity of migration and remittances in the literature is the instrumental variables (IV) approach. The main challenge with using this approach is finding valid instruments that are correlated with the endogenous variable of interest but uncorrelated with the outcomes of interest except through the endogenous regressor. While the first assumption - called the relevance assumption - can be easily tested, the second assumption, which is the exclusion restriction, cannot be tested empirically and researchers must rely on

economic intuition and logic to justify their exclusion restriction. It is therefore no surprise that the migration literature has converged on a few least controversial instruments (Antman, 2012). They are; current or historical migration networks (Acosta, 2011; Alcaraz et al., 2012; Calero et al., 2009; Coon, 2016; Hildebrandt et al., 2005; Mckenzie & Rapoport, 2011), and variables that capture economic conditions or changes in economic conditions in destination countries (Cuadros-Menaca & Gaduh, 2020; Amuedo-Dorantes, 2014; Yang, 2008).

As stated previously, it is difficult to motivate and defend the exclusion restriction of the traditional IV method. This is exacerbated by the fact that there are no definitive tests to prove that the exclusion restriction is satisfied (Clarke & Matta, 2018). For example, the decision to migrate and send remittances is correlated with current migration networks. However, the exclusion restriction may be violated as some district level events may also affect the decision to migrate or send remittances, e.g. a weather shock. Historical migration networks are less affected by current shocks but the exclusion restriction may also be violated. For example, previous remittance flows, return migration, and the transfer of knowledge via migration may be correlated with district level factors such as education facilities, health facilities, and a better investment climate. Consequently, historical migration networks could be correlated with the current level of infrastructure in a district. Similarly, destination-level variables affect remittances but are assumed to be uncorrelated with outcomes in origin countries. However, the choice of the destinations themselves are endogenous, thus violating the exclusion restriction.

1.5.2 Methodological Contribution

The preceding discussion provides the context for the methodological contribution of this thesis. I implement an alternative method to account for the endogeneity of the remittances and migration without making strong assumptions about the exclusion restriction. Specifically, I use the imperfect instrumental variables (IIV) approach developed by Nevo & Rosen (2012). This method allows the researcher to learn about the endogenous parameter of interest even if the exclusion restriction fails. In place of the exclusion restriction of the standard IV method, Nevo & Rosen (2012) make two weaker assumptions that allow the endogenous parameter of interest to be partially identified. First, they assume a non-zero correlation between the IIV and the error term. That is, they allow the IIV to be correlated with the error term. In addition, they assume that the sign of the correlation between the IIV and the error term is the same direction as the sign of the correlation between the endogenous regressor and the error term. The second assumption is that the correlation between the IIV and the

error term should be less than the correlation between the endogenous regressor and the error term. This assumption implies that the IIV should be less endogenous than the endogenous regressor. These two, weaker assumptions in place of the traditional validity assumption generate bounds on the parameter of interest rather than point estimates. To my knowledge, this thesis is the first to apply the IIV method to the migration literature. The IIV has been used to check the sensitivity of IV results in health economics (Amin et al., 2020), environmental economics (Aragón & Rud, 2016; Lovo & Veronesi, 2019) and household economics (Tur-Prats, 2019). However, it has not been extended to the migration literature. This is important as many studies in the migration literature rely on instrumental variables for identification.

Chapter 2

Remittances and Household Investment Decisions: Evidence from Sub-Saharan Africa

Note: A version of this essay has also appeared as an article in the April 2022 edition of IZA Journal of Development and Migration; DOI: 10.2478/izajodm-2022-0004. An older version has also been published as Department of Economics (University of Reading) Discussion Paper Series No. 2021-04. This article was co-authored with Md Shahadath Hossain, who is a PhD student at the State University of New York, Binghamton, USA; e-mail: mhossai3@binghamton.edu. Shahadath has agreed that the essay can appear within this thesis, and that it represents a significant contribution on my part. Reproduction of the essay here does not infringe the publisher's copyright policies. The version here has been rewritten and reformatted compared with the aforementioned article, and so they are not identical, though the main substance and results are. This work was presented at the Department of Economics (University of Reading) PhD Seminar Series.

2.1 Introduction

Globally, one in nine people receive remittances from a migrant family member, and these transfers make up about 60 percent of the receiving household's income (United Nations, 2019). The United Nations estimate that about three-quarters of remittances are spent on necessities, such as food and housing, while the rest is saved or invested in income-generating activities and coping with shocks (i.e., crop failure or family emergencies) (United Nations, 2019). Earlier studies on the uses of remittances

focused on household consumption expenditure (i.e., durable and non-durable goods). However, more recently, an increasing number of studies are investigating households' use of remittances for investment purposes.

In principle, remittances can help boost the longer-term prospects of remittance receiving households by facilitating investment in productive assets. It can also help to smoothen consumption for households affected by adverse economic shocks. However, despite the potential of remittances to stimulate capital accumulation and investment, the earning capacity of receiving households often stays unchanged even after years of receiving remittances. This observation suggests that remittance receiving households often fail to accumulate capital and invest in income-generating activities but allocate remittances to immediate and conspicuous consumption (Chami et al., 2003; Kakhkharov & Ahunov, 2020; Simiyu, 2013). Additionally, dependence on remittances may reduce involvement in income-generating activities by the left-behind household members.

It is difficult to theoretically determine the net effect of remittances on investment decisions. Several empirical studies have investigated this question, but the findings are inconclusive (Démurger, 2015). Studies have found positive (Amuedo-Dorantes & Pozo, 2010; Jena, 2018), null (Acosta, 2011), and adverse effects (Simiyu, 2013) of remittances on household investment decisions. The bigger concern here is the reliability of the existing empirical studies, as these studies often suffer from selection bias and other endogeneity issues (Adams, 2011).

This study aims to examine the effect of remittances on households' investment decisions using data from five Sub-Saharan Africa (SSA) countries. More specifically, we investigate two questions. First, are remittance receiving households more likely to make investment expenditures than non-remittance receiving households? Second, do the household investment decisions vary by the type of investment expenditure: human capital (i.e., education and health), physical capital, and social capital? In addition, we explore the heterogeneous effect of remittance sources– internal, within Africa, and out-of-Africa remittances. Finally, we examine three different channels– income effect, substitution effect, and migration expectations– through which remittances can affect household investment decisions.

Sub-Saharan Africa is an excellent context to study these questions as little is known about the relationship between remittances and household investment decisions in the region. To our knowledge, only a handful of studies have examined this question in the region. Moreover, most empirical studies on the subject are based on Latin American countries, with some focus on Asia (Acharya & Leon-Gonzalez, 2014)

but largely ignoring Sub-Saharan Africa. The results from these regions may not be generalisable to Sub-Saharan Africa primarily due to differences in migration patterns. SSA migrants typically migrate to other African countries or outside the continent with no intention of returning, while Latin American and Asian migrants are typically temporary migrants who return to their country of origin (Ratha et al., 2011).

Our study utilises the Migration and Remittances Household Surveys conducted by the World Bank between 2009 and 2010 as part of the Africa Migration Project (AMP). These cross-sectional household surveys provide comprehensive information about migration, remittances, housing conditions, household assets and expenditures, and other socioeconomic and demographic characteristics. The dataset also provides the opportunity to analyse remittance flows by sources, namely, internal remittances, within-Africa remittances, and out-of-Africa remittances. We use data on five predominantly remittance receiving countries in the AMP: Uganda, Kenya, Nigeria, Burkina Faso, and Senegal. An important characteristic of the AMP surveys is that they are standardised across countries, which allows for easy aggregation and comparison. The AMP surveys enable us to provide country-specific results and explore the effect heterogeneity across countries in SSA.

We define investment expenditure as an outlay for which the household expects financial returns in the future. Human capital investments are broadly defined to have two components– expenditure on education and health. Education investments are households' expenditure on tuition payment, purchase of school uniforms, books, and other related expenditures. Health investments are households' expenditure on doctor fees, hospital fees, cost of diagnostics tests and medicine. Physical capital investments are households' expenditure on setting up a business, opening a store, purchasing farming equipment such as tractors, and purchasing other productive assets. Finally, social capital investments are households' expenditure on festivals, weddings, and funerals. Households that spend on festivals, either as contributions to the village or in private celebrations, receive tangible returns in the form of higher social status, access to larger social networks to protect against adverse economic shocks, and access to credit markets (Rao, 2001).

To identify the effect of remittances on household investment decisions, we use a recursive bivariate probit model and instrumental variables (IV) approach. The recursive bivariate probit model simultaneously estimates remittance receipt and investment decisions while incorporating the remittance receipt variable in the investment decision equation. The identification of the recursive bivariate probit model parameters requires at least one variable (i.e., instrumental variable) in the remittance receipt equation that is excluded from the investment decision equation

(Bhattacharya et al., 2006; Horrace & Oaxaca, 2006; Jena, 2018; Wooldridge, 2002). Our primary outcome variables are binary indicators that equal one if the household made an investment expenditure in the previous six months before the interview and zero otherwise. Similarly, our treatment variable is a binary indicator, which equals one if the household has received remittances in the previous 12 months before the interview and zero otherwise. Since the investment decision and remittance receipts are binary variables and remittance receipt is potentially endogenous, the regression analysis employs a recursive bivariate probit model. However, we also implement a two-stage least squares (2SLS) approach as a robustness check. In addition, we conduct intensive margin analysis using the actual amounts of investment expenditures and remittances.

We account for the potential endogeneity of remittances by using historical migration networks as instrumental variables. This instrument has been used previously in the migration literature (see Acosta, 2011; Coon, 2016; Mckenzie & Rapoport, 2011). We define historical migration networks as district-level historical migration rates. District-level historical migration rates are obtained from Population and Housing censuses– Burkina Faso 1996, Kenya 1999, Nigeria 2006, Senegal 1988, and Uganda 2002. The identifying assumption is that historical migration networks predict current migration rates and the subsequent inflow of remittances but do not directly affect a household's current investment decisions except through migration and remittances.

We find that remittances positively affect human, physical, and social capital investment in most countries analysed. Our findings are consistent with past studies that find positive effects of remittances on human capital (Amuedo-Dorantes & Pozo, 2010), physical capital (Jena, 2018), and social capital (Fransen, 2015). However, we find that remittances reduce health and social capital investment in Nigeria and physical capital investment in Burkina Faso.

We check the robustness of our main results by using different specifications, different definitions of our key explanatory and outcome variables, and relaxing the exclusion restriction assumption. First, we implement Nevo & Rosen (2012)'s imperfect instrumental variables (IIV) approach that relaxes the exogeneity assumption by allowing the instrument to be correlated with the regression error term. The key assumption here is that the correlation between the instrument and error term is weaker than the correlation between the instrument and endogenous variable. Our results are largely robust to relaxing the exclusion restriction. Next, we consider a continuous treatment variable– the amount of cash remittances received by the household– and our main result persists. Finally, we used a continuous treatment (i.e., the cash amount

of remittances) and a continuous outcome variable (i.e., the cash amount of investment expenditure), and the results are qualitatively similar to our main results. This suggests that our results are robust to relaxing the exclusion restriction, using different model specifications, and different definitions of the treatment and outcome variables.

We also explore the heterogeneity of our results across three different dimensions. First, we investigated how households with migrants and households without migrants differ in their investment decisions. Our results show that there is some variation in investment decisions between the two groups. However, our main results are driven by households with migrants. Next, we consider the effect of remittance sources on a household's investment decisions. Heterogeneity by remittance sources is important because the remittance literature points out that remittance sources contain critical information such as the relative size of remittances, migrant's control over the household's use of remittances, and transfer of values and norms. We find interesting patterns in investment by remittance sources: internal remittances matter more for education investment, within Africa remittances are more likely to increase health investment, and out-of-Africa remittances are more likely to increase physical and social capital investment.

We also explore the potential mechanisms through which remittances affect households' investment decisions. In particular, we examine the income effect, substitution effect, and migration expectations effect. We use consumption expenditure and asset ownership as proxies to measure the income effect. We find that the income effect of remittances mainly drives the positive effect on capital investment. We use the labour supply response of adult household members to capture the substitution effect, and we find evidence of lower labour supply only in Kenya and Senegal. Finally, we examine the migration expectations effect using the children's (i.e., aged 6 -15 years) labour force participation and school attendance. Our results show that children in remittance receiving households do not disproportionately drop out of school to join the labour force in most sample countries.

Our study contributes to the existing literature in the following ways. First, we contribute to the limited but growing literature on the impact of remittances on household investment decisions by providing empirical evidence for the understudied sub-Saharan Africa region. Second, our study uses data for five SSA countries and dis-aggregates investment expenditure into three categories– human capital, physical capital, and social capital investment. Our analysis allows us to compare the effect of remittances across countries using a standardised dataset. Past studies only study one type of capital investment and one country at a time. For instance, Jena (2018) and Ajefu (2018) studied only physical capital investment in Kenya

and Nigeria, respectively. In addition, addressing the multiplicity of the investment alternatives allows us to explore the heterogeneity among the investment types and check for substitutability. Third, we identify the heterogeneous effect of remittances from domestic, within-Africa, and out-of-Africa sources on receiving households' investment decisions; past studies mostly focus on only international remittances or only internal remittances, and a few explore internal and international remittances. Finally, we explore several mechanisms through which remittances affect investment decisions. Existing studies assume that the income effect is the main mechanism; however, they do not demonstrate this empirically.

Our study has important policy implications. First, we provide further evidence that remittances can contribute to economic development through productive investments. Thus policymakers in SSA can design policies aimed at reducing remittance transfer costs to harness remittances and foster local economic development. Our study is also relevant for the local and international organisations designing business models and financial instruments to maximise the impact of remittances on economic development. Understanding the heterogeneous effect of remittance sources will help these organisations design effective financial instruments to boost capital formation and income generation in the remittances receiving communities. For instance, policymakers can imitate Kenya's M-PESA– a mobile banking service– to facilitate the transfer of internal remittances. This is important since internal remittances matter most for education investment in SSA.

The rest of the paper is organised as follows. In Section 2, we provide the conceptual framework that explains the linkage between remittances and capital investment. We describe the data and methodology in Section 3 and Section 4, respectively. In Section 5, we discuss our main results. Next, we present the robustness checks in Section 6, heterogeneity analysis in Section 7, and effect mechanisms in Section 8. Finally, we conclude the paper in Section 9.

2.2 Conceptual Framework

In the literature, economic migration decisions have been explained by the role of remittances. In these decisions, households send migrants to urban centres, or out of the country with a desire to increase household income level and to diversify income sources (Adams, 1998; Clemens & Ogden, 2013; Rosenzweig & Stark, 1989; Stark, 1991). Theoretical models present different motives for sending remittances: altruism, insurance contract, loan contract, and investment or inheritance motive (Lucas & Stark, 1985). The altruism model posits that remittances are sent because migrants care about

their left-behind family members (Lucas & Stark, 1985; Stark, 2009). The insurance contract model suggests that remittances result from an implicit contract between the households and migrants to protect the household against shocks (Cox et al., 1998; Rosenzweig & Stark, 1989). The loan contract model argues that remittances are repayments for an informal loan taken out by the migrants from their families to enhance their human capital and finance the cost of migration (Poirine, 1997). The first three models– altruism, insurance contract, and loan contract– are silent about the investment use of remittances or assume that remittances are not invested. The investment and inheritance motive suggests that migrants send remittances because they aspire to inherit family property, intend to return home, and considerations that left-behind family members are trustworthy agents to maintain assets on their behalf (Lucas & Stark, 1985; Taylor & Wyatt, 1996).

The migration literature further points out that the four remittance motives may not be mutually exclusive. It may be the case that remittances are sent for all the motives at the same time, with each motive comprising a share of it (Poirine, 1997). It could also be the case that one of these motives becomes dominant at different stages of migration. For instance, at the early stage of migration, remittances sent back are typically for loan repayments. However, regardless of the motive, remittances are expected to positively affect household income at home if migrants earn a substantially higher income in the destination country (Stark & Bloom, 1985).

Remittances affect household investment decisions through three main channels– income effect, substitution effect, and migration expectations (Amuedo-Dorantes, 2014). First, remittances help ease households' resource constraints; the income effect of remittances reduces the need for households to send their children to join the labour force and enable households to pay tuition and other education-related expenses. Several studies in the literature have found a positive effect of remittances on education investments and the education outcomes of children left behind (Alcaraz et al., 2012; Amuedo-Dorantes & Pozo, 2010; Cox-Edwards & Ureta, 2003). Similarly, higher resource availability leads to better health outcomes of the household members through investment in improved lifestyle and spending more on health care (Ambrosius & Cuecuecha, 2013; Berloffa & Giunti, 2019; Hines & Simpson, 2018; Salas, 2014). Furthermore, the income effect of remittances positively affects physical capital investment through facilitating savings and improving access to the financial market (Amuedo-Dorantes, 2014; Chiodi et al., 2012; Jena, 2018).

The income effect of remittances may also affect a household's spending on social events such as birthdays, wedding ceremonies, and funerals. In developing countries where social safety net programs are relatively weak and private insurance

services are inaccessible, households rely on informal risk coping mechanisms to mitigate the impact of adverse economic shocks. Relying on relatives, friends, and community members is the most frequently used informal coping mechanism (Carter & Maluccio, 2003; Gerry & Li, 2010). Rao (2001) shows that spending on big social events generates tangible returns, such as paying a lower price for items in the local marketplace and achieving higher social status. A relatively stronger social network and social status signal the creditworthiness of the household and increase access to credit markets. Thus, investing in building social networks through spending on social events is a form of social capital as it not only hedges against future shocks but also generates other economic returns. However, remittances can act as a risk mitigation strategy, which may reduce the need to rely on social networks to cope with economic shocks. Consequently, the effect of remittances on social capital investment is ambiguous and can only be determined empirically.

Second, remittances can have a substitution effect because they may raise the reservation wage– the lowest wage at which a person is willing to work– of the left behind household members and reduce the opportunity cost of leisure. Assuming leisure is a normal good, the substitution effect provides left behind household members with incentives to lower labour supply. This phenomenon is also related to a moral hazard problem whereby left behind household members are less inclined to engage in income generating activities which eventually leads to dependency on remittances (Amuedo-Dorantes & Pozo, 2006a; Démurger, 2015). The lowering of labour supply in response to receiving remittances is well-documented in the literature (Amuedo-Dorantes & Pozo, 2006a; Binzel & Assaad, 2011; Mendola & Carletto, 2012). In addition, remittance dependence due to the substitution effect of remittances may reduce the likelihood of capital investments as some physical assets (e.g., tractors) need to be combined with labour to be productive.

Finally, remittances can affect households' investment decisions through migration expectations. Left-behind household members in a remittance receiving household may have high expectations of migration and be reluctant to engage in income generating activities. Moreover, migration expectations of left-behind household members can negatively affect human capital formation. Children may drop out of schools if they perceive lower returns to education in their destination country. For instance, Mckenzie & Rapoport (2011) found that boys in migrant households in Mexico are less likely to complete junior secondary school due to migration expectations and lower returns of Mexican education in the US labour market, especially in the context of illegal migration.

Theoretically, it is difficult to determine the effect of remittances on household investment decisions unambiguously. Thus, we set out to empirically investigate this phenomenon. Focusing on three investment categories– human capital, physical capital, and social capital– also helps us understand whether household investment decisions vary by type of investment expenditure.

2.3 Data Description

We used data from the Migration and Remittances Household Surveys conducted by the World Bank between 2009 and 2010. These household surveys are part of the Africa Migration Project (AMP) and are designed to provide information about the volume, causes, and impacts of migration and remittances in Sub-Saharan Africa (Plaza et al., 2011). An important feature of the surveys is that they are standardised across countries, which allows for easy aggregation and comparison. We use data on five predominantly remittance-receiving countries from the AMP, namely Burkina-Faso, Kenya, Nigeria, Senegal, and Uganda. The surveys are cross-sectional and provide comprehensive information about migration, remittances, housing conditions, household assets and expenditures, and other socioeconomic and demographic characteristics. The surveys contain information about households with no migrants, internal (domestic) migrants, within-Africa migrants, and out-of-Africa migrants, which we use to create a variable representing the source of remittances. The principal respondent to the survey was the household head or their representative, who reported information about the migrant(s).

We define investment expenditure as an outlay for which the individual or household expects financial returns in the future. Following Jena (2018), we define physical capital investment as households' expenditure on setting up a business, opening a store, purchasing farming equipment such as tractors, and purchasing other productive assets. Human capital investments are broadly defined to have two components– expenditure on education and health. Education expenditures include tuition payment, purchase of school uniforms, and books. In many SSA countries, the public education system is subsidised; for instance, Nigeria's Universal Basic Education (UBE) up to Junior High School. Such public programs suggest that there is little need to spend on tuition fees. However, despite subsidised public education, households still incur educational expenses such as buying textbooks, uniforms, and after-school lessons. Health care expenditures include doctor fees, hospital fees, cost of diagnostics tests and medicine. Like education, the public health system in many SSA countries is highly subsidised. Despite subsidised health systems, not all services are available in public facilities, and not all services are free. Out-of-pocket expenditures

on diagnostic tests and medicine comprise a substantial share of health expenditure in most SSA countries (Okoroh et al., 2018). Finally, following Rao (2001), we define social capital investments as households' expenditure on festivals, weddings, and funerals.

Households report the investment expenditures made during the last six months before the interview date. At the extensive margin, we use dummy indicators capturing whether the household made an investment expenditure or not in the preceding six months. Along with this extensive margin analysis, we conduct an intensive margin analysis using the actual amount of investments.

The control variables are household head characteristics such as gender of household head, whether the household head is a paid employee, whether the household head is self-employed, whether the household head has secondary education, whether the household head has above secondary education, whether the household head is aged 45-60 years old, whether the household head is above 60 years old, and socioeconomic characteristics of the household such as, number of children, number of elderly, and location of the household. We also control for the overall resource availability to the household by including per capita income. Per capita income is proxied by per capita expenditure following the standard practice in the literature as income data often suffer from measurement errors (Deaton, 2018; Jena, 2018).

Table 2.1 presents summary statistics of the outcome and control variables for the countries analysed. Considerable variation exists between remittance receiving and non-remittance receiving households across all the countries in our sample. The first noticeable factor in Table 2.1 is that remittance receiving households, on average, are more likely to be female headed than non-remittance receiving households. Another interesting observation is that household heads in remittance receiving households are on average less likely to hold paid employment or self-employment compared to non-remittance receiving households in all the countries in our sample. Furthermore, for all the investment categories considered, remittance receiving households, on average, spend more than non-remittance receiving households. Kenya, on average, receives the highest amount of remittances, followed by Senegal and then Nigeria. Conversely, Burkina Faso receives the smallest remittances on average. Table A1 in the appendix presents correlation coefficients between the treatment and outcome variables.

Table 2.1: Summary Statistics

	Uganda		Kenya		Nigeria		Burkina Faso		Senegal	
	Received Remittances (= if yes)	Not Received Remittances (= if yes)	Received Remittances (= if yes)	Not Received Remittances (= if yes)	Received Remittances (= if yes)	Not Received Remittances (= if yes)	Received Remittances (= if yes)	Not Received Remittances (= if yes)	Received Remittances (= if yes)	Not Received Remittances (= if yes)
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Female household head (=1 if yes)	0.375	0.282	0.425	0.221	0.167	0.074	0.089	0.051	0.431	0.186
	(0.485)	(0.45)	(0.495)	(0.415)	(0.374)	(0.262)	(0.285)	(0.221)	(0.496)	(0.389)
Head is paid employee (=1 if yes)	0.243	0.254	0.238	0.408	0.214	0.297	0.021	0.033	0.107	0.217
	(0.43)	(0.435)	(0.426)	(0.492)	(0.41)	(0.457)	(0.143)	(0.178)	(0.31)	(0.413)
Head has secondary education (=1 if yes)	0.336	0.326	0.262	0.296	0.236	0.214	0.034	0.036	0.142	0.15
	(0.473)	(0.469)	(0.44)	(0.457)	(0.425)	(0.41)	(0.181)	(0.187)	(0.349)	(0.357)
Head has above secondary education (=1 if yes)	0.418	0.373	0.251	0.261	0.521	0.545	0.012	0.006	0.055	0.11
	(0.494)	(0.484)	(0.434)	(0.439)	(0.5)	(0.498)	(0.108)	(0.078)	(0.228)	(0.313)
Head's age 45-60 years (=1 if yes)	0.352	0.224	0.284	0.301	0.433	0.365	0.336	0.306	0.308	0.386
	(0.478)	(0.417)	(0.451)	(0.459)	(0.496)	(0.482)	(0.473)	(0.461)	(0.462)	(0.487)
Head's age above 60 years (=1 if yes)	0.204	0.112	0.316	0.149	0.284	0.114	0.318	0.157	0.336	0.255
	(0.404)	(0.315)	(0.465)	(0.356)	(0.451)	(0.318)	(0.466)	(0.364)	(0.473)	(0.436)
Log household income	7.6	7.181	7.974	7.755	8.574	8.321	7.661	7.591	8.829	8.612
	(1.091)	(1.09)	(1.102)	(1.253)	(0.902)	(0.876)	(0.787)	(0.852)	(0.731)	(0.813)
Number of children in the household	2.299	2.045	1.432	1.47	6.057	6.039	1.529	1.492	4.277	3.18
	(1.998)	(1.929)	(1.54)	(1.614)	(3.183)	(3.436)	(1.545)	(1.417)	(3.631)	(2.934)
Number of elderly in household	0.332	0.175	0.583	0.344	0.504	0.253	0.67	0.416	0.703	0.515
	(0.584)	(0.433)	(0.747)	(0.637)	(0.722)	(0.562)	(0.847)	(0.675)	(0.753)	(0.709)
Household is in urban area (=1 if yes)	0.51	0.487	0.423	0.54	0.456	0.513	0.067	0.058	0.631	0.692
	(0.501)	(0.5)	(0.494)	(0.499)	(0.498)	(0.5)	(0.25)	(0.235)	(0.483)	(0.462)
Remittances amount (in USD)	776.47	0	2170.59	0	1847.85	0	181.86	0	1890.90	0
	(2391.68)	(0)	(10769.82)	(0)	(6819.30)	(0)	(427.82)	(0)	(2752.23)	(0)
Domestic migration network (%)	-1.915	-2.849	0.106	0.152	0.129	0.108	0.109	0.103	3.486	3.67
	(7.992)	(8.077)	(0.169)	(0.218)	(0.082)	(0.081)	(0.031)	(0.023)	(2.122)	(2.014)
International migration network (%)	-	-	0.037	0.045	-	-	0.356	0.329	0.101	0.128
	-	-	(0.045)	(0.052)	-	-	(0.17)	(0.163)	(0.116)	(0.122)
Education investment (in USD)	481.154	269.02	464.76	375.07	607.35	360.37	71.07	50.86	143.80	106.97
	(769.14)	(585.13)	(965.26)	(911.61)	(944.09)	(709.12)	(134.21)	(109.27)	(209.14)	(190.90)
Health investment (in USD)	89.89	48.15	181.44	128.95	157.03	100.82	81.46	74.74	203.65	145.53
	(131.07)	(83.14)	(420.75)	(363.64)	(236.93)	(177.72)	(116.24)	(111.63)	(299.5)	(244.77)
Physical capital investment (in USD)	91.94	28.83	142.41	56.58	211.58	123.18	19.33	14.077	34.77	18.77
	(437.17)	(232.32)	(745.31)	(384.57)	(821.46)	(591.59)	(70.58)	(51.69)	(134.67)	(92.35)
Social capital investment (in USD)	30.01	17.19	100.34	67.70	186.17	112.51	52.20	57.22	269.08	217.64
	(72.08)	(53.70)	(411.34)	(327.98)	(603.84)	(432.07)	(92.62)	(95.56)	(412.80)	(346.22)
Number of observations	304	1299	789	1032	842	1188	764	1131	839	866

Note: a) This table presents the mean and standard deviation of the key variables. b) Standard deviations are presented in parentheses.

2.4 Empirical Methodology

We model households' investment decisions as a function of their remittance receipt status and a vector of other explanatory variables. Adams (2011) and many others have noted that empirical analyses of migration and remittances have failed to provide needed insights because of various econometric issues. One such issue is endogeneity, which can arise from selection bias and simultaneity. First, migrants are a self-selected group as migration and remittance transfers are not random events. Remittance-receiving households might differ systematically from non-remittance receiving households in unobservable characteristics, such as migration aspirations, entrepreneurial ambitions, level of altruism, and household-specific norms. Given that these characteristics are unobservable, estimating a regression model without properly accounting for them may lead to the classic omitted variables bias. Next, simultaneity may arise from the reason for sending the remittances. For example, it could be the case that the migrant sends remittances to take advantage of a business opportunity in the home community. In this case, remittances did not lead to investment expenditures; instead, the migrant's desire to invest led to the transfer of remittances. Thus, researchers need to address endogeneity issues carefully to obtain unbiased estimates.

Since the investment decision and the remittance receipt are binary variables in our main estimation and the latter is likely to be endogenous, we employ a recursive bivariate probit model (Bhattacharya et al., 2006; Horrace & Oaxaca, 2006; Jena, 2018; Wooldridge, 2002). The recursive bivariate probit model accounts for endogeneity by simultaneously estimating remittance receipt and investment decisions while incorporating the remittance-receipt variable in the investment decision equation. The recursive bivariate probit model we estimate is as follows:

$$R_{i1}^{*} = X_i'\beta_1 + \varepsilon_{i1} \tag{2.1}$$

$$Y_{i1}^{*} = R_{i1}\delta_1 + Z_i'\beta_2 + \varepsilon_{i2} \tag{2.2}$$

and

$$E[\varepsilon_{i1}|X,Z] = E[\varepsilon_{i2}|X,Z] = 0 \tag{2.3}$$

$$Var[\varepsilon_{i1}|X,Z] = Var[\varepsilon_{i2}|X,Z] = 1 \tag{2.4}$$

$$Cov[\varepsilon_{i1},\varepsilon_{i2}] = \rho \tag{2.5}$$

Where R_{i1}^{*} and Y_{i1}^{*} are latent dependent variables that determine the propensity of remittance receipt and the propensity to make an investment expenditure by the household respectively. X_i' and Z_i' are vectors of covariates, and ε_{i1} and ε_{i2} are unobservable error terms and are assumed to be correlated. The correlation between the remittance-receipt equation and investment decision equation is ρ. We let two observable indicator variables to represent the latent variables R_{i1}^{*} and Y_{i1}^{*} such that:

$$R_{i1} = \left\{ \begin{array}{ll} 1 & if \;\; R_{i1}^{*} > 0 \\ 0 & if \;\; R_{i1}^{*} \leq 0 \end{array} \right\} \tag{2.6}$$

$$Y_{i1} = \left\{ \begin{array}{ll} 1 & if \;\; Y_{i1}^{*} > 0 \\ 0 & if \;\; Y_{i1}^{*} \leq 0 \end{array} \right\} \tag{2.7}$$

Where R_{i1} indicates the remittance receipt status of the household, and Y_{i1} captures the households' investment decision. This study aims to empirically obtain estimates for the parameter δ_1 in equation 2.2, the parameter corresponding to the endogenous variable, R_{i1}

Based on equation 2.6 and 2.7, the four basic probabilities of bivariate probit model are:

$$Prob[R_{i1} = 1, Y_{i1} = 1] = F[X_i'\beta_1, Z_i'\beta_2 + \delta_1; \rho] \tag{2.8}$$

$$Prob[R_{i1} = 1, Y_{i1} = 0] = F[X_i'\beta_1, -Z_i'\beta_2 + \delta_1; -\rho] \tag{2.9}$$

$$Prob[R_{i1} = 0, Y_{i1} = 1] = F[-X_i'\beta_1, Z_i'\beta_2; -\rho] \tag{2.10}$$

$$Prob[R_{i1} = 0, Y_{i1} = 0] = F[-X_i'\beta_1, -Z_i'\beta_2; \rho] \tag{2.11}$$

where $F[.]$ indicates the distribution function of the bivariate normal distribution with correlation parameter ρ.

The identification of the recursive bivariate probit model parameters through exclusion restrictions[1] requires at least one variable (i.e., instrumental variable) in the remittance-receipt equation (i.e., 2.1) that is excluded from the investment decision equation (i.e., 2.2). A credible instrument should be strongly correlated

[1] recursive bivariate probit models can also be identified through recursivity and functional form.

with the endogenous regressor of interest (i.e., receipt of remittances in our case) but uncorrelated with the outcome of interest (i.e., investment decisions). While the first condition can be easily tested, the second condition is practically untestable. Consequently, it is difficult to find credible instruments, and only a few instruments are generally acceptable in the migration literature. We use historical migration networks as an instrument for remittances as it is one of the generally acceptable instruments that have been widely used in the migration literature (Acosta, 2011; Alcaraz et al., 2012; Calero et al., 2009; Coon, 2016; Hildebrandt et al., 2005; Mckenzie & Rapoport, 2011).

The argument for using historical migration networks as an instrument is that such networks can reduce the cost of migration and induce current migration by providing access to information and facilitating services at the destination (i.e., assistance with accommodation and employment opportunities). We expect that households with access to larger migration networks are more likely to have migrants and receive remittances. In addition, migration networks can provide migrants with information on convenient and cheap ways to send remittances. Studies have shown that remittances are elastic to the cost of sending them, see (Ahmed et al., 2021). To summarise, there is a positive relationship between migration networks and remittances. The identifying assumption is that historical migration networks predict current migration rates and the subsequent inflow of remittances but do not directly affect a household's current investment decisions except through migration and remittances. Households with more extensive migration networks are expected to have lower migration costs, which increases their likelihood of having a migrant member and receiving remittances (Coon, 2016).

We define historical migration networks as district level historical migration rates. District level historical migration rates are obtained from Population and Housing censuses– Burkina Faso 1996, Kenya 1999, Nigeria 2006, Senegal 1988, and Uganda 2002[2]. We created domestic and international migration networks at the district level based on data availability. Domestic migration networks are defined as the proportion of the total population of a district that migrated to another district within the same country. Similarly, international migration networks are defined as the proportion of the total population of a district that migrated out of the country. For Uganda, we only have census data on net migration, which is total out-migration minus total in-migration in a district, and we use this variable as our instrument. We define a district as a second-tier administrative unit within a country. This refers to a

[2]Data source: Minnesota Population Center. Integrated Public Use Microdata Series, International: Version 7.3 [dataset]. Minneapolis, MN: IPUMS, 2020. https://doi.org/10.18128/D020.V7.2

district in Uganda and Kenya, local government in Nigeria, and department in Burkina Faso and Senegal. Districts cover large geographic areas and populations, making it difficult for households to affect the migration networks in any significant way. The domestic migration network is about 0.1% in Kenya, Nigeria, and Burkina Faso, which suggests that, on average, one in 1,000 households have a domestic migrant (see Table 2.1). The domestic migration network in Uganda is negative, which suggests that, on average, districts experience more in-migration than out-migration. We have international migration network data for Kenya, Burkina Faso, and Senegal. Of these countries, Burkina Faso has the highest international migration network– about three in 1000 households. In our estimation, we use both domestic and international migration networks in Kenya and Burkina Faso. However, because data is unavailable elsewhere, we use only domestic migration networks in Uganda and Nigeria and only international migration networks in Senegal. We argue that either historical domestic or international migration rates capture the overall migration network in the district.

The first stage regression shows that historical migration network has a positive and statistically significant effect on remittances in Uganda, Nigeria, Burkina Faso, and Kenya (for international migration networks). However, we find negative coefficients in Senegal and Kenya (for domestic migration network). A possible reason for the unexpected negative coefficient is that these migrants move permanently or move with their entire family. As a result, their incentives to send remittances are small. In essence, historical migration networks, facilitates current migration but could result in smaller or negative remittances if migrants move permanently[3] (see Table 2.2). The F-statistic in the first stage is higher than 10 for all the countries under review except Uganda. However, it is close to 10 for Uganda. We check for over-identifying restrictions on our instruments using the Hansen's J-statistic. The joint null hypothesis states that the instruments are valid, and rejecting the null hypothesis implies that at least one of the instruments is not valid. In our case, we cannot reject the null hypothesis for any of the countries because the p-values are higher than the traditional significance levels.

A potential threat to identification using district level historical migration networks as an instrument is that previous remittance flows, return migration, and the transfer of knowledge via migration may be correlated with district level factors such as education facilities, health facilities, and a better investment climate. Consequently, historical migration networks could be correlated with the current level of infrastructure in a district. One way to account for this violation of the exclusion restriction is to

[3]The phenomenon of sending smaller remittances as migrants stay longer in destination countries is called remittance decay (Makina & Masenge, 2015)

control for district-level variation in infrastructure. However, it is difficult to find data on infrastructure at the district level in SSA. Consequently, we implement the imperfect instrumental variable (IIV) approach introduced by Nevo & Rosen (2012) as a robustness check. Nevo & Rosen (2012)'s IIV approach relaxes the exogeneity assumption by allowing the instrument to be correlated with the regression error term. In place of the exogeneity assumption, they make two weaker assumptions that allow the endogenous regressor to be partially identified. First, they assume that the correlation between the endogenous regressor and error term and instrument and error term have the same sign. Next, they assume that the correlation between the instrument and error term is weaker than the correlation between the instrument and endogenous regressor. With these two weaker assumptions, the IIV approach produces interval estimates on the endogenous parameter of interest rather than point estimates. In our application, these assumptions are likely satisfied. Unobserved village characteristics such as local economic conditions may be correlated with remittances. For example, good road networks or business opportunities may facilitate the flow of remittances. Thus, we can argue that our endogenous regressor – remittances have a positive correlation with omitted variables in the error term such as unobserved village characteristics. Similarly, the instrument – historical migration networks have a positive, albeit, small correlation with unobserved village characteristics. For example, villages with more entrepreneurial or ambitious households are likely to have access to more extensive migration networks. However, since our instrument is defined at the district level and the district is much larger than the village, then we expect that this correlation will be weaker as individual villages cannot affect district level migration networks in any significant way. Once these conditions are satisfied, we can estimate bounds on remittances.

Table 2.2: First Stage Regression Estimates

	Uganda	Kenya	Nigeria	Burkina Faso	Senegal
	(1)	(2)	(3)	(4)	(5)
Domestic migration network	0.004***	-0.445***	0.646***	2.411***	-
	(0.001)	(0.090)	(0.130)	(0.436)	-
International migration network	-	0.632*	-	0.312***	-0.535***
	-	(0.356)	-	(0.068)	(0.113)
Household head is female (=1 if yes)	0.082***	0.230***	0.172***	0.151***	0.288***
	(0.023)	(0.025)	(0.034)	(0.047)	(0.026)
Head paid employee (=1 if yes)	-0.078**	-0.143***	-0.200***	-0.227***	-0.118***
	(0.040)	(0.032)	(0.039)	(0.082)	(0.041)
Head has secondary education (=1 if yes)	0.061**	0.014	0.039	0.058	0.046
	(0.024)	(0.027)	(0.031)	(0.064)	(0.035)
Head has above secondary education (=1 if yes)	0.076**	0.040	0.018	0.177	-0.022
	(0.030)	(0.032)	(0.030)	(0.131)	(0.048)
Head's age 45-60 (=1 if yes)	0.111***	0.022	0.123***	0.114***	-0.065**
	(0.026)	(0.026)	(0.024)	(0.025)	(0.026)
Head's age is >60 (=1 if yes)	0.073	0.125***	0.212***	0.212***	-0.017
	(0.060)	(0.045)	(0.044)	(0.037)	(0.038)
Log household income (in USD)	0.057***	0.071***	0.085***	0.024*	0.099***
	(0.010)	(0.011)	(0.013)	(0.014)	(0.017)
Number of children in household	0.010*	-0.001	-0.004	0.015*	0.017***
	(0.005)	(0.007)	(0.003)	(0.008)	(0.004)
Number of elderly in household	0.080*	0.036	0.026	0.039**	0.060***
	(0.041)	(0.026)	(0.024)	(0.018)	(0.022)
Household is in urban area (=1 if yes)	-0.002	-0.070***	-0.066***	-0.075	-0.077***
	(0.024)	(0.025)	(0.023)	(0.052)	(0.027)
Constant	-0.285***	-0.109	-0.324***	-0.201	-0.364**
	(0.072)	(0.082)	(0.108)	(0.137)	(0.135)
Observations	1,603	1,821	2,029	1,895	1,705
F-statistics (test of excluded instrument)	7.24	16.11	24.68	20.58	22.45
Hansen's J-statistic (overidentification test of instruments)	-	0.382	-	2.87	-

Note: a) This table presents the first stage estimates of our instrumental variable estimation. b) Robust standard errors are presented in parentheses. c) The Hansen's J-statistics is the test statistics from Sargan Hansen test of overidentifying restrictions. The joint null hypothesis is that the instruments are the valid instruments. d) The outcome variable in all columns is an indicator that equals one if a household received remittances. e) *** p<0.01, ** p<0.05, * p<0.10.

2.5 Main Results

We present our main estimation results in Table 2.4. The treatment variable is "received remittances," which is an indicator variable that takes one if a household received remittances in the 12 months before the survey and zero otherwise. The outcome variables are investment decision indicators that equal one if a household made a capital investment in the six months before the survey and zero otherwise. Columns 1-4 show the naïve probit estimates, while columns 5-8 show the recursive bivariate probit estimates. Panels A-E present the results for Uganda, Kenya, Nigeria, Burkina Faso, and Senegal, respectively. All columns of Table 3 include control variables[4].

We present the average marginal effects from the probit and the recursive bivariate probit models in Table 2.4 and the estimated coefficients in Appendix Table A3. In addition, we present the robust standard errors in parentheses. Since our treatment - remittance receipt - varies at the household level and our unit of analysis is the household, we clustered our standard errors at the household level[5]. Comparing the results of naïve probit and recursive bivariate probit estimates, we see that the naïve probit estimates are biased downwards. Downward bias in the probit estimation implies the presence of endogeneity due to reverse causality. Consequently, we focus on interpreting the recursive bivariate probit estimates.

2.5.1 Effect on Education Investment

Table 2.4, column 5 shows the effect of remittance receipt on education investment. We see positive marginal effects on the received remittances variable in all the countries, which indicates that remittance receiving households are more likely to invest in education, compared to non-remittance receiving households. The marginal effects are statistically significant in all the countries except Uganda. The marginal effects show that remittance receiving households are about 16-19 percent more likely to invest in education in Kenya, Nigeria, Burkina Faso, and Senegal. This finding is consistent with the literature (Acharya & Leon-Gonzalez, 2014; Alcaraz et al., 2012; Amuedo-Dorantes & Pozo, 2010).

As argued in the remittance literature, remittances may reduce human capital investment by raising the opportunity cost of education and lowering the incentive to study (Amuedo-Dorantes & Pozo, 2006a; Antman, 2012). In our sample countries, we do not see such negative effects. However, this negative effect may counteract the

[4]These results are robust to the inclusion of "whether the household head is self-employed", which is a potentially bad control.

[5]As a sensitivity test, we also clustered our standard errors at the village level - the smallest administrative unit above the household - and the main results persist.

positive effect and lead to a null result. The insignificant and relatively small (i.e., 2%) marginal effect of remittance receipt in Uganda may be a consequence of children dropping out of school due to migration expectations or making up for the migrant worker in home production.

2.5.2 Effect on Health Investment

Remittances can improve a household's living standard by stabilising the household's income and easing budget constraints (Amuedo-Dorantes, 2014; Yang & Choi, 2007). The positive income effect of remittance can also improve access to electricity, better sanitary facilities, acquisition of durable goods such as refrigerators and gas stoves, which significantly improves the health outcomes of household members. Similarly, remittances can significantly improve human capital through increased access to quality healthcare and health care expenditure. We test the hypothesis that remittances positively affect households' health expenditure and present the results in column 6 of Table 2.4.

We find significant positive marginal effects for received remittances in Kenya and Burkina Faso. Remittance receiving households in Kenya and Burkina Faso are about 18 percent more likely to spend on health than non-remittance receiving households. This result is consistent with previous findings in the literature (Ambrosius & Cuecuecha, 2013; Berloffa & Giunti, 2019; Hines & Simpson, 2018; Salas, 2014). However, our results also show that remittance receiving households in Nigeria are about six percent less likely to spend on health care than non-remittance receiving households. Kakhkharov et al. (2021) finds a similar result in Uzbekistan. They argue that the reduction in health expenditure arises from allocating a large proportion of a household's budget to other expenditures.

2.5.3 Effect on Physical Capital Investment

The positive income effect of remittances can facilitate savings and asset accumulation by easing households' credit constraints and improving access to the financial market. Dealing with remittances may also increase the financial literacy of the household members (Aggarwal et al., 2011). Higher financial literacy, bigger savings, and improved access to the financial market may facilitate physical capital investments such as establishing a business, purchasing farming equipment, and other productive assets.

Since most physical capital needs to be combined with some labour to be productive, we may not see the positive effect of remittance on physical capital investment if

households face a substitution effect of remittances. Remittances, being non-labor income, has a substitution effect that creates incentives to cut back labour supply to continue receiving remittances (Amuedo-Dorantes, 2014; Killingsworth, 1983) – a moral hazard problem. Therefore, the observed effect of remittances on physical capital is the net effect of the income and substitution effects. We present our result on the effect of remittances on physical capital investment in column 7 of Table 2.4.

Similar to health investment, we see a mixed result for physical capital investment– a significant positive effect in Kenya, and Nigeria, and a significant negative effect in Burkina Faso. More precisely, remittance receiving households in Kenya, and Nigeria are 10.2, and 11.7 percent more likely to invest in physical capital, respectively. In contrast, remittance receiving households in Burkina Faso are 18 percent less likely to invest in physical capital compared to non-remittance receiving households. This result suggests that the income effect of remittances dominates the substitution effect in Kenya, and Nigeria, whereas it is not true in Burkina Faso. Our findings of positive effect on physical capital are consistent with the literature; for instance, Jena (2018) in Kenya, Osili (2004), and Ajefu (2018) in Nigeria all found similar results. On the other hand, we find null effects in Uganda and Senegal, which could be due to the competing influence of the income and substitution effects. Other studies also found null effects, such as De & Ratha (2012) in Sri Lanka. The negative association between remittances and physical capital investment in Burkina Faso could be due to the relatively small size of remittance inflows. This is important in the context of the initial cash outlay that physical capital investment requires.

2.5.4 Effect on Social Capital Investment

In developing countries with less well-established credit markets and social protection systems, households adopt informal risk coping mechanisms such as relying on family and social networks. These networks can be developed or maintained by contributing towards ceremonies such as festivals, weddings, and funerals. Remittance receiving households with positive income effects have more resources to spend on these ceremonies, thus building larger social capital than non-remittance receiving households. On the contrary, as the migration literature points out, remittances being an income diversification strategy also works as a risk coping mechanism (Amuedo-Dorantes & Pozo, 2006b; Yang & Choi, 2007). Therefore, if remittances work as an effective coping mechanism, it will reduce households' incentive to spend on building social capital. There is a slight concern that our instrument - historical migration networks may not identify social capital investment since our outcome variable measures a dimension of social network itself. It is important to

note that social capital investment (defined as household's expenditure on weddings, festivals and funerals) are typically at the village level. Meanwhile, historical migration networks are defined as district level historical migration rates based on census data. Also, note that a district covers large geographic areas and multiple villages. As a result, it is difficult for individual households or village-level social networks to affect district-level migration networks in any significant way. We are confident that our instrument is uncorrelated with the outcome – social capital. In the unlikely case that our exclusion restriction is not satisfied, the imperfect instrumental variable approach which allows for partial identification using weaker-than-normal assumptions addresses this issue."

In column 8 of Table 2.4, we present the effect of remittances on social capital investment. We find a significant positive effect in all the countries under review except Nigeria. Remittance receiving households in Uganda, Kenya, Burkina Faso, and Senegal are about 3%, 17%, 15%, and 21% respectively more likely to invest in social capital than non-remittance receiving households. Our findings support previous results in the literature, for instance, Gerber & Torosyan (2013) in Georgia and Rao (2001) in rural India. On the contrary, we find that remittances reduce the likelihood of investment in social capital by 17% in Nigeria. Other studies such as Fransen (2015) also finds a negative effect of remittance on social capital in Burundi. This finding supports the notion that remittances can act as a risk coping mechanism and reduce the need for remittance receiving households to invest in social capital.

To sum up our results, we find that remittances increase the likelihood of human, physical, and social capital investments in most of the countries studied. Based on the conceptual framework, we suggest that the positive income effect of remittances likely drives the positive effect of remittances on capital investment. Conversely, we find a negative effect of remittances on health and social capital in Nigeria, and on physical capital in Burkina Faso.

Table 2.3: Effect of Remittances on Households' Investment Decisions - main summary

	Health Capital			
	Education (=1 if yes) (1)	Health (=1 if yes) (2)	Physical Capital (=1 if yes) (3)	Social Capital (=1 if yes) (4)
Panel A: Uganda Received remittances (=1 if yes)	Null	Null	Null	+
Panel B: Kenya Received remittances (=1 if yes)	+	+	+	+
Panel C: Nigeria Received remittances (=1 if yes)	+	-	+	-
Panel D: Bukina Faso Received remittances (=1 if yes)	+	+	-	+
Panel E: Senegal Received remittances (=1 if yes)	+	Null	Null	+

Note: a) This table reports the sign of the average marginal effects of the recursive biprobit model in Table 2.4 b) + signifies a positive and statistically significant effect, - signifies a negative and statistically significant effect and null signifies a statistically insignificant effect.

Table 2.4: Effect of Remittances on Households' Investment Decisions

	Probit				Recursive Biprobit			
	Human Capital		Physical Capital (=1 if yes)	Social Capital (=1 if yes)	Human Capital		Physical Capital (=1 if yes)	Social Capital (=1 if yes)
	Education (=1 if yes)	Health (=1 if yes)			Education (=1 if yes)	Health (=1 if yes)		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Panel-A: Uganda								
Received remittances (=1 if yes)	0.049*	-0.016	0.025	0.051*	0.021	0.002	0.017*	0.030*
	(0.028)	(0.027)	(0.020)	(0.028)	(0.023)	(0.054)	(0.009)	(0.017)
Mean of the outcome variable	0.684	0.792	0.119	0.299	0.684	0.792	0.119	0.299
Observations			1,603				1,603	
Panel-B: Kenya								
Received remittances (=1 if yes)	0.021	0.014	0.053***	0.015	0.174***	0.182***	0.106***	0.169***
	(0.022)	(0.022)	(0.016)	(0.024)	(0.014)	(0.007)	(0.028)	(0.011)
Mean of the outcome variable	0.594	0.676	0.141	0.418	0.594	0.676	0.141	0.418
Observations			1,821				1,821	
Panel-C: Nigeria								
Received remittances (=1 if yes)	0.052**	0.021	0.047***	0.042*	0.170***	-0.059**	0.113***	-0.172***
	(0.020)	(0.020)	(0.018)	(0.022)	(0.017)	(0.025)	(0.022)	(0.005)
Mean of the outcome variable	0.729	0.764	0.185	0.374	0.729	0.764	0.185	0.374
Observations			2,029				2,029	
Panel-D: Burkina Faso								
Received remittances (=1 if yes)	0.096***	0.016	0.000	0.011	0.157***	0.186***	-0.180***	0.148***
	(0.022)	(0.016)	(0.020)	(0.023)	(0.024)	(0.017)	(0.020)	(0.019)
Mean of the outcome variable	0.645	0.875	0.231	0.649	0.645	0.875	0.231	0.649
Observations			1,895				1,895	
Panel-E: Senegal								
Received remittances (=1 if yes)	0.086***	-0.002	0.031**	-0.048**	0.189***	0.033	0.016	0.209***
	(0.023)	(0.020)	(0.015)	(0.023)	(0.051)	(0.056)	(0.055)	(0.013)
Mean of the outcome variable	0.672	0.825	0.096	0.734	0.672	0.825	0.096	0.734
Observations			1,705				1,705	

Note: a) This table reports the average marginal effects from the probit and recursive bivariate probit models. (b) Robust standard errors are presented in parentheses. (c) The variable of interest, received remittances, is an indicator that takes one if a household received remittances and zero otherwise. (d) Outcome variables are also indicator variables that equal one if a household made capital investment, and zero otherwise. (e) Control variables are female household head, head is a paid employee, head is self-employed, head has secondary education, head has above secondary education, head's age is 45-60 years, head's age is above 60 years, log household income, number of children in the household, number of elderly in the household, and location is urban. (f) *** p<0.01, ** p<0.05, * p<0.10.

2.6 Robustness Checks

2.6.1 Relaxing the Exclusion Restriction Assumption

We tested the robustness of our results using alternative estimation techniques and different specifications of our model. As mentioned in the methodology section, a potential threat to identification using historical migration networks is that previous remittance flows, return migration, and the transfer of knowledge via migration may be correlated with district level factors such as education facilities, health facilities, and a better investment environment. This can lead to a violation of the exclusion restriction. We estimate a model using the imperfect instrumental variables (IIV) approach to address this potential violation of the exclusion restriction. We also present ordinary linear regression (OLS) and two-stage linear regression (2SLS) estimates to compare with the IIV estimates. The result of this analysis is presented in Table 2.5. Columns 1-4 present the OLS estimates, columns 5-8 present the 2SLS estimates, and columns 9-12 present the IIV estimates. The IIV estimation coefficient bounds are presented in brackets, and the corresponding 95 percent confidence intervals are presented in parentheses. The coefficients are statistically significant at the 5 percent significance level if the 95 percent confidence intervals do not contain zero.

In Table 2.5, we see the OLS coefficients are severely biased downward towards zero. The 2SLS coefficients in Table 2.5 and the biprobit results in Table 2.4 are qualitatively similar– they have the same sign of the coefficients. However, there are a few differences. First, in Uganda, the coefficient of education expenditure becomes significant while the coefficient of physical capital becomes insignificant, compared to the biprobit estimations in Table 2.4. Another difference is that, in Senegal, the coefficients of education and social capital lose their statistical significance, compared to Table 2.4. These results suggest that the 2SLS estimates are less precise than the biprobit estimates.

Table 2.5 column 9, presents the IIV estimates for education investment. The first point to notice is that all the IIV coefficient bounds are positive, suggesting that the remittance receiving households are more likely to invest in education than non-remittance receiving households. Second, we find that the OLS coefficients are either the lower bound or below the coefficient bounds, indicating that OLS estimates are biased downward. Finally, we find that the 2SLS coefficients are mostly either inside the IIV coefficient bounds or the upper bounds. These results suggest that our main results for education investment are robust to relaxing the validity assumption of the IV estimation approach.

Table 2.5 column 10, presents the IIV estimates for health investment. The IIV coefficient bounds are positive in Uganda, Kenya, Burkina Faso, and Senegal. The results show that the OLS coefficients are mostly below the coefficient bound, and 2SLS coefficients are inside the bound. However, the IIV coefficient bounds are statistically significant only in Kenya. In Nigeria, the coefficient bound is not strictly negative, whereas biprobit and 2SLS results are significant and negative. This result suggests that the IV estimation coefficient for health investment in Nigeria is not robust to relaxing the exclusion restriction assumption of the IV estimation approach. However, this finding does not nullify our main estimation result for health investment in Nigeria. Instead, it suggests that the exclusion restriction of the instrument we argued in the method section is critical and must be satisfied.

We present the IIV estimates for physical capital in column 11 of Table 2.5. Similar to our main estimation in Table 2.4, the IIV coefficient bounds are positive in Uganda, Kenya, and Nigeria and negative in Burkina Faso. In addition, the results show that the OLS coefficients are mostly below the coefficient bound, and 2SLS coefficients are inside the bound. These results suggest that our main results of physical capital investment are robust to relaxing the validity assumption of the IV estimation approach.

Finally, Table 2.5 column 12, shows the IIV estimates for social capital. The IIV coefficient bounds are positive in Uganda, Kenya, and Burkina Faso. The results show that the OLS coefficients are mostly below the coefficient bounds and 2SLS coefficients are inside the bounds. In Nigeria, the coefficient bound is not strictly negative, whereas biprobit and 2SLS results are significant and negative. This result suggests that the IV estimation coefficient for social capital investment in Nigeria is not robust to relaxing the exclusion restriction assumption of the IV estimation approach. However, as discussed above, this finding does not nullify our main estimation result of social capital investment in Nigeria; instead, it suggests that the exclusion restriction of the instrument is critical and must be satisfied.

To sum up the results from this robustness check, we find that the 2SLS estimates are qualitatively similar to the biprobit estimates, except in a few cases, the 2SLS estimates are relatively less precise (i.e., have larger standard errors). The IIV estimation shows that most of our biprobit estimates are robust to relaxing the exclusion restriction. However, health and social capital investments in Nigeria appear to be sensitive to the relaxation of the exclusion restriction. It is possible that the instrument used - domestic historical migration rates - does not fully capture the overall migration networks in a district. Consequently, the estimates for Nigeria should be interpreted with caution. Due to data limitations, we are only able to use domestic historical migration rates as an instrument for remittances in Nigeria. We argue that domestic migration rates

can proxy the overall migration network in a district. However, it is possible this assumption doesn't hold in Nigeria – domestic migration network is not a good proxy for international migration and international remittances. In addition, Nigeria is inherently different from the other countries – Nigeria has a significantly larger population, more migrants in diaspora and receive significantly more remittances, according to World Bank (2021a). Given this, the estimates for Nigeria should be interpreted with caution.

Table 2.5: Alternative Estimates of the Effect of Remittances on Household Investment Decision

	OLS				2SLS				Imperfect IV			
	Human Capital		Physical Capital (=1 if yes)	Social Capital (=1 if yes)	Human Capital		Physical Capital (=1 if yes)	Social Capital (=1 if yes)	Human Capital		Physical Capital (=1 if yes)	Social Capital (=1 if yes)
	Education (=1 if yes)	Health (=1 if yes)			Education (=1 if yes)	Health (=1 if yes)			Education (=1 if yes)	Health (=1 if yes)		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Panel-A: Uganda												
Received remittances (=1 if yes)	0.051**	-0.017	0.028	0.053*	1.673**	0.656	0.102	1.317**	[0.051 , 1.673]	[0.051, 0.656]	[0.035 , 0.102]	[0.180 , 1.317]
	(0.025)	(0.026)	(0.022)	(0.031)	(0.684)	(0.468)	(0.262)	(0.619)	(0.002, 3.014)	(-0.043 , 1.572)	(-0.029 , 0.616)	(0.082 , 2.530)
Observations			1,603				1,603				1,603	
Panel-B: Kenya												
Received remittances (=1 if yes)	0.029	0.016	0.056***	0.015	0.694***	0.649***	0.471***	1.192***	[0.722, 0.842]	[0.853, 1.754]	[0.499, 0.625]	[1.436 , 2.520]
	(0.022)	(0.022)	(0.017)	(0.024)	(0.219)	(0.232)	(0.129)	(0.270)	(0.211 , 1.792)	(0.293 , 3.281)	(0.185 , 1.246)	(0.705 , 4.498)
Observations			1,821				1,821				1,821	
Panel-C: Nigeria												
Received remittances (=1 if yes)	0.051**	0.020	0.049***	0.042*	0.791***	-0.387**	0.708***	-0.872***	[0.051 , 0.791]	[-0.387 , 0.020]	[0.049 , 0.708]	[-0.872 , 0.042]
	(0.020)	(0.020)	(0.019)	(0.023)	(0.232)	(0.195)	(0.226)	(0.277)	(0.012 , 1.246)	(-0.786 , 0.060)	(0.013 , 1.150)	(-1.415 , 0.087)
Observations											2,029	
Panel-D: Burkina Faso												
Received remittances (=1 if yes)	0.097***	0.017	-0.001	0.012	0.530***	0.501***	-0.415***	1.145***	[0.361 , 0.777]	[0.256 , 0.858]	[-1.338 , -1.078]	[0.012 , 0.675]
	(0.022)	(0.016)	(0.020)	(0.023)	(0.160)	(0.131)	(0.144)	(0.233)	(0.049, 1.441)	(-0.018 , 1.470)	(-2.485 , -0.101)	(-0.033 ,1.352)
Observations			1,895				1,895				1,895	
Panel-E: Senegal												
Received remittances (=1 if yes)	0.087***	0.004	0.028*	-0.047**	0.161	0.203	-0.164	0.196	[0.087 , 0.161]	[0.018 , 0.203]	[-0.164 , 0.028]	[-0.047 , 0.196]
	(0.023)	(0.020)	(0.016)	(0.023)	(0.192)	(0.172)	(0.119)	(0.206)	(0.041 , 0.538)	(-0.040 , 0.539)	(-0.398 , 0.058)	(-0.091 , 0.600)
Observations			1,705				1,705				1,705	

Note: a) This table reports the estimates of OLS, 2SLS, and IIV estimation. (b) Robust standard errors are presented in parentheses. (c) IIV estimation bounds are reported in square brackets and corresponding confidence intervals are reported in parentheses. (d) The variable of interest, received remittances, is an indicator that takes one if a household received remittances and zero otherwise. (e) Outcome variables are also indicator variables that equal one if a household made capital investment, and zero otherwise. (f) Control variables are female household head, head is paid employee, head is self-employed, head has secondary education, head has above secondary education, head's age is 45-60 years, head's age is above 60 years, log household income, number of children in the household, number of elderly in the household, and location is urban. (g) *** p<0.01, ** p<0.05, * p<0.10.

2.6.2 Continuous Treatment Variable

In our main estimation, we find the treatment effect of remittances by comparing remittance receiving and non-receiving households. Here, we use remittance amount (in log scale) as the treatment variable. Outcome variables are still dummy indicators for investment decisions. This exercise allows us to address the concern that the indicator variable (i.e., received remittances) in our main estimation might be picking up the effect of unobserved differences between remittance-receiving and non-remittance-receiving households instead of the effect of remittances. The results for this exercise are presented in Table 2.6. Columns 1-4 present the average marginal effects of naïve probit estimates, while columns 5-8 present the average marginal effects of IV-probit estimates.

Once again, we observe that the naïve probit estimates are biased downward towards zero. Consequently, we focus on the IV-probit estimates. Table 2.6 column 5, presents the results for education investment, which shows that the coefficients are positive for all countries and statistically significant in Uganda, Kenya, Nigeria, and Burkina Faso. Similarly, we find a significant positive effect of remittance amount on health investment in Uganda, Kenya, and Burkina Faso. However, we find a significant negative effect in Nigeria, which is consistent with our main result. In Table 2.6 column 7, consistent with our main results, we find that the remittances amount has a statistically significant positive effect on physical capital in Kenya and Nigeria but a significant negative effect in Burkina Faso. However, the remittance coefficient becomes insignificant in Uganda compared to our main result.

Finally, in column 8, we find that remittances amount has a statistically significant positive effect on social capital investment in Uganda, Kenya, and Burkina Faso but a significant negative effect in Nigeria. These findings are qualitatively similar to our main result from the biprobit estimation in Table 2.4. Thus, we argue that our main results are robust to using a continuous treatment variable.

Table 2.6: Effect of Cash Remittances on Household Investment Decision

	Probit				IV Probit			
	Human Capital		Physical Capital (=1 if yes)	Social Capital (=1 if yes)	Human Capital		Physical Capital (=1 if yes)	Social Capital (=1 if yes)
	Education (=1 if yes)	Health (=1 if yes)			Education (=1 if yes)	Health (=1 if yes)		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Panel-A: Uganda								
Log(Cash remittances)	0.008	-0.003	0.004	0.009*	0.137***	0.102**	0.019	0.120***
	(0.005)	(0.005)	(0.003)	(0.005)	(0.015)	(0.046)	(0.049)	(0.015)
Mean of the outcome variable	0.684	0.792	0.119	0.299	0.684	0.792	0.119	0.299
Observations			1,603				1,603	
Panel-B: Kenya								
Log(Cash remittances)	0.000	0.002	0.006**	-0.000	0.072***	0.079***	0.072***	0.085***
	(0.003)	(0.004)	(0.002)	(0.004)	(0.010)	(0.011)	(0.008)	(0.002)
Mean of the outcome variable	0.594	0.676	0.141	0.418	0.594	0.676	0.141	0.418
Observations			1,821				1,821	
Panel-C: Nigeria								
Log(Cash remittances)	0.008**	0.002	0.006**	0.003	0.073***	-0.044**	0.066***	-0.073***
	(0.003)	(0.003)	(0.003)	(0.004)	(0.010)	(0.017)	(0.009)	(0.009)
Mean of the outcome variable	0.729	0.764	0.185	0.374	0.729	0.764	0.185	0.374
Observations			2,029				2,029	
Panel-D: Burkina Faso								
Log(Cash remittances)	0.020***	0.005	-0.001	-0.001	0.099***	0.113***	-0.096***	0.119***
	(0.005)	(0.004)	(0.004)	(0.005)	(0.015)	(0.011)	(0.019)	(0.003)
Mean of the outcome variable	0.645	0.875	0.231	0.649	0.645	0.875	0.231	0.649
Observations			1,895				1,895	
Panel-E: Senegal								
Log(Cash remittances)	0.012***	0.001	0.005**	-0.010***	0.022	0.024	-0.021	0.021
	(0.003)	(0.003)	(0.002)	(0.003)	(0.024)	(0.021)	(0.020)	(0.024)
Mean of the outcome variable	0.672	0.825	0.096	0.734	0.672	0.825	0.096	0.734
Observations			1,705				1,705	

Note: a) This table reports the average marginal effects for probit and IV probit models. (b) Robust standard errors are presented in parentheses. (c) The variable of interest is the amount of cash remittances received (in log scale) in last 12 months. (d) Outcome variables are also indicator variables that equal one if a household made capital investment, and zero otherwise. (e) Control variables are female household head, head is paid employee, head is self-employed, head has secondary education, head has above secondary education, head's age is 45-60 years, head's age is above 60 years, log household income, number of children in the household, number of elderly in the household, and location is urban. (f) *** p<0.01, ** p<0.05, * p<0.10.

2.6.3 Continuous Treatment and Outcome variables

So far, we have examined investment decisions at an extensive margin, i.e., whether an investment expenditure was made or not. However, we are also interested in the amount of money spent on investments, i.e., the intensity of investment expenditure. Consequently, we examine the effect of remittances on investment decisions using a log scale of the actual amounts of investment expenditure. The result of this exercise is presented in Table 2.7. Columns 1-4 reports the OLS estimates, while columns 5-8 reports the 2SLS estimates. Since both the key explanatory variable and the outcome variables are in log scales, we can interpret the estimated coefficients as elasticities.

Table 2.7 column 5 reports the intensive margin estimates for education expenditure and shows that remittances increase education expenditure in all the countries examined except Senegal. Although we do not find a significant extensive margin effect of remittances received in Uganda, the intensive margin result shows remittances significantly increase education expenditure. Specifically, a 10 percent increase in remittances leads to a 14.7 percent increase in education expenditure in Uganda. On the contrary, the extensive margin effect of remittances received on education investment was significant in Senegal, but we find no significant effect on the intensive margin. For other countries, we find that a 10 percent increase in remittances leads to a 5-7 percent increase in education expenditure in Kenya, Nigeria, and Burkina Faso.

Column 6 of Table 2.7 shows the intensive margin estimates for health expenditure. We find a significant positive effect of remittances on health expenditure in Uganda and Burkina Faso. Specifically, a 10 percent increase in remittances leads to a 5-8 percent increase in health expenditure in Uganda and Burkina Faso. Although the extensive margin effect of remittances received on health investment was significant in Kenya, we find no significant effect on the intensive margin. Consistent with the extensive margin effect of remittances received, we find a significant negative effect of remittances on health expenditure in Nigeria. Specifically, a 10 percent increase in remittances leads to a 5 percent reduction in health expenditure in Nigeria.

Column 7 of Table 2.7 presents the intensive margin results for physical capital expenditure. Again, consistent with our main estimation, we find a significant positive effect of remittances on physical capital expenditure in Kenya and Nigeria and a significant negative effect in Burkina Faso. Specifically, a 10 percent increase in remittances leads to a 5 percent increase in physical capital expenditure in Kenya and Nigeria, but a 2.75 percent decrease in Burkina Faso.

Finally, Column 8 of Table 2.7 presents the intensive margin results for social capital expenditure. We find a significant positive effect of remittances on social capital

expenditure in Uganda, Kenya, and Burkina Faso and a significant negative effect in Nigeria. Specifically, a 10 percent increase in remittances leads to a 4-8 percent increase in social capital expenditure in Uganda, Kenya, and Nigeria, but a 5 percent decrease in Nigeria. Although the extensive margin effect of remittances received on social capital investment was significant in Senegal, we find no significant effect on the intensive margin.

Further extending the intensive margin analysis, we check for the non-linear effect of remittances on household investment expenditures. We explore the non-linearity of remittances with two different specifications. First, we add a quadratic term (i.e., squared remittance) in our main estimation equation. We expect the quadratic term to capture non-linearity in the effect of remittance on investment expenditures. Second, we add two additional terms in our main specification– high remittances and interaction of high remittances with remittances amount. High remittances is an indicator variable that equals one if the household received above district average remittances, and zero otherwise. This exercise will highlight whether a high amount of remittances received leads to any differential effect of remittances on household investment expenditures. We found little evidence of any non-linear effect of remittances on household investment expenditures. The results of these exercises are presented in Appendix Table A.5.

Table 2.7: Effect of Remittances Amount on Household Investment Expenditure

	OLS				2SLS			
	Human Capital				Human Capital			
	Log(Education Expenditure)	Log(Health Expenditure)	Log(Physical Capital Expenditure)	Log(Social Capital Expenditure)	Log (Education Expenditure)	Log(Health Expenditure)	Log(Physical Capital Expenditure)	Log(Social Capital Expenditure)
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Panel-A: Uganda								
Log(Cash remittances)	0.053*	0.028	0.035	0.041*	1.469**	0.779*	0.093	0.759*
	(0.029)	(0.023)	(0.022)	(0.024)	(0.638)	(0.401)	(0.242)	(0.388)
Mean of the outcome variable	3.408	2.791	0.466	0.981	3.408	2.791	0.466	0.981
Observations	1,603				1,603			
Panel-B: Kenya								
Log(Cash remittances)	0.023	0.025	0.044***	0.002	0.686***	0.188	0.540***	0.624***
	(0.022)	(0.018)	(0.015)	(0.017)	(0.253)	(0.183)	(0.153)	(0.204)
Mean of the outcome variable	3.115	2.742	0.680	1.556	3.115	2.742	0.680	1.556
Observations	1,821				1,821			
Panel-C: Nigeria								
Log(Cash remittances)	0.070***	0.032*	0.042**	0.025	0.633***	-0.498***	0.504***	-0.522***
	(0.019)	(0.017)	(0.017)	(0.019)	(0.162)	(0.144)	(0.151)	(0.162)
Mean of the outcome variable	3.989	3.312	0.976	1.763	3.989	3.312	0.976	1.763
Observations	2,029				2,029			
Panel-D: Burkina Faso								
Log(Cash remittances)	0.087***	0.033**	0.007	-0.037*	0.500***	0.508***	-0.275**	0.428**
	(0.020)	(0.016)	(0.018)	(0.021)	(0.159)	(0.147)	(0.127)	(0.169)
Mean of the outcome variable	2.361	3.376	0.820	2.454	2.361	3.376	0.820	2.454
Observations	1,895				1,895			
Panel-E: Senegal								
Log(Cash remittances)	0.071***	0.023	0.025**	-0.039**	-0.232	0.192	-0.111	-0.037
	(0.017)	(0.015)	(0.012)	(0.019)	(0.149)	(0.122)	(0.082)	(0.150)
Mean of the outcome variable	3.112	3.867	0.484	3.790	3.112	3.867	0.484	3.790
Observations	1,705				1,705			

Note: a) This table reports OLS and 2SLS estimates. (b) Robust standard errors are presented in parentheses. (c) Outcome variables are capital investment expenditure in US dollars (in log scale) in the past 12 months. (d) The variable of interest is the amount of cash remittances received in US dollars (in log scale) in last 12 months. (e) Outcome variables are also indicator variables that equal one if a household made capital investment, and zero otherwise. (f) Control variables are female household head, head is a paid employee, head is self-employed, head has secondary education, head has above secondary education, head's age is 45-60 years, head's age is above 60 years, log household income, number of children in the household, number of elderly in the household, and location is urban. (g) *** p<0.01, ** p<0.05, * p<0.10.

2.7 Heterogeneity

2.7.1 Household With and Without Migrants

In this section, we explore the heterogeneity of the effect of remittances on capital investments. In the first heterogeneity analysis, we study how households with migrants and households without migrants differ in their investment decisions. In most cases, migration is a pre-condition to receiving remittances, but receiving remittances from non-household members (i.e., brothers, sons-in-law, and uncles) is not uncommon in SSA. A key difference between the two types of households is the relationship to the household head. For migrant households, the migrants are close family members, usually the child or spouse of the household head. In contrast, for households without migrants, the remitters are usually distant relatives such as cousins, in-laws, grandparents, etc. This difference in relationship to household head may lead to differences in remitting behaviours. Several studies in the literature have suggested that migration is an investment and that migrants and their households enter an implicit and informal contract (Brown & Poirine, 2005; Clemens & Ogden, 2013; Poirine, 1997). In this contract, households finance migrants travel costs as well as invest in the human capital of migrants. These contracts are not enforceable by law but are rather driven by altruism (Sana & Massey, 2005). As a result, remittances are returns on investment rather than a windfall and this somewhat explains the more frequent and larger remittances to migrant households compared to households without migrants. This can also somewhat explain differences in investment behaviour between the two types of households. Some studies in the literature have examined the impact of remittances on outcomes of left behind individuals while conditioning on migration see (Amuedo-Dorantes & Pozo, 2010; Bargain & Boutin, 2015. It is important to note that the estimates from this analysis cannot be interpreted causally since we are conditioning on an endogenous variable[6] - whether a household has a migrant. Instead, this heterogenity analysis provides illustrative evidence of the importance of distinguishing between the effects of remittances and migration on household investment decisions. The result of this exercise using a recursive biprobit model is presented in Table 2.8. The treatment variable is an indicator of remittances received, and the outcome variables are investment decision indicators. Columns 1-4 present the results for households with migrants, and columns 5-8 present those without migrants.

The results presented in Table 2.8 show sizeable heterogeneity in investment decisions between the households with and without migrants. The result for households with

[6]Estimating a model conditional on an endogenous variable may be problematic because the error term would likely contain differential correlation structures with the outcome variable.

migrants almost completely mirrors our main findings except for a few differences. We find that remittance receiving households in almost all the countries under review are more likely to invest in education than non-remittance receiving households. We also find mixed effects for the other capital types and across countries. For example, remittances have positive effects on health expenditure in Uganda, Kenya, and Burkina Faso but a negative effect in Nigeria. Similarly, remittances have positive effects on physical capital investment in Uganda, Kenya, and Nigeria but a negative effect in Burkina Faso. Finally, remittances have positive effects on social capital in all the countries except Nigeria, where the effect is negative. This suggests that the effects found in the main results are driven by households with migrants.

The results for households without migrants are slightly different from households with migrants. For instance, column 5 of Table 2.8 shows that remittance has a negative effect on education expenditure in Kenya. This finding contradicts our main results and results from households with migrants. It suggests that remittances create disincentives for investing in education for a household without migrants. We find a positive effect on education for Nigeria and Burkina Faso, which is similar to our main results. Column 6 of Table 2.8 presents results for health investment in households without migrants. We find negative effects in Uganda and Nigeria but positive effects in Senegal. The results in Uganda and Senegal are different from those for households with migrants. There is no difference in physical capital investment for the two groups in Kenya, Nigeria, and Burkina Faso. Finally, for social capital, there is no difference between the two groups for Nigeria and Burkina Faso. However, the coefficient for Uganda is negative and significant compared to the positive effect in households with migrants.

Overall, we find important heterogeneity between the two groups, which varies substantially across countries. This heterogeneity analysis suggests that the main results are driven mainly by households with migrants. This could be due to the altruism of migrants or an implicit contract between migrants and their left behind family members. For households without migrants, some results were similar to those with migrants but mostly different. It is possible that the absence of an implicit contract between the migrant and left behind household members affects the size, frequency, and utilisation of remittances.

Table 2.8: Effect of Remittances on Household Investment Decisions Conditional on Having a Migrant

	Household with a Migrant				Household with no Migrant			
	Human Capital				Human Capital			
	Education (=1 if yes)	Health (=1 if yes)	Physical Capital (=1 if yes)	Social Capital (=1 if yes)	Education (=1 if yes)	Health (=1 if yes)	Physical Capital (=1 if yes)	Social Capital (=1 if yes)
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Panel-A: Uganda								
Received remittances (=1 if yes)	0.143***	0.113*	0.044**	0.096***	0.010	-0.014***	-0.010	-0.005***
	(0.014)	(0.064)	(0.018)	(0.017)	(0.011)	(0.002)	(0.006)	(0.001)
Mean of the outcome variable	0.736	0.798	0.131	0.327	0.641	0.786	0.108	0.276
Mean received remittances	0.356				0.054			
Observations	719				884			
Panel-B: Kenya								
Received remittances (=1 if yes)	0.246***	0.269***	0.232***	0.311***	-0.014***	0.008	0.013*	0.013
	(0.052)	(0.025)	(0.089)	(0.013)	(0.002)	(0.051)	(0.007)	(0.034)
Mean of the outcome variable	0.610	0.692	0.153	0.436	0.566	0.649	0.119	0.389
Mean received remittances	0.622				0.104			
Observations	1,158				1,158			
Panel-C: Nigeria								
Received remittances (=1 if yes)	0.163**	-0.125***	0.242***	-0.247***	0.047*	-0.010***	0.022***	-0.036***
	(0.067)	(0.048)	(0.050)	(0.040)	(0.025)	(0.003)	(0.005)	(0.005)
Mean of the outcome variable	0.773	0.756	0.191	0.347	0.659	0.777	0.177	0.418
Mean received remittances	0.579				0.151			
Observations	1,253				776			
Panel-D: Burkina Faso								
Received remittances (=1 if yes)	0.206***	0.253***	-0.216***	0.242***	0.053**	0.056	-0.062*	0.057***
	(0.048)	(0.015)	(0.056)	(0.027)	(0.027)	(0.046)	(0.034)	(0.011)
Mean of the outcome variable	0.696	0.878	0.231	0.654	0.568	0.871	0.229	0.641
Mean received remittances	0.542				0.193			
Observations	1,142				753			
Panel-E: Senegal								
Received remittances (=1 if yes)	-0.006	0.069	0.184	0.318***	-0.012	0.032***	0.007	-0.014
	(0.145)	(0.147)	(0.123)	(0.052)	(0.011)	(0.012)	(0.006)	(0.009)
Mean of the outcome variable	0.727	0.838	0.109	0.738	0.581	0.803	0.073	0.728
Mean received remittances	0.745				0.072			
Observations	1,065				640			

Note: a) This table reports the average marginal effects for recursive bivariate probit models. (b) Columns 1-4 show estimates for households with a migrant household member and column 5-8 show estimates for households with no migrant household member. (c) Robust standard errors are presented in parentheses. (d) The variable of interest, received remittances, is an indicator that takes one if a household received remittances and zero otherwise. (e) Outcome variables are also indicator variables that equal one if a household made capital investment, and zero otherwise. (f) Control variables are female household head, head is a paid employee, head is self-employed, head has secondary education, head has above secondary education, head's age is 45-60 years, head's age is above 60 years, log household income, number of children in the household, number of elderly in the household, and location is urban. (g) *** p<0.01, ** p<0.05, * p<0.10.

2.7.2 Remittance Sources

Next, we explore heterogeneity by remittance sources– internal (domestic), within-Africa, and out-of-Africa. Heterogeneity by remittance sources is important because the remittance literature points out that remittance sources contain critical information such as the relative size of remittances, migrant's control over the

household's use of remittances, and transfer of values and norms. For example, compared to domestic remittances, out-of-Africa remittances are generally bigger in size (see Appendix Table A.3), but the migrant being far away from the household may have limited control over the use of remittances. Similarly, out-of-Africa migrants may transfer a vastly different set of values and norms learned at the destination countries to the household compared to domestic or within-Africa migrants (Tuccio & Wahba, 2018; Tuccio et al., 2019). However, constrained by our data, it is difficult for us to identify exactly which information the remittance source contains. Consequently, we explore the overall effect of remittance sources. Table 2.9 presents the effects of remittances conditional on the remittance sources. Columns 1-4 present the results for internal remittance, columns 5-8 present the results for within-Africa remittances, and columns 9-12 present the results for out-of-Africa remittances.

To understand the heterogeneity of the effect of remittances on education investment, we compare Table 2.9 columns 1, 5, and 9. In Uganda, internal and African remittances have no significant effect on education. However, we find a significant negative effect of out-of-Africa remittances on education. In Kenya and Burkina Faso, we find that remittances from internal and within-Africa sources significantly increase the likelihood of investment in education, but it is insignificant for out-of-Africa remittances. We find a different result in Nigeria– internal and out-of-Africa sources have a significant positive effect on education investment, and African remittances have a significant negative effect. Finally, in Senegal, only remittances from internal sources have a statistically significant effect. These findings suggest that the remittance sources differentially affect education investment decisions in different countries. Overall the result indicates that internal remittances increase the likelihood of investment in education, whereas African and out-of-Africa remittances have a mixed effect. This pattern in education investment from internal remittance is likely due to lower migration expectations and greater control of the migrant over household investment decisions.

Unlike investment in education, health investment decisions does not have any substantive variation by remittance sources. Apart from the small, marginally significant effect of internal remittances on health expenditure in Uganda, we found no significant effect on health investment regardless of remittance sources in Uganda and Senegal. Conversely, in Kenya and Burkina Faso, remittances have a positive effect on health investment regardless of remittance sources. Finally, in Nigeria, we find that within-Africa sources have a significant, positive effect on health investment but domestic and out-of-Africa sources are insignificant. Comparing columns 3, 7, and 11, we see variations in physical capital investment across sources. In Uganda,

only remittances from out-of-Africa sources significantly increase the likelihood of investment in physical capital. Meanwhile, only internal remittances have a significant positive effect on physical capital investment in Nigeria. In Kenya, remittances from all sources significantly increase the likelihood of physical capital investment. On the contrary, in Burkina Faso, we find that both internal and within-Africa remittances have significant negative effects on physical capital investment and out-of-Africa remittances have significant but modest positive effects. Overall, our results suggest that out-of-Africa remittances increase the likelihood of physical capital investment, even in Bukina Faso, where internal and African remittances negatively affect physical capital investment. This result is due to the relatively strong income effect generated from larger out-of-Africa remittances.

Finally, we observe substantial heterogeneity of social capital investment across remittance sources by comparing columns 4, 8, and 12 of Table 8. In Uganda, we find that within-Africa remittances have a significant negative effect on social capital investment while out-of-Africa remittances have significant positive effects. In Kenya and Burkina Faso, only internal and within Africa sources have significant positive effects on social capital investment. In Nigeria, internal remittances significantly reduce the likelihood of social capital investment, while in Senegal, out-of-Africa remittances significantly increase the likelihood of social capital investment.

Overall, we find substantial heterogeneity in household investment decisions by remittance sources. Moreover, the effect of remittance sources also varies across countries, making it difficult to distinguish patterns. However, a few patterns emerge: internal remittances are more likely to increase education investment, within-Africa remittances are more likely to increase health investment, and out-of-Africa remittances are more likely to increase physical and social capital investment.

Table 2.9: Effect of Remittances on Household Investment Decision by Remittance Source

	Internal Remittances				African Remittances				Out-of-Africa Remittances			
	Human Capital				Human Capital				Human Capital			
	Education (=1 if yes)	Health (=1 if yes)	Physical Capital (=1 if yes)	Social Capital (=1 if yes)	Education (=1 if yes)	Health (=1 if yes)	Physical Capital (=1 if yes)	Social Capital (=1 if yes)	Education (=1 if yes)	Health (=1 if yes)	Physical Capital (=1 if yes)	Social Capital (=1 if yes)
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Panel-A: Uganda												
Received remittances (=1 if yes)	0.011	-0.013*	-0.025	0.009	0.006	0.009	0.002	-0.002***	-0.006***	-0.002	0.004***	0.010***
	(0.011)	(0.008)	(0.044)	(0.018)	(0.007)	(0.020)	(0.001)	(0.000)	(0.002)	(0.009)	(0.001)	(0.002)
Mean of the outcome variable	0.677	0.790	0.115	0.291	0.661	0.791	0.111	0.285	0.661	0.788	0.114	0.290
Observations	1,482				1,343				1,365			
Panel-B: Kenya												
Received remittances (=1 if yes)	0.083***	0.095***	0.061**	0.073***	0.021***	0.028***	0.005***	0.016***	0.038	0.066	0.021***	0.009
	(0.009)	(0.014)	(0.030)	(0.007)	(0.006)	(0.009)	(0.002)	(0.003)	(0.038)	(0.048)	(0.006)	(0.082)
Mean of the outcome variable	0.581	0.654	0.137	0.409	0.572	0.648	0.112	0.393	0.573	0.657	0.114	0.381
Observations	1,363				1,114				1,259			
Panel-C: Nigeria												
Received remittances (=1 if yes)	0.127***	0.073	0.071***	-0.084***	-0.003**	0.002***	0.001	0.002	0.037**	0.015	0.004	0.013
	(0.006)	(0.317)	(0.014)	(0.006)	(0.001)	(0.000)	(0.001)	(0.002)	(0.018)	(0.025)	(0.021)	(0.022)
Mean of the outcome variable	0.722	0.759	0.184	0.385	0.706	0.750	0.159	0.346	0.715	0.753	0.167	0.343
Observations	1,646				1,224				1,355			
Panel-D: Burkina Faso												
Received remittances (=1 if yes)	0.082***	0.122***	-0.095***	0.053***	0.081***	0.114***	-0.041***	0.051***	0.002	0.002***	0.000**	0.002
	(0.018)	(0.009)	(0.013)	(0.002)	(0.022)	(0.009)	(0.005)	(0.004)	(0.005)	(0.001)	(0.000)	(0.019)
Mean of the outcome variable	0.619	0.875	0.228	0.642	0.624	0.867	0.226	0.640	0.602	0.867	0.227	0.643
Observations	1,445				1,458				1,142			
Panel-E: Senegal												
Received remittances (=1 if yes)	0.052**	-0.006	-0.033	0.003	0.014	-0.001	-0.039*	0.027	-0.017	0.067	0.003	0.121***
	(0.025)	(0.022)	(0.049)	(0.037)	(0.022)	(0.018)	(0.024)	(0.035)	(0.037)	(0.056)	(0.073)	(0.006)
Mean of the outcome variable	0.636	0.813	0.083	0.740	0.622	0.810	0.091	0.736	0.648	0.815	0.092	0.732
Observations	1,144				1,018				1,234			

Note: a) This table reports the average marginal effects for recursive bivariate probit models. (b) Robust standard errors are presented in parentheses. (c) The variable of interest, received remittances, is an indicator that takes one if a household received remittances and zero otherwise. (d) Outcome variables are also indicator variables that equal one if a household made capital investment, and zero otherwise. (e) Control variables are listed in Table 2.1 (f) *** p<0.01, ** p<0.05, * p<0.10.

2.7.3 Substitutability

Our final heterogeneity analysis explores the substitutability in investment decisions, which is the likelihood of investing in one capital type conditional on already investing in other capital types. This exercise relaxes the implicit assumption about the independence of the investment choices and allows us to explore potential substitutability among investment alternatives. The result of this exercise is presented in Table 2.10. In addition, this exercise allows us to examine whether conditioning on investment in other types of capital takes away the statistical significance or alters the sign of the effect, which will indicate strong substitutability between different types of capital investments.

Table 2.10 columns 1 and 2 present the likelihood of investing in human capital (i.e., education and health) conditional on investing in physical or social capital. In Kenya and Senegal, we find that remittances no longer significantly affect human capital investment if households invest in physical or social capital. Compared to our main result in Table 2.4, there is strong substitutability between human capital and other capital types in Kenya. However, we do not see such substitutability in Uganda, Nigeria, and Burkina Faso; households' likelihood of human capital investment is unaffected by the investment in other capitals. This result suggests a substantial variation in substitutability among human capital and other investment choices across countries.

Table 2.10 column 3 presents how remittances affect the likelihood of physical capital investment conditional on investment in either human or social capital. Compared to Table 2.4, we find that investment in human and social capital does not affect physical capital investment. This result suggests that there is no substantive substitutability between physical capital and other investment alternatives in any of the countries. We find a similar conclusion for social capital investment (Table 2.10 column 4); there is no sizeable substitutability between social capital and other investment alternatives. Since we find substitutability only in human capital and only in two countries, our implicit assumption of independence between the investment alternatives is benign. Consequently, relaxing the assumption will not substantively change our results.

Table 2.10: Substitutability of Investments

	Invested in Physical Capital or Social Capital		Invested in Human Capital or Social Capital	Invested in Human Capital or Physical Capital
	Human Capital			
	Education (=1 if yes)	Health (=1 if yes)	Physical Capital (=1 if yes)	Social Capital (=1 if yes)
	(1)	(2)	(3)	(4)
Panel-A: Uganda				
Received remittances (=1 if yes)	0.022	0.074	0.018**	0.032
	(0.036)	(0.066)	(0.008)	(0.021)
Mean of the outcome variable	0.769	0.872	0.124	0.314
Observations	576	576	1,480	1,468
Panel-B: Kenya				
Received remittances (=1 if yes)	0.064	0.022	0.108***	0.177***
	(0.068)	(0.115)	(0.026)	(0.016)
Mean of the outcome variable	0.672	0.811	0.152	0.470
Observations	882	882	1,545	1,516
Panel-C: Nigeria				
Received remittances (=1 if yes)	0.177***	-0.049*	0.131***	-0.179***
	(0.033)	(0.027)	(0.024)	(0.005)
Mean of the outcome variable	0.758	0.844	0.184	0.391
Observations	986	986	1,874	1,884
Panel-D: Burkina Faso				
Received remittances (=1 if yes)	0.155***	0.197***	-0.181***	0.147***
	(0.029)	(0.018)	(0.018)	(0.017)
Mean of the outcome variable	0.672	0.901	0.235	0.661
Observations	1,331	1,331	1,834	1,800
Panel-E: Senegal				
Received remittances (=1 if yes)	0.011	-0.006	0.018	0.208***
	(0.066)	(0.052)	(0.058)	(0.023)
Mean of the outcome variable	0.678	0.853	0.099	0.748
Observations	1,282	1,282	1,651	1,584

Note: a) This table reports the average marginal effects for recursive bivariate probit models. (b) Robust standard errors are presented in parentheses. (c) The variable of interest, received remittances, is an indicator that takes one if a household received remittances and zero otherwise. (d) Outcome variables are also indicator variables that equal one if a household made capital investment, and zero otherwise. (e) Control variables are female household head, head is a paid employee, head is self-employed, head has secondary education, head has above secondary education, head's age is 45-60 years, head's age is above 60 years, log household income, number of children in the household, number of elderly in the household, and location is urban. (f) Estimates of columns 1 and 2 are conditional on households investing on physical or social capital. Similarly, estimates of column 3 are conditional on households investing on human or social capital. Finally, column 4 is conditional human or physical capital investment (g) *** p<0.01, ** p<0.05, * p<0.10.

2.8 Mechanisms

2.8.1 Income Effect

This section explores the potential mechanism through which remittances affect a household's investment decisions. The first mechanism we study is the income effect. Remittances through easing a household's budget constraint may affect investment decisions. We use consumption expenditure and asset ownership as proxies to measure the income effect. More specifically, we use an indicator variable that takes one if a household spends above the district-level median consumption expenditure and zero otherwise. Similarly, we use dummy indicators for ownership of radio and mobile phones.

Table 2.11 column 1 shows that remittance receiving households in Uganda, Kenya, Nigeria, and Senegal are more likely to engage in above-median consumption than non-remittance receiving households. However, we find that remittance receiving households in Burkina Faso are less likely to engage in above-median consumption expenditure. This result suggests that remittance receiving households in Burkina Faso are less likely to allocate a large proportion of their budget on consumption. Nevertheless, we still find some evidence of income effect in Burkina Faso as remittances increase the likelihood of asset ownership (see Column 2-3 of Table 2.11). Similarly, we find that remittances increase the likelihood of asset ownership in Kenya, Nigeria, and Senegal. These results indicate that remittances have a substantial income effect and are consistent with the literature. For instance, (Simiyu, 2013) finds a similar result in Kenya and (Kakhkharov & Ahunov, 2020) in Uzbekistan.

2.8.2 Substitution Effect

The second mechanism we study is the substitution effect of remittances. Remittances, being non-labour income, has a substitution effect that creates incentives for left behind household members to cut back labour supply to continue receiving remittances. The result of this exercise is presented in column 4 of Table 2.11. The outcome variable is the proportion of adult household members working. If substantial substitution exists, we expect to find a negative relationship between received remittances and the proportion of adult household members working.

The effect of received remittances is significant and negative in Kenya and Senegal. This result indicates that adult members in remittance receiving households are less likely to join the labour force than their counterparts in non-remittance receiving households in Kenya and Senegal. This finding is consistent with the literature

(Amuedo-Dorantes & Pozo, 2006a; Binzel & Assaad, 2011). On the contrary, we find a significant positive effect of remittances on adult household members' labour supply in Nigeria and Burkina Faso. This result is similar to (Vadean et al., 2017), who found that remittances increase the likelihood of employment in Tajikistan. Overall, we only find evidence of the substitution effect of remittances in Kenya and Senegal.

2.8.3 Migration Expectations

The final mechanism we explore is migration expectations. Remittance may reduce human capital investment by raising the opportunity cost of education and lowering the incentive to study (Amuedo-Dorantes & Pozo, 2006a; Antman, 2012; Mckenzie & Rapoport, 2011). Furthermore, left behind individuals have lower incentive to invest in education if they have migration intentions and if the returns to origin country education is low in destination countries. We explore two outcome variables to measure migration expectations– children's labour force participation (i.e., the proportion of children aged 6-15 working) and children's schooling (i.e., the proportion of children aged 6-15 in school). The result of this exercise is presented in columns 5 and 6 of Table 2.11.

In column 5, we do not find significant positive coefficients of received remittances, which indicates that migration expectations do not significantly increase the labour force participation of the children (aged between 6-15 years) in remittance receiving households. On the contrary, we find that remittances significantly decrease children's labour force participation in Burkina Faso, which corresponds to the findings of (Bargain & Boutin, 2015).

We find a similar positive effect of received remittances (in Column 6) on children's schooling in all the countries except Senegal. This result suggests that children in remittance receiving households are more likely to continue school in Uganda, Kenya, Nigeria, and Burkina Faso. However, in Senegal, we find the opposite effect suggesting children in remittance receiving households are less likely to continue school. Consequently, we can argue that the migration expectations channel is only in effect in Senegal but play no significant role in explaining household investment decisions in other sample countries.

To summarise, we empirically explore three mechanisms and find that the income effect is the main channel through which remittances affect households' investment decisions. In addition, we find evidence of the substitution effect of remittances in Kenya and Senegal. Finally, we find evidence of migration expectations channel in Senegal only. One limitation of this analysis of mechanisms is that the estimates

cannot be interpreted causally. It is important to note that these estimates cannot be interpreted causally. Given that we use cross-sectional data for our analysis, we are unable to disentangle the timing of the channels, neither can we lag our variables of interest.

Table 2.11: Mechanisms of the Effect

	Income Effect			Labor Substitution	Migration Expectation	
	Above Median Consumption Expenditure (=1 if yes)	Own Radio (=1 if yes)	Own Mobile Phone (=1 if yes)	Proportion of Adult Household Member Working	Proportion of Children Aged 6-15 Working	Proportion of Children Aged 6-15 in School
	(1)	(2)	(3)	(4)	(5)	(6)
Panel-A: Uganda						
Received remittances (=1 if yes)	0.045***	-0.013	0.006	-0.234	-0.094	0.305
	(0.003)	(0.021)	(0.020)	(0.266)	(0.237)	(0.464)
Mean of the outcome variable	0.303	0.778	0.569	0.676	0.080	0.871
Observations	1,603	1,603	1,603	1,603	963	963
Panel-B: Kenya						
Received remittances (=1 if yes)	0.154***	0.136***	0.001	-0.298***	0.058	0.308
	(0.011)	(0.051)	(0.069)	(0.105)	(0.039)	(0.930)
Mean of the outcome variable	0.253	0.848	0.801	0.541	0.004	0.832
Observations	1,821	1,821	1,821	1,821	901	901
Panel-C: Nigeria						
Received remittances (=1 if yes)	0.070***	0.196***	0.171***	0.665***	-0.073	0.984***
	(0.024)	(0.016)	(0.011)	(0.172)	(0.057)	(0.274)
Mean of the outcome variable	0.339	0.876	0.5783	0.595	0.031	0.705
Observations	2,030	2,030	2,030	2,030	1,245	1,245
Panel-D: Burkina Faso						
Received remittances (=1 if yes)	-0.132**	0.149***	0.104***	0.278***	-1.001***	0.802***
	(0.062)	(0.044)	(0.030)	(0.094)	(0.221)	(0.205)
Mean of the outcome variable	0.322	0.062	0.403	0.764	0.412	0.452
Observations	1,895	1,895	1,895	1,895	1,633	1,633
Panel-E: Senegal						
Received remittances (=1 if yes)	0.179***	0.110**	0.117*	-0.205*	0.342	-0.606*
	(0.009)	(0.045)	(0.064)	(0.117)	(0.247)	(0.353)
Mean of the outcome variable	0.678	0.823	0.850	0.541	0.294	0.684
Observations	1,705	1,705	1,705	1,705	1,296	1,296

Note: a) Columns 1-3 report the average marginal effects for recursive bivariate probit models and columns 4-6 report the estimates of 2SLS regression. (b) Robust standard errors are presented in parentheses. (c) The variable of interest, received remittances, is an indicator that takes one if a household received remittances and zero otherwise. (d) Control variables are female household head, head is a paid employee, head is self-employed, head has secondary education, head has above secondary education, head's age is 45-60 years, head's age is above 60 years, log household income, number of children in the household, number of elderly in the household, and location is urban. (e)*** p<0.01, ** p<0.05, * p<0.10.

2.9 Conclusion

Remittances can stimulate investment in income-generating activities by relaxing liquidity constraints in receiving households. However, remittance dependence and other unintended consequences can reduce investment in income-generating activities. In the context of SSA, we study whether the remittance receiving households make any investment expenditures, and if they do, what kind of investments do they make. Except for a few exceptions, we find that remittances increase investment in human,

physical, and social capital in the countries analysed. The income effect of remittances mainly drives this positive effect on investment. We do not find evidence of a strong income effect in Burkina Faso and it is only in this country that remittances reduce the likelihood and amount of physical capital investment. This finding is not surprising as the average remittances received by households in Burkina Faso are the lowest in countries analysed. Furthermore, we find evidence of substitution effect by the left behind household members in Kenya and Senegal, but the effect is strong enough to influence investment decisions only in Senegal. Similarly, we find evidence of migration expectations only in Senegal, and remittances do not increase human capital expenditure there.

We also explore the heterogeneous effect of remittance sources on households' investment decisions. We find some interesting patterns: internal remittances matter more for education investment, within Africa remittances are more likely to increase health investment, and out-of-Africa remittances are more likely to increase physical and social capital investment. We argue that internal remittances are more likely to increase education investment because they create relatively lower migration expectations than within Africa and out-of-Africa remittances. Similarly, out-of-Africa remittances are more likely to increase physical and social capital investment due to the relatively strong income effect generated from the larger remittances.

Our study has important policy implications for SSA's economic development. First, we provide further evidence that remittances can contribute to economic development through productive investments. Given that migrants send about 15 percent of their total income as remittances, there is great potential to harness remittances by devising policies to reduce remittances transfer costs. It also coincides with the Sustainable Development Goal (SDG) 10.7.C (United Nations, 2015), which aims to reduce the cost of sending remittances to less than 3% by 2030 from the current 9% to SSA (World Bank, 2018a). Our study is also relevant for the local and international organisations designing business models and financial instruments to maximise the impact of remittances on economic development. Understanding the heterogeneous effect of remittance sources will help these organisations design effective financial instruments to boost capital formation and income generation in the remittances receiving communities.

Furthermore, our study highlights the importance of social capital investment, which suggests that researchers and policymakers should devote more attention to this investment type. Policymakers seeking to boost human and physical capital investments should also focus on social capital investment decisions.

Although highly complementary to the existing literature, our findings must be evaluated against the fact that our analysis is not free from limitations. We use cross-sectional data, which makes us unable to follow the same household over time. Given the rising importance of remittances, a multi-country longitudinal study is required to generate deeper knowledge for policy action.

Chapter 3

Migration, Remittances and Labour Force Participation: Evidence from Sub-Saharan Africa

Note: This paper has been presented at the Annual Southern PhD Economics Conference (ASPEC) 2021, the 1st Virtual Reading PhD Workshop in Economics and PhD seminars at the Department of Economics, University of Reading. I am deeply grateful for helpful comments and advise from my supervisors, Dr Stefania Lovo and Professor Simonetta Longhi. I am also grateful for constructive criticism and insightful comments from Professor Uma Kambhampati.

3.1 Introduction

This study focuses on the impact of international migration and remittances on the labour market outcomes of left behind household members. International migration can affect the labour market decisions of left behind individuals in different ways. On one hand, the inflow of remittances raises the reservation wage[1] of left behind household members thus reducing their labour supply. Remittances can also alleviate household liquidity constraints and facilitate the establishment of small businesses which can increase self-employment. On the other hand, the inflow of remittances is usually associated with the emigration of working-age household members which can induce changes in the labour market decisions of left behind household members.

[1]Reservation wage is the amount for which an individual is indifferent between participating in the labour market or not.

Since these channels work in opposite directions, the effect of migration on left behind household members is theoretically ambiguous.

Convincing studies on this question is scarce, but evidence has been increasing in the past decade with mixed results (Bossavie & Özden, 2022). However, the preponderance of evidence in the literature seems to suggest that labour force participation and hours worked for women decline in response to migration and remittances. This has been found in Mexico (Amuedo-Dorantes & Pozo, 2006a), El-Salvador (Acosta, 2007), Haiti (Jadotte & Ramos, 2016), Nepal (Lokshin & Glinskayai, 2009), Albania (Mendola & Carletto, 2012) and Egypt (Binzel & Assaad, 2011). Other studies have found positive or neutral effects on labour supply. For example, Cox-Edwards & Rodríguez-Oreggia (2009) using household data from Mexico found a "neutral" effect of remittances on the labour force participation of left behind household members. Similarly, Yang (2008) exploited the 1997 Asian financial crisis to investigate this question. He found that positive remittance shocks increase the hours worked in self-employment among left behind household members. The existing empirical literature suggest that this remains an open empirical question with inconclusive evidence.

This study contributes to the empirical literature on remittances and labour supply by examining the effect of international remittances on the labour market decisions of left behind household members in Sub-Saharan Africa. Sub-Saharan Africa provides an interesting context to study this question because the region has experienced significant emigration and inward remittance flows in the past decade (Ratha, 2011). However, there is almost no research on this region mainly because of data unavailability. This chapter differs from the previous chapter along three main lines - research question, focus and instrumental variables used. In terms of the research question, Chapter 2 examines the effect of remittances on investment decisions, whereas this chapter examines the effect of remittances on the labour supply of left behind individuals. Next, chapter 2 examines the effect of remittances regardless of the source (i.e. domestic, within Africa and out-of-Africa), whereas this chapter focuses on international remittances only. Finally, chapter 2 uses historical migration networks as instrumental variables for receiving remittances, meanwhile, this chapter uses changes in the economic conditions of migrants' destination countries as instruments for international remittances.

The dataset used for this study was collected specifically to fill the knowledge gap on magnitude, causes and impacts of migration and remittances in Sub-Saharan Africa (Plaza et al., 2011). In particular, this study used the Migration and Remittances Household Survey conducted by the World Bank in 2009 – 2010. The data is

cross-sectional and covers 6 countries in sub-Saharan Africa namely: Nigeria, Kenya, Uganda, Burkina Faso, Senegal and South Africa. A unique feature of these surveys is that they are standardised across countries, which allows for easy aggregation and comparison. In addition to standard information about individual and households, the data set also contains rich information about migrant characteristics which is a significant improvement from other data sources used in the remittance literature.

Migration and remittances are endogenous variables. For instance, the decision to migrate is not random as migrants self-select into migration. Households choose whether to engage in migration or not, they choose who to migrate, when and where to migrate to, the migrants choose whether to send remittances, how much to send, how frequently to send remittances, whether to return and when to return. Unobserved factors that are correlated with migration and remittance decisions may also be correlated with labour supply decisions. As a result, linear regression models that do not address this endogeneity will yield biased and inconsistent estimates.

This study relies on instrumental variables (IV) for identification. In particular, I exploit changes in the economic conditions of migrants' destination countries as instruments for international remittances. In particular, I use per capita GDP growth rate and employment rate in migrants' destination countries as IVs. These destination level instruments provide a source of exogenous variation in remittance flows but do not directly affect labour market decisions in origin countries. The intuition is that economic conditions at the migrants' destination countries affect the earnings of the migrants and by extension their remittances. However, they are likely to be uncorrelated with labour market outcomes in origin countries. Several researchers have used economic conditions and changes in economic condition in destination countries as instruments for international remittances see (Antman, 2014; Bargain & Boutin, 2015; Nepal, 2016; Yang, 2008). One criticism of using destination level variables as instruments for remittances is that the choice of destination country is endogenous. Another criticism is that simultaneous shocks could affect remittances inflows and households labour market outcomes in origin countries. These criticisms amount to potential violations of the exclusion restriction.

This study addresses the potential violation of the exclusion restriction by implementing Nevo & Rosen (2012)'s imperfect instrumental variables (IIV) approach. In place of the validity assumption of the standard IV approach, Nevo & Rosen (2012) make two weaker assumptions that allow us to partially identify the effect of remittances on labour supply. First, they assume a non-zero correlation between the IIV and the error term. That is, they allow the IIV to be correlated with the error term. In addition, they assume that the sign of the correlation between the

IIV and the error term is the same direction as the sign of the correlation between the endogenous regressor and the error term. The second assumption is that the correlation between the IIV and the error term should be less than the correlation between the endogenous regressor and the error term. This assumption implies that the IIV should be less endogenous than the endogenous regressor. These two, weaker assumptions in place of the traditional validity assumption generates bounds on the parameter of interest.

I contribute to the literature in the following ways. First, to my knowledge, this study is one of the first to apply IIV to the migration literature. The IIV has been used to check the sensitivity of IV results in health economics (Amin et al., 2020), environmental economics (Aragón & Rud, 2016; Lovo & Veronesi, 2019) and household economics (Tur-Prats, 2019). However, only Hossain & Sunmoni (2022) have applied the IIV approach to the migration literature. This is important because the instrumental variables approach is one of the most popular methods for addressing endogeneity in the migration literature. Second, I offer a comprehensive view of the effect of remittances on labour supply in Sub-Saharan Africa, a region for which there is little evidence on this phenomenon. The study exploits the strengths of cross-country analyses and country-specific analyses to provide a comprehensive view of sub-Saharan Africa. In the context of country specific analysis, each country is examined in isolation, accounting for country characteristics. In terms of the cross-country analysis, five countries in Sub-Saharan Africa are analysed with a standardised data set and methodology. To my knowledge, only Binzel & Assaad (2011) has provided evidence for Africa. However, they focus on Egypt which is different from the rest of Sub-Saharan Africa in many respects, e.g. migration patterns. As a result, the findings from this country cannot be generalised to other SSA countries. Third, I provide comparable estimates for Sub-Saharan Africa using a standardised data set, methodology and assumptions. Past studies only study one country at a time. Furthermore, the estimates are not comparable as the datasets, methodologies and assumptions are different. For instance, Amuedo-Dorantes & Pozo (2006a) studied only Mexico, Binzel & Assaad (2011) studied only Egypt and Jadotte & Ramos (2016) studied only Haiti. Finally, I explore different transmission channels of the effect of migration on labour supply. This is important because the net effect of migration on labour supply is ultimately determined by the relative strength of the opposing forces. Consequently, it is important to examine the specific channels through which the estimated effects are transmitted. Past studies only state that the income effect is the main transmission channel, but they do not empirically prove it. I analyse three different mechanisms – income effect, liquidity effect and labour loss effect – of how remittances affect the labour supply of left behind household members.

The results show that the effect of remittances on labour supply differs across the countries studied. I find positive effects in Nigeria and Burkina Faso, statistically insignificant results in Kenya and Uganda and a negative effect in Senegal. The result in Senegal and Burkina Faso is driven by female left behind household members and is stronger in rural areas. Meanwhile, remittances ease liquidity constraints in Nigeria and facilitates the establishment of small-businesses for men. Analysis of mechanisms show that the results are mainly driven by the income effect of remittances and to a lesser extent the liquidity effect of remittances. I do not find any evidence of the labour lost effect in all the countries under review. The results are robust to relaxing the exclusion of the traditional instrumental variables approach, alternative definition of the main explanatory and outcome variable, and alternative model specifications.

One important finding of this study is that remittances can facilitate the establishment of small businesses particularly for liquidity constrained households. Policy makers can design strategies to help reduce the cost of sending remittances, thus helping migrant households realise higher returns and entrepreneurs access capital for their investments[2].

The rest of the chapter is structured as follows: Section 3.2 covers the theoretical framework, Section 3.3 provides a review of relevant literature, Section 3.4 discusses the data source, Section 3.5 provides information about the empirical methodology employed, Section 3.6 discusses the results, Section 3.7 provides robustness checks, Section 3.8 covers heterogeneity of effect, Section 3.9 covers mechanisms and Section 3.10 concludes the chapter.

3.2 Theoretical Framework

Economists typically use the neoclassical model of labour-leisure choice to model labour supply decisions. In the neoclassical model, individuals derive satisfaction from consuming goods and services and enjoying leisure activities subject to a budget constraint which comprises of labour income and non-labour income. Labour income is determined by the market wage rate and the individual's time budget, while non-labour income refers to income from other sources such as, inheritance, investment income and remittances (Borjas, 2016).

[2]The cost of sending remittances through formal channels have been linked with the volume and frequency of sending money. For example, Ahmed et al. (2021) using bilateral data for 30 sending countries and 75 receiving countries for the period 2011 - 2017, found that a 1% decrease in the cost of sending $200 is associated with a 2% increase in remittances.

The decision to participate in the labour market is driven mainly by the reservation wage which is defined as the minimum wage rate that would make an individual indifferent between working or not working (Cahuc et al., 2014). Therefore, an agent will only work if the market wage rate is higher than his/her reservation wage. Remittances are a form of non-labour income which can increase the reservation wage of individuals in remittance-receiving households and thus reduce their probability of participating in the labour market (Cox-Edwards & Rodríguez-Oreggia, 2009; Killingsworth, 1983).

The migration of a productive household member affects the left behind household through two main channels. On one hand, the inflow of remittances can affect the labour force participation of left behind members in competing ways. First, the income effect of remittances can increase non-labour income and reservation wage which in turn will (ceteris paribus) dampen incentives for the left behind household members to join the labour market. Remittances, by increasing non-labour income, can also reduce the opportunity cost of leisure which will increase the demand for leisure (assuming leisure is a normal good) and reduce the probability of participating in the labour market. Second, the inflow of remittances may help households overcome the type of liquidity constraints that prevent the establishment of new small or medium scale enterprises which could increase households' participation or labour supply in self-employment. This is the self-employment liquidity effect.

On the other hand, the migration of a member of the household implies that the person's input will be missing in home production and domestic labour market. If the migrant was economically active, the absence of the person reduces the total stock of labour hours available in the household and household income which may induce the other household members to join the labour force or increase labour supply. Furthermore, if the person had caring responsibilities, their absence might mount greater burden of work on the remaining household members. For example, if the migrant is the carer for young children or elderly parents, their absence in the household may increase time spent on home production for other family members. Since these mechanisms work in opposite directions, the impact of migration and remittances on left behind family members can only be determined empirically.

3.3 Review of Empirical Literature

In general, most empirical studies in the literature find that international migration and remittances lead to a reduction in households' labour supply and participation rates. These effects are usually influenced by gender, age and duration of migration. For

example, women are found to reduce labour supply in paid employment and increase home production while there is no overall change in men's labour supply but allocation among employment types (Amuedo-Dorantes & Pozo, 2006a; Bossavie & Özden, 2022).

In an early study, Funkhouser (1992) investigated the effect of remittances on the labour market outcomes of left behind household members in Nicaragua. He found that remittances decrease labour force participation but increase self-employment of left behind male and female household members. Rodriguez & Tiongson (2001) examined the effect of international migration on the propensity of left behind household members to participate in formal wage employment. Using data from urban Philippines, they found a negative impact on both male and female left behind members. However, the effect was stronger for women. Similarly, Kim (2007) using data from Jamaica found that international remittances have a negative impact on the labour force participation of left behind members but had a neutral effect on weekly working hours. The author concluded that remittance receiving households have a higher reservation wage compared to their counterparts and they reduce their labour supply by either moving out of the labour force or showing less enthusiasm to get a job. While these studies are informative, the results should be interpreted with caution as the authors did not account for endogeneity in the migration and remittances variables which could bias the results.

Among the studies accounting for endogeneity, Acosta (2007) used 2SLS and migration networks to instrument for international remittances. He used data for El-Salvador and found that international remittances reduce the labour force participation of women but not men in remittance receiving households. He also found that men in remittance-receiving households are more likely to be self-employed while women are more likely to be involved in non-farm activities especially in the rural areas. Generally, the results suggest that remittances reduce household credit constraints, particularly in rural areas. However, the exclusion restriction may be violated as large migration networks may be correlated with local economic situation which has a direct impact on individuals' labour supply decision. In a similar study in Mexico, Amuedo-Dorantes & Pozo (2006a) used the number of western union offices in a state as an instrument for remittances and found no overall change in male labour supply. However, they found that men in remittance-receiving households switch from formal to informal work whereas the overall labour supply of rural women declines in response to remittance inflows. The exclusion restriction may also be violated here as the number of western union offices in a state is correlated with the level of urbanisation or economic development of the state. This has implications for the

quantity of jobs available which affects peoples labour supply directly. More recent studies find similar results in different countries. For instance, Lenoël & David (2019) in Morocco, Phadera (2016) in Nepal, Jadotte & Ramos (2016) in Haiti and Vadean et al. (2017) in Tajikistan all find that migration or remittances reduce female labour supply or participation. A major difference between these IV results and the descriptive results discussed earlier is that the descriptive results merely present associations while the IV results present causal effects (if the exclusion restriction is satisfied).

The impact of migration and remittances on the labour supply of left behind individuals is also heterogeneous by the gender composition of household members. In addressing the differential impact by gender, some studies have focused on the effect of male migration on the labour force participation of left behind female household members. In an early study, Lokshin & Glinskayai (2009) proposed a two-period model of utility maximisation by a household consisting of husband and wife. The model highlights a theoretically ambiguous impact of male migration on female labour force participation at home as the mechanisms work in opposite directions. On one hand, remittances sent by the husband may disincentivize the wife from participating in the labour market by increasing her reservation wage. On the other hand, the absence of the husband from the household may increase or reduce the wife's home production and therefore local labour market participation depending on whether the inputs of the spouses in home production are complements or substitutes (Démurger & Li, 2012). Using data from Nepal, the authors find an overall negative impact of male migration on female labour force participation.

In line with this approach, Mendola & Carletto (2012) investigated the impact of migration on male and female labour supply in origin countries. They used data from Albania's 2005 Living Standards Measurement Survey (LSMS) and an instrumental variables (IV) approach. They found that migration reduces female paid labour supply but increase unpaid labour supply. However, this relation does not hold for left behind men. Similarly, Binzel & Assaad (2011) used Egyptian data and 2SLS approach to study the effect of male migration on the labour supply response of left behind women. They used migration networks as IV and found that women decrease wage work, especially in urban areas. However, rural women in migrant households are much more likely to be employed in unpaid work and subsistence work compared to women in non-migrant households. The authors argue that the response of labour supply is driven by the need of the household to replace the migrant's lost labour. Here, migration networks could be a potentially invalid IV because the exclusion restriction may not be satisfied. Migration networks is likely correlated with local economic situation which has a direct impact on labour force participation. Overall, this strand of

literature finds that women decrease wage work in response to migration but increase labour supply in unpaid home production which the authors argue is to replace the migrant's lost labour.

While all the preceding studies find that international migration and remittances often lead to a reduction in the labour supply and participation of left behind household members, some studies have found that migration has limited or no significant effect on the labour force participation of left behind members. For instance, Cox-Edwards & Rodríguez-Oreggia (2009) using propensity score matching (PSM) studied the effect of remittances on the labour market status of the left behind family members. Using data from Mexico, they found that remittances have limited impact on the labour force participation of left behind household members. The authors argue that their result is consistent with the notion that migration is a crucial part of household's income generation strategy. The PSM method only matches treatment and control groups based on observable characteristics thus this study is vulnerable to omitted variables bias, particularly for unobservable characteristics. Similarly, Kan & Aytimur (2018), investigated the effect of male migration on the labour force participation of women left behind. Using panel data from Tajikistan and migration density as an IV, they found that male migration has no significant effect on the number of hours that women work. They also found that women work more when the household has agricultural land, regardless of whether it is a migrant household or not. Migration density is similar to migration network and is likely correlated with some unobservable district level characteristics which also affects labour market decisions. Thus, the exclusion restriction may not be satisfied. More recently, Mobarak et al. (2021) using a randomised controlled trial (RCT) for Bangladesh found that international migration has no significant effect on Labour supply. In a nutshell, this strand of the literature shows that migration has no significant effect on the labour supply of left behind household members.

The approach of this paper differs from previous empirical studies in that I implement Nevo & Rosen (2012)'s imperfect instrumental variable approach which allows for weaker assumptions in place of the validity (exclusion restriction) condition of the traditional IV method. The IIV method then generate bounds which allow us to partially identify the endogenous parameter of interest (remittances in this case). Thus, I can partially identify the effect of remittances on the labour force participation of left behind individuals even if the exclusion restriction is violated. In addition, this study provides comparative estimates for five countries - in Sub-Saharan Africa, a region for which there is little evidence on this phenomenon. To my knowledge, only Binzel & Assaad (2011) has studied this phenomenon in Africa. However, they focus on Egypt

which is different from the rest of Sub-Saharan Africa in many respects, e.g. migration patterns. As a result, the findings from this country cannot be generalised to other SSA countries.

3.4 Data and Descriptive Statistics

3.4.1 Data Sources

The data used in this study was obtained from the Migration and Remittances Household Survey conducted by the World Bank between October 2009 and May 2010. The cross-sectional surveys covered six sub-Saharan countries namely: Burkina Faso, Kenya, Nigeria, Senegal, Uganda and South Africa (Plaza et al., 2011). The surveys collected comprehensive information about migration and remittances, individual and migrants labour market situation, housing conditions, household assets and expenditures, use of financial services, as well as a wide range of individual and household socio-economic and demographic characteristics.

The household surveys were part of the Africa Migration Project (AMP) and were specifically designed to fill the knowledge gap on magnitude, causes and impacts of migration and remittances in Sub-Saharan Africa (Plaza et al., 2011). One unique feature of this dataset is that it contains comprehensive information about the migrants. For example, the surveys collected information about the destination of the migrants, their employment status, gender, age, marital status, level of education before migration and duration of migration. This information was provided by the household head[3] or their representative and is crucial for generating instruments. Other household surveys such as living standards survey, demographic and health survey and labour force survey do not contain such rich information about migrants. Another unique feature of this dataset is that they are standardised across countries as they were conducted around the same time using the same questionnaires. This allows for easy aggregation and comparison across countries. However, one drawback of this dataset is that it contains no information about hours worked. Consequently, we cannot investigate the impact of remittances on labour supply at the intensive margin. This notwithstanding, we can address whether a person works or not.

In Nigeria, Senegal and Uganda, population census frameworks were used to select provinces, districts and other units and to conduct nationally representative samples (Plaza et al., 2011). However, in Kenya and Burkina Faso, the population census

[3]The household head is the person who makes key decisions of the household on day-to-day basis and whose authority is recognised by all members of the household (World Bank, 2009).

frameworks were too old to be used. Consequently, the samples were not nationally representative but representative of the level of the unit of analysis chosen i.e. province, state or unit (Plaza et al., 2011). Since the focus of the project was on migration, surveying in Kenya and Burkina- Faso were restricted to provinces and districts with high incidence of migration. Once these were selected, a two-phase sampling procedure was used. Households were classified according to their migration statuses; no-migrant, internal migrant and international migrant. These three groups were treated as independent sub-frames and households were selected randomly from each group. Local survey firms in origin countries conducted the fieldwork, which involved collecting and validating the responses as well as creating datasets in STATA and other formats.

I dropped South Africa from the analysis because it is mainly a migrant-receiving country rather than a migrant-sending country (Bredtmann et al., 2018; Plaza et al., 2011). The sample was restricted to left behind members within the working age of 16-64 years. The key outcome variable is the decision to participate in the labour market for the left behind household members. Specifically, I used the question "what is your current work situation?" from the survey, then I assigned the value 1 to the following categories: paid employment (full time), paid employment (part time), self-employed, military, and unemployed but looking for a job. I assigned the value zero to the following categories: housewife and student. I dropped people who cannot work from the analysis. For instance, I dropped people who are retired, permanently disabled people and people with terminal illnesses. The key explanatory variable is a binary variable that equals one if the household received remittances from abroad in the 12 months preceding the survey and zero otherwise. Following the migration literature, I included individual level controls such: as age, age-squared, gender, marital status, and level of education. I also included household level covariates such as: share of children aged 0-15, share of elderly (members aged 65 and above), location of the household (rural or urban), and a household asset index[4].

3.4.2 Descriptive Statistics

Table 3.1 presents summary statistics of the outcome and explanatory variables for the countries included in this analysis. There is significant heterogeneity across countries. For example, the difference between remittance and non-remittance

[4]The household asset index is a measure of household wealth. It has been used extensively in the literature see (Acosta, 2011; Cuadros-Menaca & Gaduh, 2020). It was computed using principal component analysis (PCA). The assets included in the calculation include: own house, construction material, separate kitchen, drinking water source, pipe water, own agriculture land, own non-agriculture land, own radio, own fridge, own sound system, own VCR DVD, own computer, own mobile phone, own motorcycle and electricity

receiving households is more pronounced in Nigeria compared to Burkina Faso. Across all household types and countries over 50% of left behind household members are likely to participate in the labour market. The average age of left behind members is about 32 years. Most remittance receiving households have at least one migrant abroad. The summary statistics point to relatively high levels of illiteracy in the sample as a substantial proportion of left behind individuals in both households across all countries have received no formal education. Both remittance-receiving and non-remittance receiving households have a higher proportion of children below age 15, compared to having adults above 65. Across all countries, remittance receiving households are on average wealthier (have more assets) than non-remittance receiving households. For the households in this sample, Kenya receives the largest amount of remittances, followed by Nigeria, then Senegal, Uganda and finally Burkina Faso.

Table 3.1: Descriptive Statistics for Left Behind Individuals by Household Remittance Status

Variables	Nigeria		Kenya		Uganda		Senegal		Burkina Faso	
	Non-Recipient Household	Recipient Household	Non-Recipient Household	Recipient Household	Non-Recipient Household	Recipient Household	Non-Recipient Household	Recipient Household	Non-Recipient Household	Recipient Household
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Labour Force Participation (LFP)=1	0.581	0.614**	0.657	0.644	0.666	0.601**	0.569	0.496***	0.764	0.764
Paid employment=1	0.271	0.359***	0.362	0.331	0.297	0.362**	0.170	0.161	0.016	0.016
Self employment=1	0.468	0.415***	0.370	0.318**	0.533	0.420***	0.399	0.336***	0.740	0.743
Age	33	33	33	32	31	30**	32	31***	32	33*
Female=1	0.493	0.481	0.531	0.569**	0.523	0.492	0.537	0.612***	0.560	0.567
Married=1	0.602	0.467***	0.538	0.476***	0.533	0.392***	0.546	0.538	0.721	0.692**
Remittances amount (in USD)	-	2980	-	3207		1965		2558		239
International Migration==1	0.117	0.950***	0.281	0.974***	0.080	0.769***	0.147	0.906	0.236	0.816
No formal educ=1	0.276	0.062***	0.118	0.128	0.423	0.224***	0.526	0.520	0.828	0.833
Primary Education=1	0.181	0.147***	0.356	0.289***	0.296	0.275	0.210	0.198	0.102	0.093
Secondary Education=1	0.382	0.459***	0.337	0.361	0.179	0.275***	0.205	0.229**	0.066	0.067
Post Secondary Education=1	0.162	0.332***	0.188	0.223***	0.103	0.226***	0.060	0.053	0.003	0.006
Share of children below 15	0.321	0.235***	0.279	0.221***	0.358	0.285***	0.349	0.366***	0.472	0.476
Share of adults above 65	0.021	0.028***	0.017	0.023**	0.018	0.021	0.020	0.021	0.027	0.030**
Urban=1	0.457	0.500***	0.516	0.496	0.432	0.739***	0.642	0.649	0.055	0.052
Household asset index	-0.222	1.266***	-0.135	0.776***	0.054	1.672***	-0.161	0.649***	0.087	0.183*
Per capita GDP growth rate (2008/2009)	-0.555	-0.446	-0.151	-0.830	1.022	0.718	-0.685	-0.725	-1.057	-0.498
Employment rate (2007 - 2009)	58.468	58.742	60.478	61.767	58.588	58.923	55.299	54.782	53.174	54.033
Observations	6091	1411	3372	1192	4306	429	5897	3549	5858	2347

Notes: I carry out a t-test for difference in means between the two groups. Difference = non-recipient household – recipient household. $H_0 : difference = 0$ and $H_1 : \neq 0$. *** p<0.01, ** p<0.05, * p<0.10.

3.5 Empirical Methodology

The purpose of this study is to provide robust estimates for the effect of remittances on the labour force participation of left behind household members. I start the analysis with a naïve linear probability model estimated with the Ordinary Least Squares (OLS) estimator.

$$Y^*_{i,j} = \gamma_0 + \gamma_1 R_j + \gamma_2 X_i + \gamma_3 H_j + \mu_s + \varepsilon_{i,j} \tag{3.1}$$

$$Y_{i,j} = \mathbf{I}(Y^*_{i,j} > 0) \tag{3.2}$$

Where $Y^*_{i,j}$ is the unobserved or latent probability of participating in the labour force by individual i in household j. The function $Y_{i,j} = \mathbf{I}(Y^*_{i,j} > 0)$ is an indicator function that takes the value of one if $Y^*_{i,j} > 0$ and zero otherwise. R_j is a binary indicator variable which takes the value of 1 if the household have received any positive amount of remittances from abroad in the last 12 months preceding the interview and zero otherwise. The vectors X_i and H_j include a rich set of individual and household controls that affect participation in the labour market. The individual controls are age, age-squared, gender, marital status, and level of education. While the household controls are share of children aged 0-15, share of elderly (members aged 65 and above), location of the household (rural or urban), and a household asset index. μ_s is district fixed effects which accounts for all time-invariant characteristics of the district. $\varepsilon_{i,j}$ is the unobserved error term which is assumed to be normally distributed with mean zero and variance $\sigma^2 : \varepsilon_i \sim N(0, \sigma^2)$. Standard errors are clustered at the household level as we expect that unobserved individual characteristics are correlated within the household. Furthermore, Abadie et al. (2017) argue that we should cluster standard errors at the treatment level. Since the treatment is at the household level, I also cluster our standard error at this level.

The estimation of equation 3.1 presents an econometric issue which is that the remittance variable could be correlated with the error term. The potential correlation between remittances and the error term is called endogeneity and will lead to biased and inconsistent OLS estimates if left unaccounted. There are two potential sources of endogeneity in equation 3.1. First, receiving remittances is a selective, non-random process. Migrants must choose whether to send money, how much to send and the frequency of sending money. These decisions are likely correlated with some unobserved individual and household characteristics such as social norms and income shocks that also affect the labour supply decisions of left behind household members. Consequently, it is difficult to ascertain whether remittance receipt is affecting the

labour supply decisions of the left behind household members or some other variable in the error term that is correlated with both remittance receipt and labour supply. Excluding some of these unobservable individual or household characteristics could lead to the classic omitted variables bias and therefore lead to biased and inconsistent estimates. Second, although this study seeks to explain labour supply decisions in response to receiving remittances, the labour market status of left behind household members can also affect the decision to remit and amount of remittances sent. For example, a migrant will be more likely to send remittances if the number of unemployed household members is high or if someone loses their job or becomes terminally ill. Thus, the direction of causality is hard to tell which leads to endogeneity arising from reverse causality.

This study accounts for the endogeneity of remittances using the instrumental variables (IV) approach. A credible IV must satisfy two conditions – one, the IV must have a strong correlation (either positive or negative) with the endogenous regressor. This is called the relevance assumption. The second condition is called instrument exogeneity or validity assumption. It implies that the instrument should be uncorrelated with the error term in the model. Finding instruments that are correlated with remittances is generally not a challenge. However, motivating and defending the validity assumption is less straightforward. It is well-known that the validity assumption is empirically untestable, and researchers have to rely on logical arguments based on economic theory or human behaviour. Although there are partial tests for instrument exogeneity (see Hansen, 1982; Kitagawa, 2015; Sargan, 1958), these are necessary, rather than sufficient conditions to prove instrument exogeneity (Clarke & Matta, 2018).

The identification strategy exploits variation in potential earnings and labour market conditions in migrants' destination countries. In particular, I use per capita GDP growth rate and employment rate at the migrants' destination countries as instruments for international remittances. The intuition is that economic conditions at the migrants' destination countries affect the earnings of the migrants and by extension their remittances. However, they are likely to be uncorrelated with labour market outcomes in origin countries. For instance, rapid economic growth in migrant's destination countries could increase labour demand and the wages of migrants in those countries. This can also increase the migrant's propensity to send remittances and the amount of money sent. If labour markets are connected, then it is possible that a labour demand shock in migrants destination countries can affect labour market outcomes origin countries through other means apart from remittances. This constitutes a potential violation of the exclusion restriction. I discuss this point further and other potential violationsn of the exclusion restriction in the next section and how I address them.

I estimate the following system of equations using the two-stage least squares (2SLS) estimator:

$$Y_{i,j} = \beta_0 + \beta_1 \widehat{R}_j + X_i \Pi + H_j \Gamma + \mu_s + \varepsilon_{2,i} \tag{3.3}$$

$$R_j = \delta_0 + \delta_1 Z_d + X_i \Pi + H_j \Gamma + \mu_s + \varepsilon_{1,i} \tag{3.4}$$

In the first stage (equation 3.4), the probability that a household receives remittances is modelled as a function of individual X_i and household characteristics H_j and a vector of destination-level instruments Z_d assumed to be correlated with remittance receipt but orthogonal to the unobserved error term. In the second stage (equation 3.3), I regress the predicted value of remittance receipt and the controls (individual and household characteristics) on the probability that individual i in household j will participate in the labour market. The parameter of interest, β_1, captures the effect of remittances on the labour supply of left behind household members. In equations (3.3) and (3.4), both R_j^* and $Y_{i,j}^*$ are binary indicator variables that take the value one if the household received any positive amount of remittances and if working age individuals in the household participate in the labour market.

Per capita GDP growth is defined as the growth rate of per capita GDP between 2008 and 2009[5]. I calculated this variable for each of the five countries used in the analysis. The list of migrants' destination countries can be found in appendix Table B.1 and Table B.2. Employment rate is defined as the average employment rate between 2007 and 2009. I focus on these years because they coincide with the household survey. It is important to note that this period also coincides with the Global Financial Crisis as a result, GDP growth rate in many destination countries was negative. This is evidenced in the summary statistics in Table 3.1.

Per capita GDP growth and employment rate proxy the migrants earning potential and employment probability. Migrants in countries with a high employment rate are more likely to be employed compared to migrants in the countries with low employment rates. Similarly, per capita GDP growth rate proxies' employment probability and earnings capacity of migrants. The identifying assumption is that these instruments are correlated with remittances but are assumed to be exogenous to local labour market conditions in origin countries. Precisely, they predict the likelihood, size and frequency of remittances sent but they do not affect the labour supply of left behind household members except through remittances. Destination level instruments are popular in the

[5]The data used to construct the instruments was obtained from the World Banks' World Development Indicators (World Bank, 2020a) (Accessed March 2022).

remittance literature because of their plausibly exogenous characteristics and several researchers have used them to instrument international remittances (see Alcaraz et al., 2012; Antman, 2014; Bargain & Boutin, 2015; Cuadros-Menaca & Gaduh, 2020; Yang, 2008).

3.5.1 Threats to Identification

In the preceding section, I stated that the exclusion restriction is difficult to motivate and defend. Indeed, it is possible that the instruments may fail to satisfy the exclusion restriction. For example, migrants' location choices are not random but are influenced by factors such as migration networks, potential wages, and employment opportunities. Several researchers have studied the determinants of migrants location choices in different countries and established some of the identified factors above as key drivers (Fafchamps & Shilpi, 2013; Uebelmesser et al., 2013; Zorlu & Mulder, 2008). As a result, migrants' location choice constitutes a threat to identification. Another potential threat is through international trade. If the migrant's destination countries are key trading partners with origin countries, then changes in economic conditions in the destination countries can affect origin households through other channels such as loss of income and employment in origin countries. Similarly, simultaneous economic shocks between origin and destination countries could constitute a violation of the exclusion restriction. As a example, the Global Financial Crisis (GFC) and more recently, the COVID19 pandemic affected both the migrants ability to send remittances and the labour market outcomes of left behind family members simultaneously.

I account for these potential violations of the exclusion restriction using the imperfect instrumental variables (IIV) approach. I depart from the standard validity assumption of the IV approach and indeed allow the instruments to be endogenous. More specifically, I implement the method proposed by Nevo & Rosen (2012). Rather than imposing the zero-correlation assumption between the error term and the instrument, they relax this assumption and allow the error term to be correlated with the instrument. This assumption is replaced with two weaker assumptions that allow the parameter of interest to be partially identified. First, they assume a non-zero correlation between the IV and the error term. That is, they allow the IV to be correlated with the error term. In addition, they assume that the sign of the correlation between the IIV and the error term is the same direction as the sign of the correlation between the endogenous regressor and the error term. Next, they assume that the IV is less endogenous than the endogenous regressor. These two, weaker assumptions in place of the traditional validity assumption generates bounds on the parameter of interest. Nevo & Rosen (2012) call this method the imperfect instrumental Variable (IIV)

approach. The IIV assumptions are likely to be satisfied in this context. For example, unobserved individual characteristics such as migration aspirations or entrepreneurial ambitions are likely to be positively correlated with remittances. Similarly, changes in economic conditions in migrants' destination countries are also likely to be positively correlated with unobserved individual characteristics. For individuals with migration aspirations, a positive economic shock in the destination country might increase the attractiveness of the country and facilitate migration. Thus, the first assumption of the IIV is likely satisfied. Regarding the second assumption, it is likely that the correlation between remittance flows and unobserved individual characteristics is stronger than the correlation between economic shocks in migrants destination countries and unobserved individual characteristics. We argue that the instrument is less endogenous than the endogenous regressor and thus the IIV assumptions are likely satisfied.

3.6 Main Results

In this section, I present the main results of the analysis. Table 3.3 presents the OLS and IV estimation results. The main explanatory variable is "received remittances," which is an indicator variable that takes one if a household received remittances in the 12 months before the survey and zero otherwise. The outcome variable is also a binary indicator variable that equals one if a left behind individual participated in the labour market and zero otherwise. Column 1 presents the naïve OLS estimates and column 2 shows the 2SLS estimates. Panels A-E present the results for Nigeria, Kenya, Uganda, Senegal, and Burkina Faso respectively. All columns of Table 3.3 include control variables and district fixed effects[6]. The standard errors in parenthesis are clustered at the household level.

The naïve OLS estimates show that remittance receipt have a negative but statistically insignificant effect on the labour force participation of left behind individuals for all countries under review. This suggests that remittance receipt does not affect the decision to work for individuals in remittance receiving households in the sample of countries being analysed. However, this result is likely to be biased due to reverse causality and omitted variables bias. As stated in the empirical methodology section, I address endogeneity concerns using instrumental variables – per capita GDP growth rate and average employment rate. The first stage regression shows that the instruments are statistically significant at the 1 percent significance level (except for employment rate in Nigeria and Uganda). Furthermore, I check the appropriateness of the instruments using the "rule-of-thumb" introduced by Staiger & Stock (1997). The rule-of-thumb states that an instrument is suitable or appropriate if it has an F-value of 10 or higher in the first stage. The F-statistics in the first stage are greater than 10 which suggests that the instruments are suitable. Since I use two instrumental variables for one endogenous regressor, I carried out tests of over-identifying restrictions on the instruments using the Hansen's J-statistic. The joint null hypothesis states that the instruments are valid, and rejecting the null hypothesis implies that at least one of the instruments is not valid. In this case, I cannot reject the null hypothesis for any of the countries at less than 5% level of significance. This offers some confidence that the instruments used are suitable. The result of this exercise is presented in Table 3.2.

[6]the main results are robust to the inclusion of household assets which is a potentially bad control

Table 3.2: First Stage Regression Estimates

Dependent Variable: Household Received International Remittances					
	Nigeria	Kenya	Uganda	Senegal	Burkina Faso
Per capita GDP growth rate (2008/2009)	0.128**	-0.021***	-0.329***	0.176***	0.411***
	(0.058)	(0.006)	(0.045)	(0.063)	(0.041)
Average Employment rate (2007 - 2009)	0.015	0.007***	0.012	-0.071***	-0.056***
	(0.022)	(0.003)	(0.011)	(0.012)	(0.016)
Age	-0.001	-0.007*	-0.005**	-0.004	-0.006**
	(0.003)	(0.004)	(0.002)	(0.003)	(0.002)
Age-squared	0.000	0.000**	0.000***	0.000	0.000***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Female	0.015**	0.032***	-0.003	0.045***	0.013*
	(0.007)	(0.011)	(0.007)	(0.010)	(0.008)
Married	-0.066***	-0.022	-0.025**	-0.010	-0.039**
	(0.016)	(0.020)	(0.013)	(0.016)	(0.016)
Completed Primary Education	0.041***	-0.040	0.009	-0.066***	-0.015
	(0.016)	(0.028)	(0.011)	(0.020)	(0.020)
Completed Secondary Education	0.053***	-0.036	0.017	-0.056**	-0.021
	(0.017)	(0.030)	(0.017)	(0.025)	(0.031)
Completed Tertiary Education	0.131***	-0.072**	0.017	-0.123***	0.023
	(0.021)	(0.036)	(0.022)	(0.035)	(0.101)
Share below 15	-0.063	-0.092*	0.010	0.223***	0.026
	(0.048)	(0.049)	(0.032)	(0.061)	(0.065)
Share above 65	0.176	0.094	0.138	0.332	0.215
	(0.125)	(0.153)	(0.104)	(0.216)	(0.156)
Urban=1	-0.073***	-0.121***	0.041**	-0.173***	-0.079
	(0.023)	(0.026)	(0.019)	(0.034)	(0.055)
District Fixed Effects	Yes	Yes	Yes	Yes	Yes
Mean of outcome variable	0.188	0.261	0.091	0.376	0.286
Observations	7,502	4,564	4,735	9,446	8,205
F-statistics (test of excluded instrument)	24.79	12.64	27.22	20.39	136.60
SW F-statistics (weak identification test)	0.332	0.088	0.326	0.081	0.023
Hansen's J-statistics (over-identification test of instrument)	0.630	0.075	0.223	0.752	0.441

The standard errors are in parentheses and clustered at household-level. ***p<0.01, **p<0.05, *p<0.10

Once I account for endogeneity using instrumental variables, the result differs across countries. The results show that remittance receipt increase labour force participation in some countries, reduce labour force participation in some countries and has no significant effect in other countries. This suggests that the effect of remittances on the labour supply of left behind household members is complex, context-dependent and depend on many factors. Remittances increase labour force participation in Nigeria and Burkina Faso. Precisely, individuals in remittance receiving households in Nigeria and Burkina Faso are .214 and .072 points more likely to participate in the labour market compared to individuals in non-remittance receiving households. These results are statistically significant at the conventional levels.

I also find negative but insignificant results in Kenya and Uganda. This suggest that remittances do not change the labour supply of left behind household members. Cox-Edwards & Rodríguez-Oreggia (2009) argued that remittances can been seen as income contribution of a worker who lives and works in another region or country rather than as additional income or a windfall. If this is the case, then remittances should have a neutral effect on labour force participation. A few studies have found

similar results in different contexts. For example, Cox-Edwards & Rodríguez-Oreggia (2009) found that international migration and remittances have limited effect on the labour force participation of left behind household members in Mexico. Kan & Aytimur (2018) found similar results in Tajikistan. Mobarak et al. (2021) also found that international migration and remittances do not change the labour supply of left behind household members in Bangladesh.

Finally, I find that remittances reduce labour supply in Senegal. In particular, individuals in remittance receiving households are .148 points less likely to join the labour force compared to individuals in non-remittance receiving households. This result is statistically significant at the 5% level and support previous studies that show that remittances reduce labour supply at both the extensive and intensive margins (Amuedo-Dorantes & Pozo, 2006a; Binzel & Assaad, 2011; Mendola & Carletto, 2012). Some authors have argued that the reduction in labour force participation is due to higher reservation wages as a result of receiving remittances (Jadotte & Ramos, 2016; Lenoël & David, 2019).

Overall, I show that remittances have a complex impact on the labour supply of the individuals left behind in the countries under review. I find positive effects in Nigeria and Burkina Faso, statistically insignificant effects in Kenya and Uganda and a negative effect in Senegal. In the following sections, I check the robustness of the main results, then I explore heterogeneity in the main effects and channels through which remittances affect the labour supply of left behind household members.

Table 3.3: Effect of International Remittances on Labour Supply

	Dependent Variable: Labour Force Participation									
	Nigeria		Kenya		Uganda		Senegal		Burkina Faso	
	OLS	2SLS	OLS	2SLS	OLS	2SLS	OLS	2SLS	OLS	2SLS
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Received remittances=1	-0.010	0.214*	-0.007	-0.153	-0.026	-0.052	-0.021	-0.148**	-0.000	0.072***
	(0.016)	(0.121)	(0.018)	(0.122)	(0.026)	(0.074)	(0.013)	(0.059)	(0.014)	(0.028)
Age	0.057***	0.058***	0.076***	0.075***	0.080***	0.079***	0.053***	0.052***	0.011***	0.012***
	(0.003)	(0.003)	(0.003)	(0.004)	(0.003)	(0.003)	(0.002)	(0.003)	(0.002)	(0.002)
Age-squared	-0.001***	-0.001***	-0.001***	-0.001***	-0.001***	-0.001***	-0.001***	-0.001***	-0.000***	-0.000***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Female=1	-0.174***	-0.177***	-0.186***	-0.181***	-0.085***	-0.086***	-0.400***	-0.394***	-0.274***	-0.275***
	(0.011)	(0.012)	(0.013)	(0.013)	(0.011)	(0.011)	(0.011)	(0.011)	(0.011)	(0.011)
Married=1	0.144***	0.159***	-0.059***	-0.063***	0.064***	0.063***	-0.010	-0.011	-0.032**	-0.030**
	(0.017)	(0.019)	(0.017)	(0.017)	(0.015)	(0.015)	(0.012)	(0.012)	(0.014)	(0.014)
Completed Pry edu	0.155***	0.146***	0.026	0.020	-0.078***	-0.077***	0.032**	0.023	-0.120***	-0.118***
	(0.020)	(0.021)	(0.025)	(0.025)	(0.016)	(0.016)	(0.014)	(0.014)	(0.017)	(0.017)
Completed Sec edu	0.155***	0.143***	0.000	-0.007	-0.121***	-0.121***	-0.066***	-0.074***	-0.544***	-0.543***
	(0.021)	(0.022)	(0.025)	(0.026)	(0.020)	(0.020)	(0.016)	(0.016)	(0.024)	(0.024)
Completed Ter edu	0.333***	0.303***	0.101***	0.088***	0.064***	0.066***	-0.009	-0.024	-0.455***	-0.463***
	(0.023)	(0.028)	(0.027)	(0.030)	(0.023)	(0.023)	(0.024)	(0.026)	(0.087)	(0.090)
Share below 15	0.012	0.027	-0.125***	-0.138***	-0.099***	-0.099***	-0.098***	-0.070*	0.076*	0.069*
	(0.025)	(0.026)	(0.033)	(0.036)	(0.031)	(0.031)	(0.033)	(0.036)	(0.041)	(0.041)
Share above 65	-0.019	-0.063	0.138	0.152	-0.145	-0.142	0.051	0.091	0.044	0.027
	(0.093)	(0.100)	(0.110)	(0.114)	(0.116)	(0.116)	(0.115)	(0.119)	(0.105)	(0.106)
Urban=1	-0.039***	-0.025	-0.023	-0.041*	0.001	0.002	-0.049***	-0.070***	-0.041	-0.036
	(0.015)	(0.018)	(0.017)	(0.022)	(0.018)	(0.018)	(0.017)	(0.020)	(0.032)	(0.032)
District Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Mean of the outcome variables	0.587		0.654		0.660		0.541		0.764	
Observations	7,502		4,564		4,735		9,446		8,205	

Note: (a) This table present the effect of remittances on the labour supply of left behind household members. (b) The treatment variable is a binary indicator variable that equals one if the household received remittances and zero otherwise. (c) The outcome variable is labour supply at the extensive margin. It is a binary indicator variable that equals if the individual participates in the labour market (employed, self-employed or looking for a job) and zero otherwise. (d) Column 1 shows ordinary least square (OLS) estimates and column 2 shows two-stage instrumental variable estimates. (e) Standard errors are clustered at the household level and appear in parentheses. (f) All columns include district fixed effects. (g) The list of controls are; age, age squared, gender, marital status, education, asset index, share of household members below 15 years, share of household members above 65 and household's location. (j) ***Significant at the 1 percent level, **Significant at the 5 percent level, and *Significant at the 10 percent level.

3.7 Robustness Checks

I checked the robustness of the main results to violations of the exclusion restriction, different definition of the main explanatory and outcome variables and a different model specification. The results are presented in the following sections.

3.7.1 Nevo and Rosen (2012) Bounds

As mentioned in the methodology section, a potential threat to identification using per capita GDP growth rates and employment rates as instruments is that migrants' location choices are not random but are influenced by factors such as migration networks, wages, employment rates amongst others. Another potential violation of the exclusion restriction is through international trade. I estimate a model using per capita GDP growth rates and employment rates as imperfect instrumental variables (IIV) to address these potential violations of the exclusion restriction. I also present ordinary linear regression (OLS) and two-stage linear regression (2SLS) estimates to compare with the IIV estimates. The result of this analysis is presented in Table 3.4. Column 1 present the OLS estimates, column 2 present the 2SLS estimates, and column 3 present the IIV estimates. The IIV estimation coefficient bounds are presented in square brackets, and the corresponding 95 percent confidence intervals are presented in parentheses. The coefficients are statistically significant at the 5 percent significance level if the 95 percent confidence intervals do not contain zero.

The results for Uganda and Senegal are consistent with our main findings. For Uganda, I still find a negative but insignificant effect of remittances on labour supply at the extensive margin. This suggests that the results for Uganda is robust to weaker assumptions about the validity of the instruments. More precisely the IIV coefficient for Uganda has a lower bound of – 0.026 and upper bound of – 0.025 with 95% confidence interval -0.223 and 0.038. Similarly, the coefficients for Senegal are negative and significant at the 95% level. The effect of remittances on labour supply in Senegal is bounded between – 0.199 and – 0.158 with 95% confidence intervals – 0.472 and – 0.019. This also suggest that the result for Senegal is robust when considering weaker assumptions about the validity of the instruments. Note also that the OLS and 2SLS estimates have the same sign.

However, the estimates for Nigeria, Kenya and Burkina Faso are sensitive to violations of the exclusion restriction. This can be seen in their wide bounds which contain zero. It suggests that the results do not hold under weaker but more plausible assumptions. The bounds on remittances for Nigeria are – 0.017 and 0.166 with 95% confidence intervals – 0.051 and 0.507. The bounds Kenya are – 0.002 and 0.020

with confidence interval – 0.741 and 0.328. The bounds for Senegal are – 0.004 and 0.042 with confidence interval – 0.041 and 0.136. Overall, this exercise shows that the results for Uganda and Senegal are robust to weaker assumptions on the exclusion restriction. However, for Nigeria, Kenya and Senegal, the results are not robust to weaker assumptions on the exclusion restriction. One reason why the IIV estimates for Nigeria, Kenya and Burkina Faso are sensitive to violations of the exclusion restriction could be due to connected labour markets via trade. Data from UN COMTRADE[7] shows that Nigeria, Kenya and Burkina Faso have more major trading partners that are also major migrant destination countries than Uganda and Senegal. For instance, 6 out of the top 10 migrant destination countries for Nigeria are also top 10 trading partners. As a result, labour market shocks in migrants destination countries could be transmitted to origin country through other means apart from remittances. Given this sensitivity to relaxing the exclusion restriction, the estimates for Nigeria, Kenya and Burkina Faso should be interpreted with caution.

[7] see Table B.5 in the appendix

Table 3.4: IIV estimates of the effect of remittances on labour supply

	OLS	2SLS	Imperfect IV
Dependent Variable: Labour Force Participation (=1 if yes)			
	(1)	(2)	(3)
Panel A: Nigeria			
Received remittances (=1 if yes)	-0.010	0.214*	[-0.017, 0.166]
	(0.016)	(0.121)	(-0.051, 0.507)
Controls	Yes	Yes	Yes
District Fixed Effects	Yes	Yes	Yes
Mean of the outcome variables		0.587	
Observations		7502	
Panel B: Kenya			
Received remittances (=1 if yes)	-0.007	-0.153	[-0.002, 0.020]
	(0.018)	(0.122)	(-0.741, 0.328)
Controls	Yes	Yes	Yes
District Fixed Effects	Yes	Yes	Yes
Mean of the outcome variables		0.654	
Observations		4,564	
Panel C: Uganda			
Received remittances (=1 if yes)	-0.026	-0.052	[-0.026, -0.025]
	(0.026)	(0.074)	(-0.223, 0.038)
Controls	Yes	Yes	Yes
District Fixed Effects	Yes	Yes	Yes
Mean of the outcome variables		0.660	
Observations		4,735	
Panel D: Senegal			
Received remittances (=1 if yes)	-0.021	-0.148**	[-0.199, -0.158]
	(0.013)	(0.059)	(-0.472, -0.019)
Controls	Yes	Yes	Yes
District Fixed Effects	Yes	Yes	Yes
Mean of the outcome variables		0.541	
Observations		9,446	
Panel E: Burkina Faso			
Received remittances (=1 if yes)	-0.000	0.072***	[-0.004, 0.042]
	(0.014)	(0.028)	(-0.041, 0.136)
Controls	Yes	Yes	Yes
District Fixed Effects	Yes	Yes	Yes
Mean of the outcome variables		0.764	
Observations		8,205	

Note: a) This table reports the estimates of OLS, 2SLS, and IIV estimation. (b) Standard errors are clustered at the household level and appear in parentheses (c) IIV estimation bounds are reported in square brackets and corresponding confidence intervals are reported in parentheses. (d) The variable of interest, received remittances, is an indicator that takes one if a household received remittances and zero otherwise. (e) Outcome variable is a binary indicator variable that equals if the individual participates in the labour market (employed, self-employed or looking for a job) and zero otherwise (f) Control variables are age, age squared, gender, marital status, education, asset index, share of household members below 15 years, share of household members above 65 and household's location. (g) *** p<0.01, ** p<0.05, * p<0.10.

3.7.2 Alternative Definition of Outcome variable

In this section, I check for the sensitivity of the main results to changes in the definition of the outcome variable. Up till now, I have defined labour force participation as a binary indicator variable that equals 1 if a left behind individual participates in the labour market (employed, self-employed or looking for a job) and zero otherwise. In this section, I define the outcome variable as the share of working age adults in a household that are in paid or self-employment. In addition, I did not drop other categories such as retired people. This exercise checks the sensitivity of the main results to an alternative definition of the outcome variable. It also captures labour supply at the household-level in response to remittance receipt. This model was estimated using 2SLS and the result is presented in Table 3.5

The results are consistent with the main findings in Table **??**. I still find a positive effect of remittances on labour supply in Nigeria and Burkina Faso. However, they are not significant at the conventional levels. I also find negative but insignificant effects in Kenya and Uganda which corroborates the main results. Finally, I find a negative and significant effect of remittances on labour supply in Senegal. Overall, the main results are robust to alternative definition of the outcome variable. This further reinforces the main findings that the effect of remittances on labour supply is heterogeneous across countries .

Table 3.5: Effect of International Remittances on Proportion of Working Adults

Dependent Variable: Proportion of working age adults in labour force	
Panel A: Nigeria	
Received remittances (=1 if yes)	0.016
	(0.112)
Controls	Yes
District Fixed Effects	Yes
Mean of the outcome variables	0.608
Observations	1,930
Panel B: Kenya	
Received remittances (=1 if yes)	-0.201
	(0.137)
Controls	Yes
District Fixed Effects	Yes
Mean of the outcome variables	0.574
Observations	1,672
Panel C: Uganda	
Received remittances (=1 if yes)	-0.057
	(0.079)
Controls	Yes
District Fixed Effects	Yes
Mean of the outcome variables	0.679
Observations	1,688
Panel D: Senegal	
Received remittances (=1 if yes)	-0.140*
	(0.084)
Controls	Yes
District Fixed Effects	Yes
Mean of the outcome variables	0.559
Observations	1,577
Panel E: Burkina Faso	
Received remittances (=1 if yes)	0.053
	(0.032)
Controls	Yes
District Fixed Effects	Yes
Mean of the outcome variables	0.767
Observations	1,591

Note: a) This table reports the estimates of 2SLS estimation. (b) Robust standard errors are in parentheses (c) The variable of interest, received remittances, is an indicator that takes one if a household received remittances and zero otherwise. (d) Outcome variable is the proportion of household members aged 16 and 64 who are in paid or self-employment (e) Control variables are age, age squared, gender, marital status, education, asset index, share of household members below 15 years, share of household members above 65 and household's location. (f) *** p<0.01, ** p<0.05, * p<0.10.

3.7.3 Alternative Definition of Main Explanatory Variable

In the main results, I find the effect of remittances by comparing remittance receiving to non-receiving households. Here, I use the cash amount of remittance as the main explanatory variable. This captures the intensity of remittance effects on labour force participation and the marginal effect of an extra dollar on the decision to work. It also allows us to address the concern that the indicator variable (i.e., received remittances) in the main estimation might be picking up the effect of unobserved differences between remittance-receiving and non-remittance receiving households (due to unresolved endogeneity) instead of the effect of remittances. The outcome variable is still a dummy indicator for labour force participation. The results for this exercise are presented in Table 3.6.

All the main results hold except for Nigeria where the estimated coefficient is no longer significant. This suggests that the results are robust to alternative definition of the treatment variable, and its not picking up unobserved differences between remittance receiving and non-remittance receiving households. I also estimated the main model with different estimator and found similar results. This result of this exercise is in appendix Table B.3 .

In this robustness section, I checked the sensitivity of the main results to violations of the exclusion restriction, different definition of the main explanatory and outcome variables and a different model specification. Overall, this exercise shows that the results are robust to relaxing the exclusion of the traditional instrumental variables approach, alternative definition of our treatment and outcome variable, and alternative model specifications.

Table 3.6: Effect of Cash Remittances on Labour Supply

Dependent Variable: Labour Force Participation (=1 if yes)	
Panel A: Nigeria	
Cash remittances	0.092
	(0.066)
Controls	Yes
District Fixed Effects	Yes
Mean of the outcome variables	0.587
Observations	7,502
Panel B: Kenya	
Cash remittances	-0.045
	(0.050)
Controls	Yes
District Fixed Effects	Yes
Mean of the outcome variables	0.654
Observations	4,564
Panel C: Uganda	
Cash remittances	-0.017
	(0.058)
Controls	Yes
District Fixed Effects	Yes
Mean of the outcome variables	0.660
Observations	4,735
Panel D: Senegal	
Cash remittances	-0.022**
	(0.011)
Controls	Yes
District Fixed Effects	Yes
Mean of the outcome variables	0.541
Observations	9,446
Panel E: Burkina Faso	
Cash remittances	0.262**
	(0.124)
Controls	Yes
District Fixed Effects	Yes
Mean of the outcome variables	0.764
Observations	8,205

Note: a) This table reports the estimates of 2SLS estimation. (b) Standard errors are clustered at the household level and appear in parentheses (c) The variable of interest is the cash amount of remittances received in US dollars. (d) The outcome variable is labour supply at the extensive margin. It is a binary indicator variable that equals if the individual participates in the labour market (employed, self-employed or looking for a job) and zero otherwise (e) Control variables are age, age squared, gender, marital status, education, asset index, share of household members below 15 years, share of household members above 65 and household's location. (f) *** p<0.01, ** p<0.05, * p<0.10.

3.8 Heterogeneity

3.8.1 Migration versus Remittance Effects

In this section, I attempt to disentangle the effect of migration from the effects of remittances on the labour force participation of left behind household members. This is important because the two phenomena, though related, have potentially opposing effects on labour force participation. While the income effect of remittances can reduce labour supply, the emigration of a household member has the opposite effect. As a result, the net effect of migration on households' labour force participation is ambiguous a priori. Separating the disruptive effect of household migration and the income effect of remittances on the labour force participation of left behind household members is difficult as it requires identification of separate events that are driven by similar factors. To do this, I follow Bargain & Boutin (2015) and focus on only migrant households and divide them into short-term and long-term migrant households based on how long the migrant has been away. I used a cut-off of 4 years and denoted households with migrant duration of less than 4 years – short-term migrants and more than 4 years long term migrants. This cut-off is based on the median migration duration across the countries under review. I also test for the sensitivity of the results to different cut-off points and the results persist. The idea is that the labour-lost effect of emigration confounds the income effect of remittances in the short term. However, in the longer term, households have fully adjusted to the absence of a member (Gibson et al., 2013).

In what follows, I provide illustrative evidence on the importance of disentangling the income effect of remittances from the labour-lost effect of emigration. Table 3.7 presents the results of this analysis. Column (1) presents the results for short term migrants and column (2) presents the results for longer term migrants. For Nigeria, I find no effect in the short term but a positive effect in the long term. It could be that the income effect of remittances counteracts the labour lost effect in the short term hence the insignificant results. The positive effect in the long-term could be because the migrants have potentially settled and are better off financially or they are allocating resources for income generating opportunities in their home countries ahead of their return. Indeed, analysis of mechanisms show that remittances ease household liquidity constraints and allow household members start businesses which increase labour supply in self-employment. Conversely, for Burkina Faso, I see a positive effect in the households with short term migrants but no significant effects in the long term. I do not find any significant effect across both types of households in Kenya, Uganda and Senegal. I explore this issue further in the mechanisms section[8].

[8] See Table B.4 in the appendix for descriptive statistics by households migration status

Table 3.7: Effect of International Remittances on Labour Supply by Migration Duration

Dependent Variable: Labour Force Participation (=1 if yes)		
	Less than 4 years	More than 4 years
	(1)	(2)
Panel A: Nigeria		
Received remittances (=1 if yes)	0.146	0.892*
	(0.396)	(0.507)
Controls	Yes	Yes
District Fixed Effects	Yes	Yes
Mean of the outcome variables	0.602	0.614
Observations	728	1,325
Panel B: Kenya		
Received remittances (=1 if yes)	-0.070	0.945
	(0.194)	(1.048)
Controls	Yes	Yes
District Fixed Effects	Yes	Yes
Mean of the outcome variables	0.630	0.668
Observations	756	982
Panel C: Uganda		
Received remittances (=1 if yes)	0.265	0.525
	(0.228)	(0.345)
Controls	Yes	Yes
District Fixed Effects	Yes	Yes
Mean of the outcome variables	0.643	0.653
Observations	378	297
Panel D: Senegal		
Received remittances (=1 if yes)	-0.164	-0.140
	(0.192)	(0.241)
Controls	Yes	Yes
District Fixed Effects	Yes	Yes
Mean of the outcome variables	0.528	0.490
Observations	1,213	2,868
Panel E: Burkina Faso		
Received remittances (=1 if yes)	0.124*	0.137
	(0.074)	(0.103)
Controls	Yes	Yes
District Fixed Effects	Yes	Yes
Mean of the outcome variables	0.797	0.748
Observations	929	2,369

Note: a) This table reports the estimates of 2SLS estimation. (b) Standard errors are clustered at the household level and appear in parentheses (c) The treatment variable is a binary indicator variable that equals one if the household received remittances and zero otherwise. (d) The outcome variable is labour supply at the extensive margin. It is a binary indicator variable that equals if the individual participates in the labour market (employed, self-employed or looking for a job) and zero otherwise (e) Control variables are age, age squared, gender, marital status, education, asset index, share of household members below 15 years, share of household members above 65 and household's location. (f) Estimates for households with short term migrants are in column (1) and longer term migrants are in column (2) (g) *** p<0.01, ** p<0.05, * p<0.10.

3.8.2 Employment Type

In this section, I explore the heterogeneity of the main result to the type of jobs the left behind individuals partake in. I essentially dis-aggregate the results by employment type – paid employment and self-employment. Paid employment is a binary indicator variable that equals 1 if an individual works either full time or part time in paid employment and zero otherwise. Similarly, Self-employment is a binary indicator variable that equal 1 if the individual is self-employed and zero otherwise. From the conceptual framework, we know that the income effect of remittances can lead to lower labour force participation. Similarly, the liquidity effect can facilitate investment in small businesses, thus increase self-employment. Furthermore, some studies have shown that remittances lead to a reduction in paid work and an increase in home production or self-employment for men. I check these hypotheses and present the results in Table 3.8. Column (1) presents the results for paid employment and Column (2) presents the results for self-employment. For Nigeria, the results show that the increase in labour force participation found in Table **??** is due to an increase in paid employment. For Burkina Faso, I find that the increase in labour force participation is driven by an increase in self-employment. I also find a negative and significant effect for paid employment in Kenya. However, I do not find any significant effect for either self or paid employment for the other countries which suggest that there is no heterogeneity by job type in these countries.

Table 3.8: Effect of International Remittances on Labour Supply by Employment Type

	Paid Employment (=1 if yes)	Self Employment (=1 if yes)
	(1)	(2)
	Panel A: Nigeria	
Received remittances (=1 if yes)	0.371**	-0.019
	(0.186)	(0.097)
Controls	Yes	Yes
District Fixed Effects	Yes	Yes
Mean of the outcome variables	0.289	0.459
Observations	4,475	5,876
	Panel B: Kenya	
Received remittances (=1 if yes)	-0.224*	-0.085
	(0.123)	(0.088)
Controls	Yes	Yes
District Fixed Effects	Yes	Yes
Mean of the outcome variables	0.353	0.357
Observations	3,270	3,288
	Panel C: Uganda	
Received remittances (=1 if yes)	-0.015	-0.043
	(0.110)	(0.062)
Controls	Yes	Yes
District Fixed Effects	Yes	Yes
Mean of the outcome variables	0.304	0.524
Observations	2,643	3,863
	Panel D: Senegal	
Received remittances (=1 if yes)	0.037	-0.096
	(0.077)	(0.061)
Controls	Yes	Yes
District Fixed Effects	Yes	Yes
Mean of the outcome variables	0.191	0.426
Observations	5,904	8,317
	Panel E: Burkina Faso	
Received remittances (=1 if yes)	-0.012	0.074***
	(0.026)	(0.028)
Controls	Yes	Yes
District Fixed Effects	Yes	Yes
Mean of the outcome variables	0.064	0.761
Observations	2,040	7,985

Note: a) This table reports the estimates of 2SLS estimation. (b) Standard errors are clustered at the household level and appear in parentheses (c) The treatment variable is a binary indicator variable that equals one if the household received remittances and zero otherwise. (d) The outcome variable is labour supply at the extensive margin. It is a binary indicator variable that equals if the individual participates in the labour market (employed, self-employed or looking for a job) and zero otherwise (e) Control variables are age, age squared, gender, marital status, education, asset index, share of household members below 15 years, share of household members above 65 and household's location. (f) Estimates for paid employment in column (1) and self employment are in column (2) (g) *** p<0.01, ** p<0.05, * p<0.10.

3.8.3 Gender

In this section, I dis-aggregate the main results by the gender of left behind household members. This is because past studies have shown that remittances typically lead to reduction in women's paid work and an increase in home production. Meanwhile, the increase in self-employment is typically by men. I test this hypothesis and present our results in Table 3.9. Column (1) presents the results for women and column (2) presents the results for men. The results show that the increase in labour supply found in Nigeria is driven by men. I find no significant effect for women. This could be due to the liquidity effect which facilitates investment in small businesses and increase self-employment. In Senegal, the reduction in labour supply is driven by women. This could be due to the income effect of remittances. I do not find any significant effects for men in Senegal. In Burkina Faso, the increase in labour supply at the extensive margin is driven by women. I do not find any significant effect for men in Burkina faso. Overall, this section reinforces the fact that the effect of remittances is complex and context-dependent. As a result, findings from one country or one region cannot be easily generalised to other countries.

Table 3.9: Effect of International Remittances on Labour Supply by Gender

Dependent Variable: Labour Force Participation (=1 if yes)	Female	Male
	(1)	(2)
Panel A: Nigeria		
Received remittances (=1 if yes)	0.143	0.277*
	(0.148)	(0.142)
Controls	Yes	Yes
District Fixed Effects	Yes	Yes
Mean of the outcome variables	0.504	0.667
Observations	3,683	3,819
Panel B: Kenya		
Received remittances (=1 if yes)	-0.156	0.004
	(0.128)	(0.151)
Controls	Yes	Yes
District Fixed Effects	Yes	Yes
Mean of the outcome variables	0.571	0.752
Observations	2,470	2,094
Panel C: Uganda		
Received remittances (=1 if yes)	-0.105	0.016
	(0.123)	(0.086)
Controls	Yes	Yes
District Fixed Effects	Yes	Yes
Mean of the outcome variables	0.623	0.701
Observations	2,461	2,274
Panel D: Senegal		
Received remittances (=1 if yes)	-0.288***	-0.002
	(0.082)	(0.078)
Controls	Yes	Yes
District Fixed Effects	Yes	Yes
Mean of the outcome variables	0.375	0.759
Observations	5,340	4,106
Panel E: Burkina Faso		
Received remittances (=1 if yes)	0.127***	0.012
	(0.048)	(0.025)
Controls	Yes	Yes
District Fixed Effects	Yes	Yes
Mean of the outcome variables	0.661	0.896
Observations	4,609	3,596

Note: a) This table reports the estimates of 2SLS estimation. (b) Standard errors are clustered at the household level and appear in parentheses (c) The treatment variable is a binary indicator variable that equals one if the household received remittances and zero otherwise. (d) The outcome variable is labour supply at the extensive margin. It is a binary indicator variable that equals if the individual participates in the labour market (employed, self-employed or looking for a job) and zero otherwise (e) Control variables are age, age squared, gender, marital status, education, asset index, share of household members below 15 years, share of household members above 65 and household's location. (f) Estimates for female are in column (1) and male are in column (2) (g) *** p<0.01, ** p<0.05, * p<0.10.

3.8.4 Location

In the final heterogeneity section, I explore the role of the location of the household. The intuition is that the household's location can affect the availability of work opportunities. For example, remittances through the liquidity effect can increase self-employment in urban areas due to the availability of more investment opportunities compared to rural areas. Similarly, I assume that social norms (in particular, gender norms that prevent women from engaging in paid employment) will be more pronounced in rural areas. As a result, I expect a reduction in paid employment for women in rural areas and an increase in home production. I test these conjectures and present the results in Table 3.10 Column (1) presents the results for households in urban areas and column (2) presents the results for households in rural areas. I find statistically significant results only in Senegal and Burkina Faso. For Senegal, I find that the reduction in labour supply is more pronounced in rural areas. The reduction in labour supply for households in rural Senegal is – 0.222 compared to -0.139. In the same vein, I find that the increase in labour supply found in Burkina Faso is also driven by households in rural areas. This could be because households in rural areas are more likely to liquidity constrained compared to households in urban areas. Consequently, remittances have bigger effects in rural areas.

Table 3.10: Effect of International Remittances on Labour Supply by Household Location

Dependent Variable: Labour Force Participation (=1 if yes)	Urban	Rural
	(1)	(2)
Panel A: Nigeria		
Received remittances (=1 if yes)	0.174	-0.104
	(0.117)	(0.504)
Controls	Yes	Yes
District Fixed Effects	Yes	Yes
Mean of the outcome variables	0.594	0.581
Observations	3,489	4,013
Panel B: Kenya		
Received remittances (=1 if yes)	-0.080	-0.205
	(0.183)	(0.142)
Controls	Yes	Yes
District Fixed Effects	Yes	Yes
Mean of the outcome variables	0.657	0.651
Observations	2,331	2,233
Panel C: Uganda		
Received remittances (=1 if yes)	-0.084	-0.043
	(0.095)	(0.087)
Controls	Yes	Yes
District Fixed Effects	Yes	Yes
Mean of the outcome variables	0.658	0.662
Observations	2,176	2,559
Panel D: Senegal		
Received remittances (=1 if yes)	-0.139*	-0.222**
	(0.074)	(0.091)
Controls	Yes	Yes
District Fixed Effects	Yes	Yes
Mean of the outcome variables	0.524	0.574
Observations	6,107	3,339
Panel E: Burkina Faso		
Received remittances (=1 if yes)	-0.150	0.086***
	(0.110)	(0.029)
Controls	Yes	Yes
District Fixed Effects	Yes	Yes
Mean of the outcome variables	0.600	0.774
Observations	445	7,760

Note: a) This table reports the estimates of 2SLS estimation. (b) Standard errors are clustered at the household level and appear in parentheses (c) The treatment variable is a binary indicator variable that equals one if the household received remittances and zero otherwise. (d) The outcome variable is labour supply at the extensive margin. It is a binary indicator variable that equals if the individual participates in the labour market (employed, self-employed or looking for a job) and zero otherwise (e) Control variables are age, age squared, gender, marital status, education, asset index, share of household members below 15 years, share of household members above 65 and household's location. (f) Estimates for female are in column (1) and male are in column (2) (g) *** p<0.01, ** p<0.05, * p<0.10.

3.9 Mechanisms

3.9.1 Income Effect

As stated in the conceptual framework, the income effect of remittances can increase non-labour income and reservation wage which in turn can dampen incentives for the left behind household members to join the labour market. Remittances can also reduce the opportunity cost of leisure which will increase the demand for leisure and reduce the probability of participating in the labour market. I use three variables to capture the income effect of remittances. The measures are, above district median consumption expenditure, education expenditure and home improvement expenditure. Above district median consumption expenditure is a binary indicator variable that equals one if the household's yearly per capita expenditure is greater than the district median per capita expenditure and zero otherwise. Education expenditure is a binary indicator variable that equals one if the household spent on children's education in the previous 12 months before the survey and zero otherwise. Home improvement expenditure is a binary indicator variable that equals one if the household made home improvement expenditures in the preceding 12 months before the survey and zero otherwise. The idea is that remittances increase the resources available in a household. As a result, the household purchases more normal goods. I do not control for household income in these regressions because it is potentially endogenous, and the survey did not collect income data. However, I control for household assets. It is important to note that these categories are not mutually exclusive. A household can spend on children's education and pay for home improvement.

The result of this analysis is presented in Table 3.11. Column (1) presents the estimates for above median consumption, column (2) presents the results for education expenditure and column (3) presents the results for home improvement expenditure. I find evidence of the income effect in Nigeria, Senegal and Burkina Faso but I do not find evidence of the income effect in Kenya or Uganda. For Nigeria, the availability of more resources via the income effect of remittances can reduce job search frictions which somewhat explains the positive effect of remittances on paid employment. In Senegal, the income effect increases the reservation wage of women in rural areas which is consistent with findings in the literature (Amuedo-Dorantes & Pozo, 2006a; Binzel & Assaad, 2011). Meanwhile, the availability of more resources via remittances facilitates self-employment for households in Burkina Faso.

Table 3.11: Income Effect

Dependent Variable	Income Effect		
	Above Median Consumption Expenditure(=1 if yes)	Education expenditure (=1 if yes)	Home Improvement Expenditure (=1 if yes)
	(1)	(2)	(3)
	Panel A: Nigeria		
Received remittances (=1 if yes)	0.301***	-0.039	0.037
	(0.113)	(0.098)	(0.107)
Controls	Yes	Yes	Yes
District Fixed Effects	Yes	Yes	Yes
Mean of the outcome variables	0.344	0.737	0.237
Observations		1,930	
	Panel B: Kenya		
Received remittances (=1 if yes)	-0.083	-0.192*	0.007
	(0.104)	(0.108)	(0.080)
Controls	Yes	Yes	Yes
District Fixed Effects	Yes	Yes	Yes
Mean of the outcome variables	0.254	0.620	0.089
Observations		1,672	
	Panel C: Uganda		
Received remittances (=1 if yes)	-0.070	0.077	0.094
	(0.074)	(0.056)	(0.058)
Controls	Yes	Yes	Yes
District Fixed Effects	Yes	Yes	Yes
Mean of the outcome variables	0.304	0.705	0.068
Observations		1,688	
	Panel D: Senegal		
Received remittances (=1 if yes)	0.143***	0.241***	-0.203***
	(0.054)	(0.051)	(0.043)
Controls	Yes	Yes	Yes
District Fixed Effects	Yes	Yes	Yes
Mean of the outcome variables	0.339	0.668	0.127
Observations		1,577	
	Panel E: Burkina Faso		
Received remittances (=1 if yes)	-0.053**	0.088***	0.075***
	(0.023)	(0.024)	(0.023)
Controls	Yes	Yes	Yes
District Fixed Effects	Yes	Yes	Yes
Mean of the outcome variables	0.343	0.653	0.110
Observations		1,591	

Note: a) This table reports the 2SLS estimates of the income effect of remittances on labour supply. (b) The treatment variable is a binary indicator variable that equals one if the household received remittances and zero otherwise. (c) The outcome variable in column (1) is a binary indicator variable for above median consumption, column (2) is investment in education and column (3) is home improvement. (d) Robust standard errors are presented in parentheses (e) Control variables are age, age squared, gender, marital status, education, asset index, share of household members below 15 years, share of household members above 65 and household's location. (f) *** p<0.01, ** p<0.05, * p<0.10.

3.9.2 Liquidity Effect

Next, I consider the liquidity effect. The inflow of remittances may help households overcome the type of liquidity constraints that prevent the establishment of new small or medium scale enterprises which could increase households' participation or labour supply in self-employment. This is particularly pertinent for households with binding liquidity constraints. I used three different measures to capture the liquidity effect. The first is whether members of the household established a business in the previous 12 months before the interview. The second measure is a binary indicator variable that equals one if members of the household purchase farming equipment in the previous 12 months before the interview and zero otherwise. Finally, a binary indicator variable that equals one if the household acquired any productive assets in the previous 12 months before the interview and zero otherwise. The result of this analysis is presented in Table 3.12. Column (1) presents the results for establish a business, column (2) for purchase farming equipment and column (3), acquire productive asset. I find some evidence of the liquidity effect in Nigeria and Uganda. However, I do not find evidence of the liquidity effect in any other country under review.

Table 3.12: Liquidity Effect

Dependent Variable	Establish Business(=1 if yes)	Purchase Farming Equipment (=1 if yes)	Acquire Productive Asset (=1 if yes)
	(1)	(2)	(3)
	Panel A: Nigeria		
Received remittances (=1 if yes)	0.273***	-0.093	0.019
	(0.101)	(0.083)	(0.122)
Controls	Yes	Yes	Yes
District Fixed Effects	Yes	Yes	Yes
Mean of the outcome variables	0.096	0.064	0.041
Observations		1,930	
	Panel B: Kenya		
Received remittances (=1 if yes)	-0.024	0.098	-0.003
	(0.061)	(0.093)	(0.062)
Controls	Yes	Yes	Yes
District Fixed Effects	Yes	Yes	Yes
Mean of the outcome variables	0.075	0.060	0.023
Observations		1,672	
	Panel C: Uganda		
Received remittances (=1 if yes)	0.273***	-0.063**	-0.074**
	(0.067)	(0.031)	(0.034)
Controls	Yes	Yes	Yes
District Fixed Effects	Yes	Yes	Yes
Mean of the outcome variables	0.049	0.062	0.024
Observations		1,688	
	Panel D: Senegal		
Received remittances (=1 if yes)	-0.043	-0.061***	-0.006*
	(0.032)	(0.019)	(0.004)
Controls	Yes	Yes	Yes
District Fixed Effects	Yes	Yes	Yes
Mean of the outcome variables	0.042	0.041	0.003
Observations		1,577	
	Panel E: Burkina Faso		
Received remittances (=1 if yes)	-0.005	0.027	-0.019***
	(0.009)	(0.049)	(0.005)
Controls	Yes	Yes	Yes
District Fixed Effects	Yes	Yes	Yes
Mean of the outcome variables	0.022	0.196	0.012
Observations		1,591	

Note: a) This table reports the 2SLS estimates of the liquidity effect of remittances on labour supply. (b) The treatment variable is a binary indicator variable that equals one if the household received remittances and zero otherwise. (c) The outcome variable in column (1) is a binary indicator variable for establish a business, column (2) is purchase farming equipment and column (3) is acquire productive asset (d) Robust standard errors are presented in parentheses (e) Control variables are age, age squared, gender, marital status, education, asset index, share of household members below 15 years, share of household members above 65 and household's location. (f) *** p<0.01, ** p<0.05, * p<0.10.

3.9.3 Labour Lost Effect

The final mechanism I explore is the labour lost effect. The idea is that the absence of a member of the household implies that the person's input will be missing in home production and domestic labour market. If the migrant was economically active, the absence of the person reduces the total stock of labour hours available in the household and household income which may induce the other household members to join the labour force or increase labour hours. Furthermore, if the person had caring responsibilities within the household, then their emigration will force other household members to taken on the burden of care. I use two variables to capture the labour lost effect. The first is the proportion of children aged 6-15 within the household participating in the labour market. The second is the proportion of children aged 6-15 within the household studying. Children dropping out of school or working is interpreted as evidence of the labour lost mechanism. I present the result of this exercise in Table 3.13. Column (1) shows results for proportion of children working and column (2) shows result for the proportion of children in school. I do not find any evidence of the labour lost effect in all the countries under review. This could be because migration is part of the income diversification strategy of migrant(Clemens & Ogden, 2013). As a result, households have factored in the loss of labour in their decision making. To conclude the mechanism section, most of the results are driven by the income effect of remittances. I find evidence of the liquidity effect only in Nigeria and find no evidence of the labour lost effect.

Table 3.13: Labour lost effect

Dependent Variable	Proportion of Children Aged 6-15 Working	Proportion of Children Aged 6-15 in School
	(1)	(2)
	Panel A: Nigeria	
Received remittances (=1 if yes)	-0.019**	-0.085
	(0.009)	(0.155)
Controls	Yes	Yes
District Fixed Effects	Yes	Yes
Mean of the outcome variables	0.020	0.695
Observations	1,248	
	Panel B: Kenya	
Received remittances (=1 if yes)	-0.027	0.024
	(0.025)	(0.169)
Controls		
District Fixed Effects	Yes	Yes
Mean of the outcome variables	0.004	0.824
Observations	792	
	Panel C: Uganda	
Received remittances (=1 if yes)	0.065	0.056
	(0.059)	(0.081)
Controls	Yes	Yes
District Fixed Effects	Yes	Yes
Mean of the outcome variables	0.024	0.864
Observations	1,144	
	Panel D: Senegal	
Received remittances (=1 if yes)	0.035	-0.024
	(0.090)	(0.089)
Controls	Yes	Yes
District Fixed Effects	Yes	Yes
Mean of the outcome variables	0.313	0.665
Observations	1,492	
	Panel E: Burkina Faso	
Received remittances (=1 if yes)	0.011	0.030
	(0.036)	(0.039)
Controls	Yes	Yes
District Fixed Effects	Yes	Yes
Mean of the outcome variables	0.407	0.454
Observations	1,764	

Note: a) This table reports the 2SLS estimates of the labour loss effect of remittances on labour supply. (b) The treatment variable is a binary indicator variable that equals one if the household received remittances and zero otherwise. (c) The outcome variable in column (1) the proportion of children working and, column (2) is the proportion of children in school. (d) Robust standard errors are presented in parentheses (e) Control variables are age, age squared, gender, marital status, education, asset index, share of household members below 15 years, share of household members above 65 and household's location. (f) *** p<0.01, ** p<0.05, * p<0.10.

3.10 Conclusion

This study explores the effect of international remittances on the labour market decisions of left behind individuals. I use data from the World Bank's Migration and Remittances Household survey. Identification relies on instrumental variables together with the imperfect instrumental variables approach. I exploit changes in economic conditions at the migrant destination countries as a source of exogenous variation in international remittances. Overall, I show that remittances have a complex impact on the labour supply of the individuals left behind in the countries under review. I find positive effects in Nigeria and Burkina Faso, statistically insignificant results in Kenya and Uganda and a negative effect in Senegal. Analysis of mechanisms show that most of the results are driven by the income effect of remittances. I find evidence of the liquidity effect only in Nigeria and no evidence of the labour lost effect in all the countries analysed.

One important finding of this study is that remittances can facilitate the establishment of small businesses particularly for liquidity constrained households in Nigeria and to some extent Uganda. Policy makers can design strategies to help reduce the cost of sending remittances, thus helping migrant households realise higher returns and entrepreneurs access capital for their investments.

This study suffers from two key limitations. The first is that I use cross-sectional data. Consequently, I cannot follow households over time or compare households' pre-migration outcomes with their post-migration outcomes. The cross-sectional data also implies that there are some unresolved selection issues. Secondly, I do not have any information on hours worked, I therefore study only the decision to work. This severely limits the scope and application of this study as I am unable to examine the effect of remittances on labour supply at the intensive margin. Another limitation of this study relates to when the data was collected, which is more than a decade old. As a result, the findings may not be generalisable to today's context. Despite, these limitations, this study contributes to our understanding of the effects of international migration and remittances on migrants' country of origin. It provides evidence for a region that is scarcely studied in the literature and offers a solid foundation for future studies.

Chapter 4

Remittances and Household Dependence: Evidence from Bangladesh

Note: This research was co-authored with Md Shahadath Hossain, who is a PhD candidate at the State Univeristy of New York, Binghamton, USA; mhossai3@binghamton.edu. Shahadath has agreed that it represents in the majority my work, and none of the work directly related to this research/essay will appear in his future thesis submission. The chapter has been presented at the Annual Southern PhD Economics Conference (ASPEC) 2022 and PhD Economics Seminars at the Universities of Reading and Bath.

4.1 Introduction

Economic theory predicts that when an adult receives an unexpected windfall, they supply less labour and earn less income. This notion underscore fears that public or private transfers such as conditional cash transfers, unconditional cash transfers or migrant remittances create work disincentives and make the recipients lazy. Public cash transfers in terms of social protection are gaining popularity in low and middle income countries and are an important lifeline for poor and vulnerable households in these countries (Banerjee et al., 2017; Beegle et al., 2018; Gentilini et al., 2014). Public cash transfers have been shown to have positive effects on health (Marinescu, 2018), nutrition (Manley et al., 2013), and poverty (Agostini & Brown, 2011; Aizer et al., 2016) outcomes of recipients. Despite these positive effects, there are concerns in the public policy circles that these transfers could discourage work and lead to

dependence[1]. However, there is little rigorous evidence to support this claim. Banerjee et al. (2017) using data from 7 randomised controlled trials (RCTs) in 6 countries found no observable evidence that public cash transfers lead to lower labour supply both at the extensive margin and the intensive margin. Similarly, Baird et al. (2018) conducted a "narrative review" of the existing evidence and concluded that public transfers have little to no effect on adults labour supply.

Remittances are private transfers and a form of non-labour income. They have been shown to reduce poverty (Adams & Cuecuecha, 2013; Adams & Page, 2005), increase investment in health (Amuedo-Dorantes & Pozo, 2011; Antman, 2010) and human capital (Acharya & Leon-Gonzalez, 2014). Remittances have also been shown to increase entrepreneurship (Acosta, 2007; Woodruff & Zenteno, 2007). In the previous two chapters, we also show that remittances increase households' investment in Human capital, Physical capital, and self-employment in some of the countries reviewed. The effect of non-labour income on a household's labour supply has received much attention in labour economics. Perhaps, the most popular example is the response of wives' labour supply to their husband's income (i.e., a form of non-labour income for the wife) (see Bredtmann et al., 2018; Halla et al., 2020; Kohara, 2010). Similarly, migration economics studies the labour supply response of left behind household members to remittance receipt from a migrant. This question emerges from a broader concern – whether remittances lead to remittance dependence. If it does, this unintended consequence of remittances can reduce economic activities in remittance-receiving communities and undermine local economic development efforts.

Existing studies on the effect of remittances on remittance dependence use indirect measures such as labour supply (see chapter 3 of this thesis). The preponderance of evidence in this literature points to lower labour supply in response to remittance inflows. Some authors have argued that this is evidence of remittance dependence (Amuedo-Dorantes & Pozo, 2014; Démurger, 2015). However, in this chapter, we argue that lower labour supply does not fully capture remittance dependence for the following reasons. First, migration from developing countries is typically a male phenomenon (BBS, 2016; Ratha et al., 2011), and left behind adult family members are usually female members (i.e., wife) and elderly parents (Démurger, 2015). Gender norms in many developing countries discourage women from engaging in paid employment. Consequently, they are more likely to stay at home and engage in home production rather than participate in the labour market. Second, remittances may facilitate asset accumulation such as acquiring agricultural land which generates non-labour income from land rents and crop sharing agreements that might not be

[1] See Banerjee & Duflo (2019) for a review.

captured by earning measures. Furthermore, remittances increase the reservation wage of recipient household members which could lead to longer search for good jobs or inspire recipient household members to quit low-paying jobs. Consequently, labour supply does not capture the extent of remittance dependence. A better approach to investigate remittance dependence is to use direct measures of a household's non-remittance income.

In this study, we examine the effect of remittances on household remittance dependence by asking whether remittances reduce the likelihood and extent of non-remittance income generated by households. Essentially, we want to test whether remittance receipt leads to remittance dependence at both the intensive and extensive margins in Bangladesh. We move away from Sub-Saharan Africa and focus on Bangladesh in this chapter. Bangladesh is a suitable context to study this question because it is a major labour exporting country and ranks among the top ten international remittance receiving countries in the world (World Bank, 2020b). Furthermore, there is a sizeable incidence of remittance dependence amongst households in Bangladesh (IOM, 2019).

We use data from the Bangladesh Survey on the Use of Remittance 2013 – a cross-sectional, nationally representative household survey of international migrant households. It provides comprehensive information about migration patterns, remittances received, and their uses. It also provides rich information on migrant characteristics, socio-economic and demographic characteristics of the left behind household members. Our key explanatory variable is the cash amount of remittances received in the previous 12 months before the survey. At the extensive margin, remittance dependence is a binary indicator that equals one if the household declare to rely solely on remittances and zero otherwise. At the intensive margin, it is the amount of non-remittance income. The rationale is that the larger non-remittance income is, the less dependent the household is on remittances. Non-remittance income comprises income from all other sources except remittances. These sources include income from agriculture, income from business, wage income and rents.

A simple regression of remittances on dependence is likely to lead to biased results due to potential confounding effects. We therefore use instrumental variables (IV) approach to address the potential endogeneity of remittances. A credible instrument must be correlated with the endogenous variable of interest but uncorrelated with the error term. We exploit changes in the economic conditions at destination as a source of exogenous variation. Specifically, our instrument – economic fitness shocks – is a measure of the destination country's diversification and ability to produce complex goods on a globally competitive basis. Higher economic fitness (EF) shows relatively

greater capabilities, higher value additions, greater ease in diversifying products, and more predictable growth (World Bank, 2021b). We argue that economic fitness is relatively better than simpler measures such as unemployment rate as an IV in that it provides a more comprehensive picture of a country's competitiveness on the global stage and the overall attractiveness of the country. It is also a better proxy of migrants' potential income and employment. We define economic fitness shocks as changes in economic fitness at the migrants' destination in the year preceding the survey. We expect that improvements (worsening) in economic fitness at destination increase (decrease) remittance flows but are uncorrelated with household level outcomes in Bangladesh except through remittances. Destination-level instrumental variables are popular in the remittance literature because they are plausibly exogenous (Amuedo-Dorantes, 2014; Cuadros-Menaca & Gaduh, 2020; Yang, 2008).

Although our instrument is plausibly exogenous, there are potential threats to identification. For example, the choice of destination countries for Bangladeshi migrants are not exogenous as they are driven, for example, by migration networks. Another potential threat is through international trade. If the destination countries are key trading partners with Bangladesh, then it is possible that economic fitness shocks at the destination country can also affect households in Bangladesh through other channels, thus violating the exclusion restriction. We test the sensitivity of our results to violations of the exclusion restriction using Nevo & Rosen (2012)'s imperfect instrumental variables (IIV) approach. The IIV approach substitutes the strong and untestable exogeneity assumption with two weaker assumptions – one, the IIV is correlated with the error term but the direction of the correlation is the same as that of the correlation between the endogenous regressor and the error term. The second assumption is that the IIV is less endogenous than the endogenous regressor of interest. In this way, we can obtain bounds on the endogenous variable of interest rather than point estimates.

At the extensive margin, we find that remittance receiving households are more likely to engage in income generating activities; implying that they are not dependent on remittances. More precisely, a 10 percent rise in remittances increase the probability of engaging in income generating activities by 1.5 percentage points. At the intensive margin, our results show that remittance receipt increases a household's non-remittance income. Specifically, we find that a 10 percent increase in remittances boost households' non-remittance income by 2.6 percentage points. Taken together, the results suggest that remittance receipt does not lead to remittance dependence, as suggested by the migration and remittance literature (Amuedo-Dorantes & Pozo, 2006a; Binzel & Assaad, 2011; Mendola & Carletto, 2012). Instead, remittances

ease households' liquidity constraints and facilitates investment in capital (Adams & Cuecuecha, 2013; Hossain & Sunmoni, 2022; Yang, 2008) and other income generating activities that increase households' non-remittance income. These results are robust to different model specifications, different definitions of our treatment and outcome variables and violations of the exclusion restriction of the instrumental variables approach.

We test for possible channels through which remittances affect household dependence other than the conventional income effect. Precisely, we explore the health productivity and liquidity mechanisms. Our results show that these are important mechanisms through which remittances affects households. Using five different measures of health productivity, we find that remittances ease liquidity constraints thus allowing individuals to purchase better quality food, live in a more sanitary environment, and invest in their health. These factors contribute to the worker's health and productivity, thus increasing their participation in the labour market and income generating activities. Secondly, we find evidence for the liquidity effect mechanism. Our results show that remittances ease households' liquidity constraints and facilitate participation in income generating activities such as investment in physical or financial capital, which boosts households' non-remittance income and reduces remittance dependence. Overall, we provide new and rigorous evidence that remittances do not lead to household dependence but rather ease households' liquidity constraints and facilitates investment in health and income generating activities which can boost household income and reduce dependence.

We make three important contributions to the migration and remittance literature. First, we use a novel approach to explicitly study remittance dependence. To our knowledge, we are the first to explicitly study the effect of remittances on receiving households' dependence. The closest studies to ours are those that study the effect of remittances on the labour supply of left-behind household members (Amuedo-Dorantes & Pozo, 2006a; Binzel & Assaad, 2011; Mendola & Carletto, 2012). We argue that labour supply decisions of household members do not fully capture remittance dependence in developing countries. Second, we highlight important channels through which remittances affect households other than the income effect. In the context of low- and middle-income countries where missing credit and insurance markets are prevalent, the income effect may not be enough to fully capture the effect of remittances on households. We thus, explore two other mechanisms – health-productivity and liquidity effect – which better capture the effect of remittances on households. Third, we used a novel method to check the sensitivity of our results to violations of the exclusion restriction. Past studies that used instrumental variables to address

endogeneity sometimes adopt instruments that do not satisfy the exclusion restriction condition.

The rest of this chapter is structured as follows: Section 4.2 covers the conceptual framework, Section 4.3 covers the data sources, Section 4.4 covers the empirical methodology, Section 4.5 covers the main results, Section 4.6 covers robustness checks, Section 4.7 covers heterogeneity of effect, Section 4.8 covers mechanisms and Section 4.9 concludes the chapter.

4.2 Conceptual Framework

The neoclassical model of labour-leisure choice predicts that an increase in non-labour income of a working age person leads a parallel, outward shift in their budget constraint. If we assume that leisure is a normal good, then an increase in non-labour income raises the demand for leisure and reduces hours of work. The income effect of an increase in non-labour income, holding wage rate fixed, is a reduction in labour supply (Borjas, 2016). On the decision to work, individuals maximise their utility (i.e. they allocate their time working for pay or enjoying pleasurable leisure activities) subject to a budget constraint. The individual's budget constraint consists of labour earnings and non-labour income. Labour earnings are determined by hours of work and the wage rate, whereas non-labour income includes income from other sources like inheritance, investment income, and remittances. (Borjas, 2016).

Researchers have argued that remittances can be considered as non-labour income in remittance-receiving households (Cox-Edwards & Rodríguez-Oreggia, 2009; Killingsworth, 1983). The decision to participate in the labour market is driven mainly by the reservation wage which is defined as the minimum wage rate that would make the agent indifferent between working or not working (Cahuc et al., 2014). Therefore, an agent will only work if the market wage rate is higher than his/her reservation wage. In the same vein, if the reservation wage increases, an agent is less likely to join the labour force and vice versa. A key determinant of the reservation wage is non-labour income which is comprised of individual or household assets/wealth, income of other household members and remittances, etc. As a result, receiving remittances can increase an agent's non-labour income which can reduce the likelihood of participation in the labour market.

Overall, the theory predicts that an increase in non-labour income leads to a reduction in the labour supply of adults both at the extensive (whether to work or not) and intensive (hours worked) margins. Several studies have investigated the

effect of remittances on labour supply and the preponderance of evidence suggest that remittances reduce labour supply (Binzel & Assaad, 2011; López-Feldman & Escalona, 2016; Mendola & Carletto, 2012). The third chapter of this thesis also studied this question for sub-Saharan Africa and finds mixed results. Some authors explain these results through the income effect of remittances. Others suggest that remittances leads to dependency by providing work disincentives (Amuedo-Dorantes & Pozo, 2014). This chapter follows the argument of Baird et al. (2018) which suggests that the simple neoclassical labour-leisure model may be too simple to explain the labour supply response of individuals to transfers such as remittances, particularly in the context of low- and middle-income countries. They suggest additional channels (health-productivity and liquidity effect) through which transfers can affect the recipients labour supply.

In this chapter, we will focus on two channels which can be grouped together as missing markets. Missing or incomplete credit and insurance markets can prevent individuals from participating in economic activities that could increase their income and labour supply (Chiodi et al., 2012). For example, credit constraints can hinder people from partaking in certain investments that can boost their earnings capacity. Similarly, missing or incomplete insurance markets can make individuals reluctant to engage in high risk, high reward activities. Private transfers such as remittances can help recipients overcome liquidity and, risk constraints and thus increase their labour earnings and potentially labour supply through channels other than the income effect. One of such channels is the health productivity and another is the liquidity effect.

Health and Productivity channel: Unhealthy workers are not very productive at work (Baird et al., 2018; Dasgupta & Ray, 1986). Health has been linked with labour supply and productivity in the literature - good health with more labour supply and vice versa (Goryakin et al., 2014; Blundell et al., 2021; Cai, 2010). Remittances can ease liquidity constraints, thus allowing individuals to purchase better quality food, live in more sanitary environments, and invest in their health. These factors contribute to the worker's health, thus increasing their productivity and participation in the labour market and other income generating activities. Several studies in the literature show that remittances improve households' health and sanitation facilities, which improves labour productivity and engagement in income generating activities (Amuedo-Dorantes & Pozo, 2011; Lu, 2013; Mergo, 2016).

Liquidity Effect: It is well established in the literature that remittances relax households' budget constraints, which can improve consumption and facilitate investment in physical or financial capital (Adams, 2011; Hossain & Sunmoni, 2022; Jena, 2018). In addition, it can provide much-needed liquidity for household members

to start businesses. For example, for individuals who have viable business ideas but lack the funds to execute it, remittances can enable them start businesses or expand current business. Studies have shown a positive effect of remittances on entrepreneurship (Giulietti et al., 2013; Kakhkharov, 2019; Woodruff & Zenteno, 2007).

4.3 Data Source

This study uses the Bangladesh Survey on the Use of Remittance 2013. This is a nationally representative cross-sectional household survey of international remittance-receiving households carried out by the Bangladesh Bureau of Statistics (BBS) in 2013. It contains comprehensive information about the characteristics of the migrants, the socioeconomic conditions of the remittance-receiving households, and detailed information on remittance use. The survey also provides detailed information on migrant characteristics as well as the destination country of the migrant. Retrospective household income and expenditure data were collected for the last 12 months before the survey. Households also reported the total remittance received in the past 12 months. One unique feature of the survey is that it provides data on household income sources and specifically whether the household received income from any sources other than remittances.

Our key explanatory variable is the cash amount of remittances received in the previous 12 months before the survey. Our outcome variable is household's dependence on remittances. We explore remittance dependence at both the extensive and intensive margins. At the extensive margin, remittance dependence is a binary indicator variable that equals one if the household declares to have no other income source but remittances and zero otherwise. This variable was created from the question "does the household have any other source of income other than remittances?" in the survey. At the intensive margin, we define remittance dependence as the amount of income from non-remittance sources. In particular, we used the question, "how much income did your household earn from other sources (excluding remittances) in the last 12 months?", from the survey to capture this variable. The rationale is that the larger the non-remittance income, the less dependent the household is on remittances. It is important to note that this variable is conditional on households having other sources of income other than remittances i.e. answering yes to the above question.

Our sample includes households with temporary economic migrants[2] who will return to their home country after living in the destination country for a period. We keep households with male migrants as migration is predominantly a male phenomenon in Bangladesh. Finally, we keep households with a migration duration of at least 18 months because households' reports of total remittances in the last 12 months will be incomplete if migration happened within the last year. In addition, migrants do not start sending remittances immediately after arriving at their destination. Finally, about 26.5% (with a standard deviation of 0.44) of our sample are fully dependent on remittances (i.e. income from other sources is zero). Our final sample consists of 9,238 remittance receiving households with temporary male migrants who migrated at least 18 months before the survey.

Table 4.1 presents the distributional characteristics of the sample[3]. The full sample is in column 1, non-remittance dependent households in column 2, and remittance dependent households in column 3. About a quarter (26%) of our sample are remittance dependent. Almost half (48%) of the remittance receiving households in Bangladesh are female headed. About a third (32%) of household heads in remittance receiving household have secondary education and a little above a quarter (28%) have primary education. The typical household head in remittance receiving households is 49 years old. The typical remittance receiving household in Bangladesh is made up of 4.7 members on average. They have about 21% of working age male household members and about 40% of working age female household members. About 42% of remittances are received by the wife of the migrant, 40% are received by the migrant's parent and only 12% is received by the migrant's siblings. Migrants sends money 5.2 times on average per year, which corresponds to almost every other month.

Most migrants from Bangladesh are young men with an average age of 33. They are typically uneducated or have very low levels of education as only 12% have secondary education. It is therefore not surprising that about 64% of them work as labourers in

[2]Low-skilled labour migration in Bangladesh is typically of a temporary nature as permanent residence in the major destinations for Bangladeshi's low-skilled migrants is prohibited (Bossavie & Wang, 2022). In the Gulf Cooperation Council (GCC) countries – the main destination of low-skilled migrants from Bangladesh – migrants cannot acquire citizenship regardless of their length of stay in the country (Bossavie & Wang, 2022; Wahba, 2015; Fargues, 2011; Fargues & De Bel-Air, 2015). Staying in the destination country is conditional on having a valid employment contract, which is for a fixed time period (Bossavie et al., 2021). In addition, migrants must depart the destination country upon the expiration of their contract, except the contract is renewed (Bossavie et al., 2021). Given this setting, low-skilled migrants from Bangladesh report that job loss or contract expiration without renewal are the key drivers of return migration from the GCC. Bangladeshi low-skilled migrants stay abroad for about 6.5 years on average.

[3]We do not present statistical differences between remittance dependent and non-remittance dependent households because remittance dependence is our outcome variable and by definition, we expect statistically significant differences.

the Middle East. The Middle East is the main destination for Bangladeshi migrant as it accounts for 70% of the migrants in our sample[4]. More than half (53%) of the migrants are sons of the household head and only 34% are the husband of the household head. Bangladeshi migrants sent a total of $2849.76[5] in the 12 months preceding the survey which amounts to an average of $237.48 per month. This is four times larger than average household income of $693.

[4]Table C.1 in the appendix provides descriptive statistics by migrants' destination

[5]The cash amount of remittances was converted from Bangladesh Taka (BDT) to USD using the average exchange rate in 2013 which was BDT78/$1

Table 4.1: Summary Statistics

	Full Sample	Remittance Dependent	
		No	Yes
	(1)	(2)	(3)
Household Head's Characteristics			
Household head is female (=1 if yes)	0.476	0.386	0.730
	(0.499)	(0.487)	(0.444)
Head has primary education (=1 if yes)	0.282	0.281	0.282
	(0.450)	(0.450)	(0.450)
Head has secondary education (=1 if yes)	0.324	0.309	0.368
	(0.468)	(0.462)	(0.482)
Head's age	48.68	51.00	42.14
	(16.47)	(16.01)	(15.95)
Household Characteristics			
Household size	4.688	4.981	3.864
	(2.322)	(2.428)	(1.75)
Proportion of male members aged 16-60 years	0.210	0.235	0.139
	(0.204)	(0.201)	(0.195)
Proportion of female members aged 16-60 years	0.402	0.397	0.413
	(0.398)	(0.175)	(0.194)
Remittance receipt by migrant's brother/sister (=1 if yes)	0.124	0.140	0.078
	(0.048)	(0.347)	(0.267)
Remittance receipt by migrant's parents (=1 if yes)	0.400	0.448	0.262
	(0.490)	(0.497)	(0.440)
Remittance receipt by migrant's wife (=1 if yes)	0.417	0.353	0.596
	(0.493)	(0.478)	(0.491)
Frequency of remittance received	5.234	5.036	5.792
	(3.154)	(3.079)	(3.293)
Migrant's Characteristics			
Migrant's age	33.24	32.41	35.59
	(9.14)	(9.07)	(8.90)
Migrant has above secondary education (=1 if yes)	0.122	0.133	0.090
	(0.328)	(0.340)	(0.286)
Migrant is a husband (=1 if yes)	0.339	0.251	0.583
	(0.473)	(0.434)	(0.493)
Migrant is a son (=1 if yes)	0.528	0.596	0.337
	(0.499)	(0.491)	(0.473)
Migrant is a labourer (=1 if yes)	0.639	0.638	0.641
	(0.480)	(0.480)	(0.480)
Migrant is in the Gulf countries (=1 if yes)	0.704	0.682	0.763
	(0.457)	(0.466)	(0.466)
Remittance Information			
Total remittances in past 12 months (USD)	2849.76	2944.62	2583.26
	(2917.13)	(3010.26)	(2620.22)
Outcome Variables			
Household is remittance dependent (=1 if yes)	0.263	0.000	1.000
	(0.440)	(0.000)	(0.000)
Total non-remittance income in past 12 months(USD)	693.736	939.74	0.000
	(1222.31)	(939.74)	(0.000)
Instrument			
Change in economic fitness of the destination country	0.121	0.120	0.123
	(0.131)	(0.132)	(0.131)
Observations	9,238	6,813	2,425

Note: (a) This table shows the mean and standard deviation of the key variables. Standard deviation is reported in parenthesis. (b) Remittance dependence is an indicator variable equals one if household has no other income except remittances, and zero otherwise. (c) The means of the variables are calculated separately for not remittance dependent and remittance dependent groups in columns 2 and 3.

4.4 Empirical Methodology

The main objective of this study is to examine the hypothesis that remittances lead to dependence – reduce the likelihood and extent of non-remittance income generated by the household. Essentially, we want to check whether remittance receipt leads to remittance dependence at both the intensive and extensive margins. We start our analysis by estimating a linear regression model using the ordinary least squares (OLS) estimator. The baseline model is given below:

$$Y_i = \beta_0 + \beta_1 R_i + X_i \Pi + \varepsilon_i \tag{4.1}$$

Where Y_i captures household i's remittance dependence at both the extensive and intensive margins. At the extensive margin Y_i is dummy variable that equals 1 if the household has no other income but remittances i.e., they are remittance dependent and zero otherwise. The function $Y_i = 1(Y_i^* > 0)$ is an indicator function that takes the value of 1 if $Y_i^* > 0$ and zero otherwise. Y_i^* is an unobserved or latent variable that captures the probability that household i is remittance dependent. At the intensive margin, Y_i is the natural logarithm of household i's total non-remittance income. The larger this amount is, the less remittance dependent the household is and vice versa. R_i is the natural log transformation of total remittances received by the household in the last 12 months before the survey. X_i is a vector of individual and household level characteristics. The controls include household head, household, and migrant characteristics presented in Table 4.1. β_1 is the parameter of interest and ε_i is the error term. $\varepsilon_i \sim N(0, \sigma^2)$.

An OLS estimation of remittance receipt on a household's remittance dependence will likely yield biased estimates. This is due to the endogeneity of remittances. For example, sending remittances is not random; migrants must choose whether to send remittances, how much to send, and the frequency. It is possible that these factors are correlated with some unobserved variables that also affect remittance dependence at the household level. This is the classic omitted variables bias. Another potential source of endogeneity is reverse causality. Though we expect that remittance receipt may lead to a household's dependence on remittances, it is also possible that a household's dependence on remittances may induce the migrant to send money. For example, gender norms in rural Bangladesh indicate that men are the family's breadwinners and women should only engage in home production (Asadullah & Wahhaj, 2021; de Brauw et al., 2021). Since women typically do not participate in the labour market and their husbands or sons migrate, their dependence is expected to lead to remittance flows.

We address the endogeneity of remittance using an instrumental variable (IV) approach. We use economic fitness shocks at the destination countries as an instrument for remittances. According to the World Bank, economic fitness is a measure of a country's level of diversification and capability to produce complex goods on a globally competitive basis (World Bank, 2021b). Countries with higher levels of economic fitness can produce a more diverse set of goods and services, they are able to quickly upgrade into more complex goods, they are likely to have more predictable long-term growth and to attain globally competitive positions, compared to other countries. Conversely, countries with lower economic fitness tend to suffer from poverty traps, have lower capabilities and less predictable growth (Roster et al., 2018). Comparing economic fitness to GDP reveals previously unknown information about the level of growth and development of countries (World Bank, 2021b).

We argue that economic fitness is a more comprehensive and refined measure of the level of economic prosperity in migrant destination countries compared to crude measures such as level of unemployment. This is because economic fitness can be used to predict economic growth, competitiveness, and level of attractiveness of destination countries to migrants. It also signposts potential income and employment opportunities for migrants. For example, since economic fitness is a predictor of economic growth, countries with higher economic fitness are more likely to grow faster and have more income and employment opportunities than similar countries with lower economic fitness. We define economic fitness shocks as a change in the economic fitness of the migrants' destination country from 2011 to 2012. A positive change in economic fitness (EF) shows relatively greater capabilities, higher value additions, greater ease in diversifying products, and more predictable growth (World Bank, 2021b). The top 5 destinations for Bangladesh Migrants in the data are Saudi Arabia, United Arab Emirates, Malaysia, Kuwait, and Oman[6].

The Linear IV model is expressed as follows:

$$Y_i = \beta_0 + \beta_1 \widehat{R_i} + X_i \Pi + \varepsilon_i \tag{4.2}$$

$$R_i = \delta_0 + \delta_1 \Delta EF_d + X_i \Pi + \varepsilon_i \tag{4.3}$$

Where ΔEF_d is the change in economic fitness in the destination country, δ_0 and δ_1 are parameters to be estimated. The other variables and parameters are as before. The

[6]Table C.4 in the appendix shows the average of the economic fitness shocks and how it relates to macroeconomic fundamental of these countries, as well as the size/share of migrants from Bangladesh

rationale for using economic fitness shocks as an instrument for remittances is that exogenous changes in economic conditions in migrant's destination countries affect the incomes and employment of migrants which in turn affect the level of remittances sent. However, these exogenous changes are not expected to affect households' remittance dependence through any other observed or unobserved channels except remittances. This instrument is relevant because it predicts the probability, amount, and frequency of remittances sent to the households. The above assumptions are likely to be satisfied in my application. Economic fitness shocks in migrant destination countries are likely to affect migrants' earnings and remittances. This is particularly true for Bangladeshi migrants who are typically employed as labourers. Positive economic shocks at destination have a positive effect on migrants' remittances and negative economic shocks have a negative effect on migrants' remittances. For example, a report by the World Bank in 2020 showed that migrants were more likely to lose employment, wages and health insurance as a result of the pandemic-induced economic crisis (World Bank, 2020b). Another report by the World Bank in 2020 showed that migrant remittances to low and middle income countries declined sharply in 2020 as a result of the pandemic (World Bank, 2020b). Due to the validity and relevance of destination-level characteristics, many studies in the migration and remittance literature used them as instruments (Amuedo-Dorantes, 2014; Cuadros-Menaca & Gaduh, 2020; Yang, 2008). The first stage regression shows that our instrument (i.e., economic fitness shocks) predicts remittance flows (see Table 4.2). The F-statistics are greater than the conventionally accepted value of 10, which provides some assurance of the quality of the instrument. We check for under-identification and weak identification using the Sanderson-Windmeijer (SW) and Cragg-Donald tests. The null hypotheses are that the endogenous regressor is weakly identified, and the model is under-identified. We reject the null hypotheses since the associated F statistics are greater than the critical values (see Table 4.2). This provides further assurance about the credibility of our instrument. However, we are not out of the woods yet. Column (1) of Table 4.2 provides the first stage for remittance dependence at the extensive margin, while column (2) provides the first stage at the intensive margin.

4.4.1 Threats to Identification

Although our instrument is plausibly exogenous, there could be violations of the validity assumption. For example, the choice of destination countries for Bangladeshi Migrants is not exogenous as it is driven by migration networks and other factors. Another potential threat is through international trade. If the destination countries are key trading partners with Bangladesh, then it is possible that economic fitness

Table 4.2: First Stage Regression

	Log (Remittances)	Log (Remittances)
	(1)	(2)
Change in the economic fitness	-0.732***	-0.828***
	(0.071)	(0.089)
Household head is female (=1 if yes)	0.003	-0.018
	(0.030)	(0.036)
Head has primary education (=1 if yes)	0.033	0.029
	(0.024)	(0.028)
Head has secondary education (=1 if yes)	0.025	-0.006
	(0.024)	(0.029)
Head's age	0.001	-0.001
	(0.001)	(0.001)
Household size	0.053***	0.046***
	(0.005)	(0.006)
Proportion of male members aged 16-60 years	0.029	-0.077
	(0.052)	(0.063)
Proportion of female members aged 16-60 years	0.273***	0.260***
	(0.057)	(0.071)
Remittance receipt by migrant's parents (=1 if yes)	0.012	0.032
	(0.025)	(0.030)
Remittance receipt by migrant's brother/sister (=1 if yes)	-0.041	0.006
	(0.034)	(0.039)
Frequency of remittance received	0.073***	0.086***
	(0.003)	(0.004)
Migrant's age	0.001	0.001
	(0.001)	(0.002)
Migrant has above secondary education (=1 if yes)	0.139***	0.128***
	(0.028)	(0.032)
Migrant is a husband (=1 if yes)	-0.083**	0.016
	(0.041)	(0.048)
Migrant is a son (=1 if yes)	0.008	0.073
	(0.042)	(0.033)
Migrant is a labourer (=1 if yes)	-0.127***	-0.118***
	(0.021)	(0.026)
Migrant is in the gulf countries (=1 if yes)	-0.086***	-0.094***
	(0.021)	(0.025)
District fixed effects	Yes	Yes
First-stage F-statistics	105.00	102.86
SW Chi-sq statistics (under-identification test)	105.93	108.01
SW F-statistics (weak identification test)	105.00	102.86
Cragg-Donald Wald F statistic (weak identification test)	135.05	128.03
Observations	8,995	6,518

Note: (a) This table present the first stage regression coefficients of the two stage least squares (2SLS) estimation. (b) Outcome variable in columns 1-2 is log(remittances). Column 1 is the first stage for the extensive margin indicator of remittance dependence and column 2 is the first stage for intensive margin indicator of remittance dependence. (c) Standard errors are clustered at the household level and appear in parentheses. (d) All columns include district fixed effects. (e) The list of controls are household head's characteristics, household characteristics, and migrant's characteristics included in Table 1. (f) The Sanderson-Windmeijer (SW) F-statistics is a test of weak identification with a null hypothesis that the endogenous regressor is weakly identified. (g) ***Significant at the 1 percent level, **Significant at the 5 percent level, and *Significant at the 10 percent level.

shocks at the destination country can also affect households in Bangladesh through other channels, thus violating the exclusion restriction.

We check for the sensitivity of our results to violations of the exclusion restriction using Nevo & Rosen (2012)'s imperfect instrumental variables (IIV) approach. Rather than imposing the zero-correlation (exogeneity) assumption between the error term and the instrument i.e., $Corr(Z,u) = 0$, they relax this strong assumption and allow the error term to be correlated with the instrument. The exogeneity assumption is replaced with two weaker assumptions that allow the parameter of interest to be partially identified. First, they assume a non-zero correlation between the IIV and the error term. Then, they assume that the sign of the correlation between the IIV and the error term is the same direction as the sign of the correlation between the endogenous regressor and the error term. This assumption is presented formally in equation 4.4 below.

$$\rho_{X\varepsilon}\rho_{Z\varepsilon} \geq 0 \tag{4.4}$$

Since this assumption uses weak inequality, it directly relaxes the validity assumption of the standard IV method i.e. $\rho_{Z\varepsilon} = 0$. Where $\rho_{X\varepsilon}$ signifies the correlation between the endogenous regressor, X and the error term, ε and $\rho_{Z\varepsilon}$ is the correlation between the IIV and the error term.

$$|\rho_{X\varepsilon}| \geq |\rho_{Z\varepsilon}| \tag{4.5}$$

The second assumption is that the IIV is less correlated with the error term than the endogenous regressor. This assumption is quite intuitive since we may believe that the IIV is not exogenous, but it is less endogenous than the endogenous regressor of interest. This assumption, in addition to the first assumption, helps tighten the bounds on the parameter of interest. The combination of assumptions 1 and 2 gives rise to the definition of "imperfect instrumental variable" – an IV that has the same direction of correlation with the error term as the endogenous regressor, but the IV is less correlated with the error term than the endogenous regressor. These two weaker assumptions in place of the traditional validity assumption generate bounds on the parameter of interest.

4.5 Main Results

In this section, we present the results of our main estimations. Table 4.3[7] presents the ordinary least squares (OLS) and instrumental variable (IV) estimates. The

[7]Table **??** in the appendix show the full model with all the controls

outcome variable in columns (1-2) of Table 4.3 is a binary indicator that equals one if the household has no other income except remittances (i.e., they are remittance dependent) and zero otherwise. Meanwhile, the outcome variable for columns (3-4) of Table 4.3 is the natural logarithm of non-remittance household income. This variable captures remittance dependence at the intensive margin. The treatment variable is the natural logarithm of the cash amount of remittances received in the last 12 months before the interview. Full set of controls and district fixed effects are included in all regressions. Furthermore, we present robust standard errors in parenthesis.

Column (1), Table 4.3 presents the naive OLS estimate of the effect of remittances on remittance dependence at the extensive margin. The results show that remittance receipt has no significant effect on remittance dependence. However, this estimate is likely biased downwards due to reverse causality. Qualitatively, the OLS coefficient underestimates the reduction in remittance dependence because of remittances. The instrumental variables result presented in column (2) of Table 4.3 shows that remittance receipt reduces the probability of remittance dependence in a household. More precisely, a 10 percent increase in remittances reduce the probability of remittance dependence by 1.5 percentage points[8].

Next, we estimate the intensive margin of remittance dependence: the effect of remittances on households' non-remittance income. The result of this analysis is presented in columns (2) and (3) of Table 4.3. The OLS result in column (3) shows that remittance receipt increases the household's non-remittance income. However, this estimate is also biased downwards due to reverse causality. It underestimates the elasticity of non-remittance income to remittance receipt. The IV result in column (4) corroborates the OLS results. We find that a 10 percent increase in remittances boosts households' non-remittance income by 2.6 percentage points. Taken together, the results suggest that remittance receipt does not lead to remittance dependence, as suggested by the migration and remittance literature (Amuedo-Dorantes & Pozo, 2006a; Binzel & Assaad, 2011; Mendola & Carletto, 2012). Our results also corroborate new evidence that debunks the myth that transfers – both private and public – make the recipients lazy and disincentivise work or engagement in income generating activities (Baird et al., 2018; Banerjee et al., 2017; Vadean et al., 2017). The prevalent view in the migration and remittance literature is that the lower labour supply response of households to remittances is due to dependence. Using a more direct measure of remittance dependence, our results challenge this view and suggest that perhaps there

[8]We also check the robustness of our main results to a different model specification. Precisely, we estimated a probit and IV probit model. The result of this exercise in presented in appendix Table C1. We find that our main result is not sensitive to different model specifications

are other mechanisms at work rather than the moral hazard or laziness effect which leads to dependence.

Table 4.3: Effect of Remittances on Households' Dependence

	Remittance Dependence(=1 if Yes)		Log (Non-remittance Income)	
	OLS	IV	OLS	IV
	(1)	(2)	(3)	(4)
Log(remittances)	-0.007	-0.152***	0.070***	0.231*
	(0.006)	(0.053)	(0.021)	(0.136)
Household head is female (=1 if yes)	0.089***	0.090***	-0.135***	-0.130***
	(0.015)	(0.016)	(0.048)	(0.049)
Head has primary education (=1 if yes)	-0.002	0.004	0.033	0.028
	(0.012)	(0.013)	(0.038)	(0.039)
Head has secondary education (=1 if yes)	-0.018	-0.014	0.189***	0.202***
	(0.012)	(0.013)	(0.038)	(0.039)
Head's age	-0.002***	-0.002***	0.007***	0.007***
	(0.000)	(0.001)	(0.002)	(0.002)
Household size	-0.025***	-0.017***	0.111***	0.103***
	(0.002)	(0.004)	(0.008)	(0.010)
Proportion of male members aged 16-60 years	-0.217***	-0.213***	0.796***	0.827***
	(0.028)	(0.030)	(0.085)	(0.087)
Proportion of female members aged 16-60 years	-0.087***	-0.047	0.477***	0.443***
	(0.030)	(0.035)	(0.095)	(0.104)
Remittance receipt by migrant's parents (=1 if yes)	-0.043***	-0.039***	0.086**	0.079*
	(0.012)	(0.013)	(0.039)	(0.040)
Remittance receipt by migrant's brother/sister (=1 if yes)	-0.035**	-0.041**	0.143***	0.140***
	(0.016)	(0.017)	(0.049)	(0.050)
Migrant's age	-0.001	-0.001	0.002	0.002
	(0.001)	(0.001)	(0.002)	(0.002)
Migrant has above secondary education (=1 if yes)	-0.043***	-0.017	0.292***	0.242***
	(0.013)	(0.016)	(0.041)	(0.046)
Migrant is a husband (=1 if yes)	0.126***	0.108***	-0.496***	-0.499***
	(0.021)	(0.023)	(0.066)	(0.068)
Migrant is a son (=1 if yes)	0.044**	0.045**	-0.336***	-0.349***
	(0.020)	(0.022)	(0.062)	(0.064)
Migrant is a labourer (=1 if yes)	0.035***	0.013	-0.112***	-0.093**
	(0.011)	(0.014)	(0.035)	(0.039)
Migrant is in the Gulf countries (=1 if yes)	0.020**	0.012	-0.105***	-0.090***
	(0.010)	(0.011)	(0.032)	(0.033)
Frequency of remittance received	0.005***	0.015***	-0.020***	-0.035***
	(0.002)	(0.004)	(0.005)	(0.013)
	Yes	Yes	Yes	Yes
District fixed effects	Yes	Yes	Yes	Yes
First-stage F-statistics	-	105.00	-	102.86
Mean of outcome	0.263		10.538	
Observations	8,995	8,995	6,518	6,518

Note: (a) This table present the effect of remittances on household dependence on remittance income. (b) The treatment variable is log(remittances). (c) Outcome variable in columns 1-2 is an extensive margin indicator of remittance dependence that equals one if household has no other income except remittances, and zero otherwise. (d) Outcome variable in columns 3-4 is an intensive margin indicator of remittance dependence (i.e., log(non-remittance income)). (e) Columns 1 and 3 show ordinary least square (OLS) estimates and columns 2 and 4 show two-stage instrumental variable estimates. (f) Standard errors are clustered at the household level and appear in parentheses. (g) All columns include district fixed effects. (i) The list of controls are household head's characteristics, household characteristics, and migrant's characteristics included in Table 4.1. (j) ***Significant at the 1 percent level, **Significant at the 5 percent level, and *Significant at the 10 percent level.

4.6 Robustness Checks

4.6.1 Nevo & Rosen (2012) Bounds

In this section, we present evidence on the effect of remittance on household dependence using economic fitness shocks as an imperfect instrumental variable. Recall that, in the methodology section, we mentioned that the exclusion restriction of our instrument may be violated in two main ways. First, though economic fitness shocks in destination countries are random and plausibly exogenous, the choice of the country to migrate to is endogenous. Secondly, international trade is another channel through which the exclusion restriction may be violated. If the destination countries are key trading partners with Bangladesh, then it is possible that shocks in the destination country can also affect households in Bangladesh.

We implement Nevo & Rosen (2012)'s imperfect instrumental variables approach to check for the sensitivity of our main results to violations of the exclusion restriction. The result of this exercise is presented in Table 4.4. Column (1) presents the results for remittance dependence at the extensive margin, i.e., the outcome variable is a binary indicator variable that equals one if the household has no other income but remittances and zero otherwise. Meanwhile, column (2) presents the results at the intensive margin. The outcome variable is the natural logarithm of households' non-remittance income.

Table 4.4: Imperfect IV Estimation of Remittances on Households' Dependence

	Remittance Dependence (=1 if Yes)	Log (Non-remittance Income)
	(1)	(2)
Log(remittances)	[-0.094, -0.021]	[0.092, 0.141]
	(-0.184, -0.005)	(0.040, 0.386)
Controls	Yes	Yes
District fixed effects	Yes	Yes
Observations	8,995	6,518

Note: (a) This table present the effect of remittances on household dependence. (b) The treatment variable is log(remittances). (c) Outcome variable in columns 1 is an extensive margin indicator of dependence that equals one if household has no other income except remittances, and zero otherwise. (d) Outcome variable in columns 2 is an intensive margin indicators of dependence (i.e., log(non-remittance income)). (e) Columns 1 and 2 show imperfect instrumental variable (IIV) estimates. (f) Standard errors are clustered at the household level and appear in parentheses. (g) IIV estimation bounds are reported in square brackets and corresponding confidence intervals are reported in parentheses in columns 1 and 2. (h) All columns include district fixed effects. (i) The list of controls are household head's characteristics, household characteristics, and migrant's characteristics included in Table 4.1. (j) ***Significant at the 1 percent level, **Significant at the 5 percent level, and *Significant at the 10 percent level.

The results in column (1) of Table 4.4 yield a fairly consistent result. We still find a negative effect of remittance receipt on households' remittance dependence at the extensive margin. The coefficient of remittances is bounded between – 0.094 and – 0.021 (with a 95 percent confidence interval of – 0.184 and – 0.005). The coefficients are statistically significant as the 95 percent confidence interval does not contain zero. Column (2) of Table 4.4 shows the IIV results at the intensive margin. The results support our main finding that remittances increase households' non-remittance income. The coefficient of remittances is positive and bounded between 0.092 and 0.141 (with a 95 percent confidence interval of 0.040 and 0.386). The result is also statistically significant as the 95% confidence interval does not contain zero.

4.6.2 Alternative Definition of Treatment

In our main estimation, the treatment variable is a continuous variable, i.e., a natural log transformation of the cash amount of remittance received. Here, we test whether the size of remittances has any effect on remittance dependence. We check whether a high cash amount of remittances affect households' remittance dependence differently compared to a relatively low cash amount of remittances. We define our treatment as an indicator variable that equals one if the remittance received is in the top quartile of the remittance distribution and zero in the bottom three[9] . The result of this exercise is presented in Panel A of Table 4.5. We also define our treatment as a binary indicator variable that equals one if remittance received is in the top tercile of remittance received and zero if it is in the bottom two terciles. The result of this analysis is presented in Panel B of Table 4.5. The outcome variables are remittance dependence at both the extensive and intensive margins.

We focus on the IV estimation results because the OLS results are biased downwards due to reverse causality. The IV estimates in Panel A show that households that receive remittances in the top quintile of the remittance distribution are on average 0.355 points less likely to be remittance dependent compared to households that receive remittances in the lower quintiles of the remittance distribution. The coefficients are statistically significant at the 1% level. Similarly, at the intensive margin, households that receive remittances in the top quintile are 0.663 points more likely to earn non-remittance income, compared to their counterparts. This is also statistically significant at the 1% level. The IV estimates in Panel B paints the same picture as above with slightly smaller magnitudes. The result of this exercise supports our main findings in Table 4.3. More precisely, our results are robust to an alternative definition of our treatment variable. We still find that remittances reduce the likelihood of remittance dependence and increase the households' non-remittance income[10] .

[9] We do not use more than one quartile or tercile because that would require more than one instrument

[10] We also check the robustness of our main results to a different model specification. Precisely, we estimated a probit and IV probit model. The result of this exercise in presented in appendix Table C.2. We find that our main result is not sensitive to different model specifications

Table 4.5: Effect of Remittances on Households' Dependence: Alternative Definitions

	Remittance Dependence (=1 if Yes)		Log (Non-remittance Income)	
	OLS	IV	OLS	IV
	(1)	(2)	(3)	(4)
Panel A				
Top quintile remittances (=1 if Yes)	-0.032***	-0.355***	0.201***	0.633**
	(0.012)	(0.123)	(0.038)	(0.320)
Controls	Yes	Yes	Yes	Yes
District fixed effects	Yes	Yes	Yes	Yes
First-stage F-statistics	-	71.35	-	59.91
Observations	9,205	8,985	6,682	6,509
Panel B				
Top tercile remittances (=1 if Yes)	-0.022**	-0.316***	0.164***	0.575**
	(0.011)	(0.110)	(0.035)	(0.289)
Controls	Yes	Yes	Yes	Yes
District fixed effects	Yes	Yes	Yes	Yes
First-stage F-statistics	-	78.39	-	66.47
Observations	9,205	8,985	6,682	6,509

Note: (a) This table present the effect of high level of remittances on household dependence on remittance income. (b) The treatment variable in Panel A is an indicator of high level of remittances equals 1 if received remittances is in the top quartile of remittance distribution, and zero if received remittances is in the bottom three quartile of remittance distribution. The treatment variable in Panel B is an indicator of high level of remittances equals 1 if received remittances is in the top tercile of remittance distribution, and zero if received remittances is in the bottom two tercile of remittance distribution. (c) Outcome variable in columns 1-2 is an extensive margin indicator of remittance dependence that equals one if household has no other income except remittances, and zero otherwise. (d) Outcome variable in columns 3-4 is an intensive margin indicator of remittance dependence (i.e., log(non-remittance income)). (e) Columns 1 and 3 show ordinary least square (OLS) estimates and columns 2 and 4 show two-stage instrumental variable estimates. (f) Standard errors are clustered at the household level and appear in parentheses. (g) All columns include district fixed effects. (i) The list of controls are household head's characteristics, household characteristics, and migrant's characteristics included in Table 4.1. (j) ***Significant at the 1 percent level, **Significant at the 5 percent level, and *Significant at the 10 percent level.

Furthermore, we check whether remittances have a nonlinear effect on households' dependence. We use a quadratic term which we expect to capture non-linearity in the effect of remittance on households' dependence. This exercise will highlight whether a low level of remittances have a differential effect on household dependence compared to high levels of remittances. The result of this exercise is presented in Table 4.6. The outcome variable in columns (1-2) of Table 4.6 is a binary indicator that equals one if the household has no other income except remittances (i.e., they are remittance dependent) and zero otherwise. Meanwhile, the outcome variable for columns (3-4) of Table 4.6 is the natural logarithm of non-remittance household income. The naïve OLS estimates in Columns (1) and (3), show some non-linearity. However, these estimates are likely to be biased due to reverse causality. The IV[11] estimates in columns (2) and (4) do not show any non-linearity. Hossain & Sunmoni (2022) also do not find any non-linear effect of remittances on households' investment decisions. This analysis lends some credibility to our linear estimation.

[11] We use the squared term of the IV to instrument remittance squared

Table 4.6: Non-linear Effect of Remittances on Households' Remittance Dependence

	Remittance Dependence (=1 if Yes)		Log(Non-remittance Income)	
	OLS	IV	OLS	IV
	(1)	(2)	(3)	(4)
Log(Remittances)	0.169***	-0.103	-1.288***	-9.882
	(0.060)	(2.775)	(0.203)	(11.156)
Log(remittances) squared	-0.012***	-0.003	0.091***	0.660
	(0.004)	(0.183)	(0.014)	(0.730)
Controls	Yes	Yes	Yes	Yes
District fixed effects	Yes	Yes	Yes	Yes
First-stage F-statistics	-	77.72	-	65.69
Observations	9,205	8,995	6,682	6,509

Note: (a) This table present the nonlinear effect of remittances on household dependence on remittance income. (b) The treatment variables are log(remittances) and log(remittances) squared. (c) Outcome variable in columns 1-2 is an extensive margin indicator of remittance dependence that equals one if household has no other income except remittances, and zero otherwise. (d) Outcome variable in columns 3-4 is an intensive margin indicator of remittance dependence (i.e., log(non-remittance income)). (e) Columns 1 and 3 show ordinary least square (OLS) estimates and columns 2 and 4 show two-stage instrumental variable estimates. (f) Standard errors are clustered at the household level and appear in parentheses. (g) All columns include district fixed effects. (i) The list of controls are household head's characteristics, household characteristics, and migrant's characteristics included in Table 4.1 (j) ***Significant at the 1 percent level, **Significant at the 5 percent level, and *Significant at the 10 percent level.

4.6.3 Alternative Definition of Outcome Variable

In this section, we check for sensitivity of our outcome variables to changes in definition. Up till now, we have defined remittance dependence at the extensive margin as a binary indicator that equals one if the household has no other income except remittances (i.e., they are remittance dependent) and zero otherwise. Meanwhile, at the intensive margin, we defined remittance dependence as the natural logarithm of non-remittance household income. In this section, we define remittance dependence as the share of remittances in total household income. The rationale is that the bigger the share, the more dependent the household is and vice versa. We estimate four different empirical models to check this robustness. The result of this exercise is presented in Table 4.7. Column (1) presents the results for OLS, Column (2) presents the results for instrumental variables (IV) estimation, Column (3) presents the results for the Tobit estimation and Column (4) presents the results for the IV-Tobit estimations. We use a Tobit model because we have censoring both left and right censoring. We have censoring on the left for households who receive very small amounts of remittances and on the right for households who do not have any other income except remittances. We thus estimate a Tobit model using maximum likelihood estimators (MLE) to circumvent this issue.

Table 4.7: Effect of Remittances on Households' Dependence Alternative Outcome

	Remittance Share of Household's Total Income			
	OLS	IV	Tobit	IVTobit
	(1)	(2)	(3)	(4)
Log(remittances)	0.114***	0.070***	0.119***	0.047*
	(0.003)	(0.022)	(0.004)	(0.027)
Marginal effect	-	-	[0.156]	[0.061]
Controls	Yes	Yes	Yes	Yes
District fixed effects	Yes	Yes	Yes	Yes
First-stage F-statistics	-	105.00	-	105.00
Mean of outcome			0.815	
Observations	9,214	8,995	9,214	8,995

Note: (a) This table present the effect of remittances on households' remittances share of total income. Total income includes both remittances and non-remittance income. (b) The treatment variable is log(remittances). (c) Outcome variable in columns 1-4 is remittances share of households' total income. The share varies between zero and 1. (d) Column 1 show ordinary least square (OLS) estimates, column 2 show two-stage instrumental variable estimates, column 3 show Tobit estimates with lower bound at zero and upper bound at one, and finally column 4 show IVTobit estimates. (e) Standard errors are clustered at the household level and appear in parentheses. (f) All columns include district fixed effects. (g) The list of controls are household head's characteristics, household characteristics, and migrant's characteristics included in Table 4.1. (h) ***Significant at the 1 percent level, **Significant at the 5 percent level, and *Significant at the 10 percent level.

The results are consistent with our main findings in Table 4.3. Across all model specifications, we find that remittances have a positive effect on the share of remittances in household income. The naïve OLS estimates show that a 1% rise in remittance receipts increases the share of remittances in household total income by 0.00114. While the naïve Tobit estimates and marginal effect also show positive effects. However, these coefficients are likely to be biased due to reverse causality. The IV and IV-Tobit also show a positive and significant effect of remittances on the share of remittances in household income. Specifically, the IV estimates show that a 1% rise in remittance receipts increases the share of remittances in household total income by 0.0007. Similarly, the marginal effects of the IV-Tobit shows that a 1% rise in remittance receipts increases the share of remittances in household total income by 0.00061.

In this robustness section, we checked the sensitivity of our main results to violations of the exclusion restriction, different definition of our treatment and outcome variables and different model specifications. We also checked for non-linearity in the effect of remittances on household dependence. Overall, this exercise shows that our results are robust to relaxing the exclusion of the traditional instrumental variables approach, alternative definition of our treatment and outcome variable, and alternative model specifications. However, we do not find any evidence of non-linearity in the effect of remittances on remittance dependence.

4.7 Heterogeneity

4.7.1 Household Head's Characteristics

In this section, we explore the heterogeneity of the effect of remittances on households' remittance dependence. In the first heterogeneity analysis, we study how the characteristics of the household head, such as gender, level of education, and age, might affect the household's dependence on remittance. Exploring heterogeneity by the characteristics of the household head is important for a number of reasons. First, gender norms in rural Bangladesh indicate that women should not engage in non-farm paid employment but should take care of the home. These norms affect women's participation in the labour market or income generating activities which are different for men. Furthermore, studies have shown that the gender of the remittance receiver can affect the utilisation of remittances. Studies have shown that on average, remittances received by women are typically spent on education, health and nutrition (Guzmán et al., 2008), meanwhile, remittances received by men are more likely to be invested in small businesses and physical capital (Lopez-Ekra et al., 2011). Secondly, the level of education of the household head can determine the type of economic activity they can partake in. For example, more educated household heads are more likely to engage in high-wage jobs than less educated ones. Thirdly, the age of the household head also determines the level of dependence. Too young or too old household heads are more likely to be dependent than working-age household heads.

The result of this exercise is presented in Table 4.8. The treatment variable is the natural logarithm of remittances. The outcome variable in column (1) is remittance dependence at the extensive margin, while the outcome variable in column (2) is remittance dependence at the intensive margin. Panel A presents the result for household heads' gender, Panel B presents the results by the Household heads' level of education, and Panel C presents the results by household heads' age. We do not find significant heterogeneity by heads' characteristics, except for heads' gender at the extensive margin. The result suggests that female-headed households are less likely to be remittance dependent than male-headed households. Female-headed households are those in which the male household head has migrated abroad. Consequently, it may be the case that the left behind female head engage in some subsistence economic activity and earn some non-remittance income.

Table 4.8: Heterogeneous Effect of Remittances on Households' Dependence by Head's Characteristics

	Remittance Dependence (=1 if Yes)	Log (Non-remittance Income)
	(1)	(2)
Panel A: Head's Sex		
Log(remittances) x Female (=1 if yes)	-0.194*	0.129
	(0.101)	(0.281)
Log(remittances)	-0.077	0.228
	(0.053)	(0.150)
Panel B: Head's Education		
Log(remittances) x Primary education (=1 if yes)	-0.106	-0.259
	(0.117)	(0.330)
Log(remittances) x Secondary education (=1 if yes)	-0.114	-0.078
	(0.124)	(0.322)
Log(remittances)	-0.087	0.351*
	(0.068)	(0.185)
Panel C: Head's Age		
Log(remittances) x Age	0.003	0.001
	(0.004)	(0.010)
Log(remittances)	-0.278	0.243
	(0.193)	(0.494)
Controls	Yes	Yes
District fixed effects	Yes	Yes
Observations	8,985	6,509

Note: (a) This table present the heterogeneous effect of remittances on households' dependence on remittance income. (b) The treatment variable is log(remittances) and interaction of log(remittances) with household head's characteristics. (c) Outcome variable in column 1 is an indicator of remittance dependence that equals one if household has no other income except remittances, and zero otherwise. (d) Outcome variable in columns 2 is an intensive margin indicators of dependence (i.e., log(non-remittance income)). (e) Columns 1 and 2 show two-stage instrumental variable estimates. (f) Standard errors are clustered at the household level and appear in parentheses. (f) All columns include district fixed effects. (g) The list of controls are household head's characteristics, household characteristics, and migrant's characteristics included in Table 4.1. (h) ***Significant at the 1 percent level, **Significant at the 5 percent level, and *Significant at the 10 percent level.

4.7.2 Household Characteristics

In this section, we explore heterogeneity by household characteristics. We expect that household characteristics can affect the participation of household members in the labour market or income generating activities and thus dependence. For example, we expect larger household sizes to reduce women's labour supply but increase men's (Cools et al., 2017). Also, we expect households with more working-age male members to supply more labour and engage in more income generating activities compared to households with more working-age female members. Furthermore, studies show that the relationship between the remitter and recipient may affect utilisation of remittances. For example, female migrants with children typically send remittances to their children's carer (usually another woman) (Pérez Orozco & Paiewonsky, 2007). In our sample, about 60 percent of remittance recipients in dependent households are wives of the migrant compared to about 45 percent of parents in non-dependent households. Finally, as Amuedo-Dorantes (2014) suggest, the frequency of remittances affects its usage at the household level. We thus hypothesise

that households that receive more frequent remittances are more likely to be dependent than those that do not. We test these hypotheses using our data and present our results in Table 4.9. Panel A shows the heterogeneity by household size, Panel B and C show heterogeneity by the proportion of working-age male and female household members respectively, Panel D shows heterogeneity by the recipient of remittances, and Panel E shows heterogeneity by the frequency of remittances.

We do not find any significant heterogeneity by household characteristics, except for the proportion of working-age female members and remittance frequency. Our results show that households with a higher proportion of working-age female members have less non-remittance income. This result is likely driven by the gender norms in rural Bangladesh, which limits women's labour market activities. Next, we find that more frequent remittances reduce the likelihood of remittance dependence. This result is most likely driven by the financial security of frequent remittance flow that helps households engage in income generating activities.

Table 4.9: Heterogeneous Effect of Remittances on Households' Dependence by Household Characteristics

	Remittance Dependence (=1 if Yes)	Log (Non-remittance Income)
	(1)	(2)
Panel A: Household Size		
Log(remittances) x Household size	0.016	-0.008
	(0.017)	(0.045)
Log(remittances)	-0.227**	0.307
	(0.098)	(0.257)
Panel B: Proportion of Male Members Aged 16-60		
Log(remittances) x Proportion of male members aged 16-60	0.169	-0.876
	(0.234)	(0.677)
Log(remittances)	-0.190**	0.489**
	(0.081)	(0.220)
Panel C: Proportion of Female Members Aged 16-60		
Log(remittances) x Proportion of female members aged 16-60	-0.063	-1.181**
	(0.205)	(0.592)
Log(remittances)	-0.123	0.775**
	(0.107)	(0.310)
Panel D: Recipient of Remittances		
Log(remittances) x Receipt by migrant's parents (=1 if yes)	0.034	-0.057
	(0.110)	(0.295)
Log(remittances) x Receipt by migrant's sibling (=1 if yes)	0.151	-0.064
	(0.137)	(0.356)
Log(remittances)	-0.192*	0.308
	(0.098)	(0.257)
Panel E: Frequency of Remittance Received		
Log(remittances) x Frequency	-0.066**	-0.042
	(0.028)	(0.065)
Log(remittances)	0.138	0.441
	(0.111)	(0.270)
Controls	Yes	Yes
District fixed effects	Yes	Yes
Observations	8,985	6,509

Note: (a) This table present the heterogeneous effect of remittances on households' dependence on remittance income. (b) The treatment variable is log(remittances) and interaction of log(remittances) with household characteristics. (c) Outcome variable in column 1 is an indicator of remittance dependence that equals one if household has no other income except remittances, and zero otherwise. (d) Outcome variable in columns 2 is an intensive margin indicators of dependence (i.e., log(non-remittance income)). (e) Columns 1 and 2 show two-stage instrumental variable estimates. (f) Standard errors are clustered at the household level and appear in parentheses. (f) All columns include district fixed effects. (g) The list of controls are household head's characteristics, household characteristics, and migrant's characteristics included in Table **??**. (h) ***Significant at the 1 percent level, **Significant at the 5 percent level, and *Significant at the 10 percent level.

4.7.3 Migrant's Characteristics

In this section, we present heterogeneity analysis based on the characteristics of the migrant. We expect that the characteristics of the migrant will affect the motivation, amount, and frequency of remittances sent home. For example, we expect that more educated migrants are more likely to get lucrative jobs in the destination countries and thus send more money back home. Furthermore, studies have shown that migrants' altruism is one of the drivers of sending remittance members (Lucas & Stark, 1985; Stark, 2009); thus, the relationship of the migrant to the household head affect the amount and frequency of remittances. We expect migrants in more lucrative destinations to send more money than migrants in less lucrative destinations. Finally, migrants with white-collar or professional jobs are more likely to send more

remittances than migrants who are labourers, for example. We test these conjectures and present our results in Table 10. Panel A presents the results for heterogeneity by migrants' age, Panel B presents the results by migrants' level of education, Panel C presents the results by the relationship of the migrant to the household head, Panel D presents the results by the occupation of the migrant and Panel E presents the results by the destination of the migrants.

Our result show that households with older migrants earn more non-remittance income and are less dependent. We find that households where the husband is the migrant are less likely to be remittance dependent at the extensive margin. We also find that migrants' destinations matter. For example, households with migrants in the Gulf countries are less likely to be remittance dependent at the extensive margin but earn less non-remittance income. We do not find any significant results for the other hypotheses examined.

To sum up this section, we find that female headed households are less likely to be remittance dependent. However, households with a high proportion of working age women are more likely to be dependent. Also, more predictable, or more frequent remittances reduce remittance dependence. Furthermore, households where the husband of the household head is the migrant and households with older migrants are less likely to be remittance dependent. Finally, households with migrants in Gulf countries are less likely to be remittance dependent.

Table 4.10: Heterogeneous Effect of Remittances on Households' Dependence by Migrant's Characteristics

	Remittance Dependence (=1 if Yes)	Log (Non-remittance Income)
	(1)	(2)
Panel A: Migrant's Age		
Log(Remittances) x Age	-0.002	0.029*
	(0.005)	(0.017)
Log(Remittances)	-0.086	-0.615
	(0.173)	(0.534)
Panel B: Migrant's Education		
Log(Remittances) x Above secondary education (=1 if yes)	-0.001	0.504
	(0.222)	(0.637)
Log(Remittances)	-0.149***	0.226*
	(0.051)	(0.134)
Panel C: Migrant's Relationship to Household Head		
Log(Remittances) x Husband (=1 if yes)	-0.265*	0.685
	(0.139)	(0.461)
Log(Remittances) x Son (=1 if yes)	-0.152	-0.077
	(0.104)	(0.272)
Log(Remittances)	-0.007	0.218
	(0.083)	(0.211)
Panel D: Migrant's Occupation		
Log(Remittances) x Labourer (=1 if yes)	-0.120	0.187
	(0.105)	(0.283)
Log(Remittances)	-0.075	0.144
	(0.083)	(0.240)
Panel E: Migrant's Destination		
Log(Remittances) x Gulf countries (=1 if yes)	-0.270***	-0.510**
	(0.098)	(0.257)
Log(Remittances)	-0.003	0.527***
	(0.068)	(0.187)
Controls	Yes	Yes
District Fixed Effects	Yes	Yes
Observations	9,214	8,995

Note: (a) This table present the heterogeneous effect of remittances on households' dependence on remittance income. (b) The treatment variable is log(remittances) and interaction of log(remittances) with household head's characteristics. (c) Outcome variable in column 1 is an indicator of remittance dependence that equals one if household has no other income except remittances, and zero otherwise. (d) Outcome variable in columns 2 is an intensive margin indicators of dependence (i.e., log(non-remittance income)). (e) Columns 1 and 2 show two-stage instrumental variable estimates. (f) Standard errors are clustered at the household level and appear in parentheses. (f) All columns include district fixed effects. (g) The list of controls are household head's characteristics, household characteristics, and migrant's characteristics included in Table 4.1. (h) ***Significant at the 1 percent level, **Significant at the 5 percent level, and *Significant at the 10 percent level.

4.8 Mechanisms

4.8.1 Health and Productivity

This section explores the potential mechanism through which remittances affect a household's remittance dependence. The first mechanism we study is the "health and productivity effect." Unhealthy workers are not very productive at work (Baird et al., 2018; Dasgupta & Ray, 1986). Remittances can ease liquidity constraints, allowing individuals to purchase better quality food, live in a more sanitary environment, and invest in their health. These factors contribute to improve a worker's health, thus increasing their productivity and participation in the labour market and other income

generating activities such as farm and non-farm enterprise development. It is also possible that the health shock of a left behind family member may lead to remittance inflows because migrants are altruistic (Lucas & Stark, 1985; Stark, 2009). One way to address this would be to control for the health status of left behind household members or use longitudinal data. Unfortunately, we have neither. As a result, we cannot interpret our estimates causally. Instead, they provide descriptive evidence. Since these are 2SLS estimates which address reverse causality, any unresolved endogeneity biases the estimates towards zero

We use five different measures to capture the health-productivity effect. The measures are health care expenditure, healthy sanitation facility, healthy cooking facility, healthy lighting facility, healthy water facility, and healthy lifestyle index. Healthy sanitation facility is a binary indicator variable that equals one if the household uses sanitary toilet facilities and zero otherwise. Healthy cooking facility is a binary indicator variable that equals one if the household uses clean cooking options such as natural gas or Liquefied petroleum gas and zero if the household uses kerosene or wood[12] . Healthy lighting facility is a binary indicator variable that equals one if the household uses clean lighting options such as electricity or solar and zero if the household uses kerosene[13]. Healthy water facility is a binary indicator variable that equals one if the household uses healthy water sources such as piped water or deep well and zero if the household uses pond or river water. Finally, the healthy lifestyle index is the first principal component[14] of the four variables (i.e., healthy sanitation facility, healthy cooking facility, healthy lighting facility, and healthy water facility) and is normalised to have zero mean and standard deviation one.

The result of this exercise is presented in Table 4.11. We find strong evidence of the health-productivity effect. Our results show a statistically significant, and positive effect of remittances on investment in a healthy lifestyle. This finding supports other findings in the literature that remittances improve households' health and sanitation facilities, which improves labour productivity and engagement in income generating activities (Amuedo-Dorantes & Pozo, 2011; Lu, 2013; Mergo, 2016).

[12]There is evidence to show that indoor air pollution has negative consequences for the health outcomes of household members. See (Ezzati, 2005). Also, the government in Bangladesh provides energy subsidies.

[13]According to the World Bank, the electrification rate in Bangladesh is 96.2% as at 2020 (World Bank, 2022b)

[14]The principal components is shown in Table C.3 in the appendix

Table 4.11: Health-Productivity Effect Mechanism

	Log(Health Care Expenditure)	Healthy Sanitation Facility (=1 if yes)	Healthy Cooking Facility (=1 if yes)	Healthy Lighting Facility (=1 if yes)	Healthy Water Facility (=1 if yes)	Healthy Lifestyle Index
	(1)	(2)	(3)	(4)	(5)	(6)
Log(Remittances)	0.651***	0.330***	0.075***	0.147***	0.021	0.749***
	(0.134)	(0.059)	(0.027)	(0.041)	(0.015)	(0.122)
Mean outcome	4.273	0.486	0.051	0.857	0.987	0.000
Controls	Yes	Yes	Yes	Yes	Yes	Yes
District Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	8,646	8,985	8,985	8,985	8,985	8,985

Note: (a) This table present the effect of remittances on households' investment in healthy lifestyle. (b) The treatment variable is log(remittances). (c) Healthy lifestyle index is the first principal component of four variables (i.e., healthy sanitation facility, healthy cooking facility, healthy lighting facility, and healthy water facility) and normalised it to have zero mean and 1 standard deviation. (d) All columns show two-stage instrumental variable estimates. (e) Standard errors are clustered at the household level and appear in parentheses. (f) All columns include district fixed effects. (g) The list of controls are household head's characteristics, household characteristics, and migrant's characteristics included in Table 4.1. (h) ***Significant at the 1 percent level, **Significant at the 5 percent level, and *Significant at the 10 percent level.

4.8.2 Liquidity Effect

The second mechanism we explore is the liquidity effect mechanism. It is well established in the literature that remittances relax households' budget constraints, which can improve consumption and facilitate investment in physical or financial capital (Adams, 2011; Hossain & Sunmoni, 2022; Jena, 2018). In addition, it can provide much-needed liquidity for household members to start businesses. Therefore, we check whether remittances through the liquidity effect can facilitate households' engagement in the labour market or income generating activities which can increase their non-remittance income and reduce dependence on remittances. The result of this analysis is presented in Table 4.12. The outcome variables in columns 1 – 5 are dummy for above-district average consumption, dummy for physical capital investment, log physical capital investment, dummy for financial capital investment and log financial capital investment respectively. This further strengthens results from previous chapters that remittances increase investment in physical capital and facilitates self-employment in some of the countries examined. We find strong evidence for the liquidity effect mechanism. Our results show that remittances ease households' liquidity constraints and facilitate participation in income generating activities such as investment in physical or financial capital, which boosts households' non-remittance income and reduces remittance dependence. Overall, we find that the effect of remittances on households' remittance dependence is transmitted through two main mechanisms – the health-productivity effect and the liquidity effect.

Table 4.12: Liquidity Effect Mechanism

	Above Average Consumption (=1 if yes)	Physical Capital Investment (=1 if yes)	Log(Physical Capital Expenditure)	Financial Capital Investment (=1 if yes)	Log(Financial Capital Expenditure)
	(1)	(2)	(3)	(4)	(5)
Log(Remittances)	0.312***	0.135***	0.647*	0.187***	0.711**
	(0.056)	(0.050)	(0.334)	(0.055)	(0.285)
Mean outcome	0.511	0.265	7.027	0.481	5.733
Controls	Yes	Yes	Yes	Yes	Yes
District Fixed Effects	Yes	Yes	Yes	Yes	Yes
Observations	8,984	8,985	2,304	8,985	4,644

Note: (a) This table present the effect of remittances on households' investment in high consumption, physical, and financial investment. (b) The treatment variable is log(remittances). (c) All columns show two-stage instrumental variable estimates. (d) Standard errors are clustered at the household level and appear in parentheses. (e) All columns include district fixed effects. (f) The list of controls are household head's characteristics, household characteristics, and migrant's characteristics included in Table 4.1. (g) ***Significant at the 1 percent level, **Significant at the 5 percent level, and *Significant at the 10 percent level.

4.9 Conclusion

The neoclassical model of labour-leisure posits that the income effect of a public or private transfer is a reduction in labour supply and higher demand for leisure. This intuition propagates the notion that cash transfers undermine the work ethics of the recipients, reduces their labour supply and makes them lazy or dependent. Recent studies have shown that there is no compelling evidence to support the notion that public cash transfers make the recipients lazy and leads to dependence. This study investigates whether private cash transfers such as remittances lead to dependence. In particular, this study explores the effect of remittances on households' remittance dependence. We used data from the Bangladesh Survey on the Use of Remittance 2013. Identification relies on instrumental variables. In particular, we exploited changes in economic situation at the migrants destination country as an instrument for remittances. Overall, we do not find any evidence that remittances leads to household dependence. As a matter of fact, we find that remittances reduces the probability of being dependent and increases households non-remittance income. Our results show that health-productivity and liquidity effects are two important channels through which remittances affects households' dependence. Precisely, our results show that remittances enable households to improve their health and sanitation outcomes thus improving their health-productivity and labour supply. Furthermore, remittances ease liquidity constraints which improves self-employment and investment in financial capital, which boosts household non-remittance income and reduces dependence. Our results are robust to different model specifications, different definitions of treatment

and outcome variables and violations of the exclusion restriction. Overall, we provide new and rigorous evidence that remittances do not lead to household dependence but rather ease households' liquidity constraints and facilitates investment in health and income generating activities which can boost household income and reduce dependence.

Chapter 5

Conclusion

International migration has the potential to reduce poverty and improve long-term welfare outcomes in developing countries. However, the impact of this powerful force on origin countries, in particular left behind household members is increasingly studied but not fully understood. This thesis contributes to our understanding of the impact of international migration on left behind household members; focusing on a region for which rigorous empirical evidence is scarce.

The second chapter "Remittances and Household Investment Decisions: Evidence from Sub-Saharan Africa" offers new evidence on the effect of remittances on household investment decisions. The chapter shows that remittances increase the likelihood of investment in human, physical, and social capital in most of the countries examined. We also show that remittance sources have a notable influence on household investment decisions. In particular, we show that internal remittances matter more for education investment, within Africa remittances matter more for health investment and out-of-Africa remittances are more likely to increase physical and social capital investments. Finally, we show that the income effect of remittances mainly drives the positive effect on capital investment. We also find evidence of substitution effect in Kenya and Senegal. This chapter contributes to the ongoing debate on the effect of remittances on capital investments, and our results shed light on the heterogeneous effect of remittance in the literature.

In chapter 3 "Migration, Remittances and Labour Force Participation: evidence from sub-Saharan Africa" I show that remittances have a complex impact on the labour supply of the individuals left behind in the countries under review. I show that remittances increase labour supply in Nigeria and Burkina Faso, reduce labour supply in Senegal and has no effect on labour supply in Kenya and Uganda. I show that the

results in Senegal and Burkina Faso is mainly driven by women in rural areas, whereas the result in Nigeria is driven by men. Analysis of mechanisms show that the income effect of remittances mainly drives the change in labour supply. Furthermore, I find that remittances eases liquidity constraints in Nigeria and facilitates investment in business enterprises. Overall, I show that the effect of remittances on the labour supply of left behind household members is complex and context-dependent.

In chapter 4 "Remittances and Household Dependence: Evidence from Bangladesh", we show that remittance does not lead to remittance dependence at the household level. As a matter of fact, we find that remittances reduce the probability of being dependent and increases households non-remittance income. Our results show that health productivity and liquidity effects are two important channels through which remittances affects households' dependence. Precisely, our results show that remittances enable households to improve their health and sanitation outcomes thus improving their productivity and labour supply. Furthermore, we show that remittances ease liquidity constraints which improves self-employment and investment in financial capital, which boosts household non-remittance income and reduces dependence. Our results are robust to different model specifications, different definitions of treatment and outcome variables and violations of the exclusion restriction. Overall, we provide new and rigorous evidence that remittances do not lead to household dependence but rather ease households' liquidity constraints and facilitates investment in health and income generating activities which can boost household income and reduce dependence.

5.1 Policy Recommendations

One recurring result across all the chapters of this thesis is that remittances boost household resources and eases liquidity constraints which facilitate investment in activities that reduce poverty in the short-term and boost household welfare in the long-term. Given the importance of remittances to development outcomes in migrant sending countries, one crucial policy implication of this research is that policy makers should design measures to reduce the cost of sending remittances to Sub-Saharan Africa (SSA). This is particularly important because SSA has the highest cost[1] of sending remittances globally, according to the World Bank (World Bank, 2022a). This also coincides with the United Nation Sustainable Development Goal (SDG) to reduce remittance costs to 3% by 2030. SSA governments can achieve this by boosting

[1] At 4.3% in Q2:2021, Bangladesh has one of the lowest cost of sending remittances in the world, comapred to 8.7% for SSA. (World Bank, 2022a)

competition in remittance markets, fostering the adoption of digital payment options such as M-PESA in Kenya and improving customers knowledge of remittance costs.

Furthermore, policy makers in SSA and Bangladesh can design strategies to increase the development impact of remittances. For example, policy makers can design measures that mobilise remittance inflows for business creation together with regulatory reforms that simplify business registration processes. In addition, policy makers can bolster financial literacy training for migrants (pre-departure) and for their families left behind.

Another important finding of this thesis is that the income effect of remittances outweighs the labour lost effect of emigration in SSA. Since there can be no remittances without emigration, an important policy implication is that policy makers in SSA should design strategies to facilitate a low cost and orderly migration of workers across international borders. This is particular important given that migration is a costly event and high reward destinations are typically costlier. This aligns with the United Nation Global Compact on Migration which aims to facilitate safe, orderly and regular migration across geographic borders.

In order to maximise the development impact of remittances, policy makers in both SSA and Bangladesh need reliable data on the inflows of remittances into their economy. Essentially, policy makers in SSA need to devise strategies to collect reliable remittances data and encourage the use of formal channels of sending remittances. Furthermore, to capture the impact of international migration on left behind household members, there is a need for high quality longitudinal data. Cross-sectional data only provide evidence at a point in time and administrative data limits the kind of analysis that can be performed. Policy makers in SSA should collaborate with statistical agencies and international organisations to collect high quality longitudinal data that fosters research on the impact of migration on left behind household members.

5.2 Future Research

Although this thesis contributes to our understanding of the effect of international migration on origin countries, there is still room for further research and questions left unexplored. For example, this thesis only considers the effect of current migration episodes on left behind household members. Questions on the effect of past migration (return migrants) on different outcomes in sub-Saharan Africa remains unexplored. Furthermore, it would be interesting to use high quality panel data (where available) to examine the impact of international migration and remittances on origin households. Finally, one strand of my future research is to examine the impact of international

migration on the transmission of fertility and gender norms in Sub-Saharan Africa. Another strand of my future research is to consider the impact of conflict and forced migration on both origin and destination countries. This is important because episodes of conflict and forced migration are pervasive in SSA. For example, Rwanda, South Sudan and Eritrea. Finally, in the future I will examine the impact of international migration on the migrants themselves and issues around assimilation and integration of migrants in destination countries.

Appendix A

Remittances and Household Investment Decisions: Evidence from Sub-Saharan Africa

Table A.1: Correlation of Treatment and Outcome Variables

	Received remittances (=1 if yes)	Log (cash remittances)	Education (=1 if yes)	Health (=1 if yes)	Physical capital (=1 if yes)	Social capital (=1 if yes)	Log (education expenditure)	Log (health expenditure)	Log (physical capital expenditure)	Log (social capital expenditure)
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Panel A: Uganda										
Received remittances (=1 if yes)	1									
Log (cash remittances)	0.943	1								
Education (=1 if yes)	0.120	0.108	1							
Health (=1 if yes)	0.017	0.015	0.120	1						
Physical capital (=1 if yes)	0.049	0.047	0.088	0.050	1					
Social capital (=1 if yes)	0.074	0.068	0.113	0.167	0.153	1				
Log (education expenditure)	0.161	0.171	0.865	0.141	0.082	0.129	1			
Log (health expenditure)	0.112	0.122	0.175	0.797	0.085	0.188	0.282	1		
Log (physical capital expenditure)	0.087	0.094	0.091	0.039	0.878	0.131	0.123	0.120	1	
Log (social capital expenditure)	0.102	0.114	0.143	0.142	0.175	0.887	0.206	0.232	0.190	1
Panel B: Kenya										
Received remittances (=1 if yes)	1									
Log (cash remittances)	0.937	1								
Education (=1 if yes)	0.056	0.047	1							
Health (=1 if yes)	0.08	0.078	0.225	1						
Physical capital (=1 if yes)	0.099	0.09	0.106	0.054	1					
Social capital (=1 if yes)	0.065	0.044	0.138	0.297	0.093	1				
Log (education expenditure)	0.072	0.101	0.881	0.204	0.06	0.106	1			
Log (health expenditure)	0.114	0.158	0.203	0.812	0.047	0.229	0.266	1		
Log (physical capital expenditure)	0.098	0.114	0.095	0.048	0.918	0.07	0.078	0.064	1	
Log (social capital expenditure)	0.076	0.085	0.147	0.273	0.08	0.865	0.158	0.304	0.082	1
Panel B: Nigeria										
Received remittances (=1 if yes)	1									
Log (cash remittances)	0.941	1								
Education (=1 if yes)	0.066	0.085	1							
Health (=1 if yes)	0.031	0.019	0.126	1						
Physical capital (=1 if yes)	0.076	0.068	-0.011	0.002	1					
Social capital (=1 if yes)	0.056	0.031	0.076	0.266	0.021	1				
Log (education expenditure)	0.129	0.183	0.875	0.081	0.006	0.035	1			
Log (health expenditure)	0.102	0.118	0.122	0.845	0.031	0.272	0.157	1		
Log (physical capital expenditure)	0.081	0.09	0.001	0.014	0.923	0.038	0.044	0.056	1	
Log (social capital expenditure)	0.074	0.069	0.051	0.225	0.044	0.92	0.055	0.274	0.074	1

Note: Number of observations in Panel A 1,603, in Panel B 1,821, in Panel C 2,030, in Panel D 1,895, and in Panel E 1,705.

Table A.2: Correlation of Treatment and Outcome Variables cont'd

	Received remittances (=1 if yes)	Log (cash remittances)	Education (=1 if yes)	Health (=1 if yes)	Physical capital (=1 if yes)	Social capital (=1 if yes)	Log (education expenditure)	Log (health expenditure)	Log (physical capital expenditure)	Log (social capital expenditure)
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Panel D: Burkina Faso										
Received remittances (=1 if yes)	1									
Log (cash remittances)	0.928	1								
Education (=1 if yes)	0.117	0.123	1							
Health (=1 if yes)	0.03	0.048	0.088	1						
Physical capital (=1 if yes)	0.012	0.009	0.026	0.047	1					
Social capital (=1 if yes)	0.021	0.015	0.098	0.128	0.137	1				
Log (education expenditure)	0.126	0.154	0.861	0.105	0.053	0.085	1			
Log (health expenditure)	0.038	0.091	0.116	0.76	0.059	0.135	0.202	1		
Log (physical capital expenditure)	0.028	0.033	0.055	0.062	0.939	0.134	0.096	0.106	1	
Log (social capital expenditure)	-0.019	0.002	0.135	0.131	0.158	0.877	0.166	0.225	0.182	1
Panel E: Senegal										
Received remittances (=1 if yes)	1									
Log (cash remittances)	0.961	1								
Education (=1 if yes)	0.148	0.154	1							
Health (=1 if yes)	0.058	0.075	0.096	1						
Physical capital (=1 if yes)	0.047	0.045	-0.002	0.029	1					
Social capital (=1 if yes)	-0.003	-0.016	0.027	0.115	0.06	1				
Log (education expenditure)	0.157	0.178	0.92	0.082	0.005	0.008	1			
Log (health expenditure)	0.106	0.145	0.114	0.86	0.015	0.096	0.146	1		
Log (physical capital expenditure)	0.056	0.058	0.004	0.028	0.971	0.056	0.018	0.023	1	
Log (social capital expenditure)	0.031	0.038	0.074	0.156	0.033	0.916	0.087	0.196	0.035	1

Note: Number of observations in Panel A 1,603, in Panel B 1,821, in Panel C 2,030, in Panel D 1,895, and in Panel E 1,705.

Table A.3: Descriptive Statistics by Sources of Remittances

	Uganda			Kenya			Nigeria			Burkina Faso			Senegal		
	Internal	African	Out-of-Africa	Internal	African	Out-of-Africa	Internal	African	Out-of-Africa	Internal	African	Out-of-Africa	Internal	African	Out-of-Africa
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)
Log (cash remittances)	4.621	5.534	6.686	5.097	6.232	7.013	5.458	6.262	7.069	3.844	4.427	5.51	6.13	6.293	7.295
	(1.402)	(1.624)	(1.407)	(1.457)	(1.682)	(1.428)	(1.586)	(1.11)	(1.441)	(1.218)	(1.255)	(1.435)	(1.208)	(1.33)	(1.319)
Log (education expenditure)	4.187	4.525	4.469	3.003	3.078	3.511	4.153	4.128	5.152	2.545	2.587	3.738	3.202	3.221	3.793
	(2.393)	(2.616)	(3.011)	(2.745)	(3.02)	(3.18)	(2.73)	(2.611)	(2.861)	(2.049)	(1.933)	(1.667)	(2.095)	(2.184)	(2.38)
Log (health expenditure)	3.116	3.405	3.361	2.465	2.845	3.442	3.433	3.128	3.795	3.479	3.329	4.057	3.851	3.825	4.328
	(1.88)	(1.813)	(2.197)	(2.03)	(2.243)	(2.621)	(2.155)	(2.476)	(2.435)	(1.582)	(1.673)	(2.177)	(1.968)	(1.935)	(2.129)
Log (physical capital expenditure)	0.675	0.406	0.898	0.994	0.745	0.701	1.259	0.677	1.291	0.876	0.785	1.129	0.402	0.722	0.639
	(1.856)	(1.27)	(2.188)	(2.1)	(2.077)	(1.904)	(2.409)	(1.958)	(2.61)	(1.677)	(1.547)	(2.027)	(1.369)	(1.804)	(1.82)
Log (social capital expenditure)	1.184	1.326	1.812	1.571	1.643	1.416	2.154	0.952	1.528	2.329	2.329	4.046	3.762	3.675	4.023
	(1.768)	(1.943)	(2.239)	(1.952)	(2.252)	(2.227)	(2.516)	(2.238)	(2.534)	(1.991)	(2.045)	(2.051)	(2.401)	(2.395)	(2.664)
Observations	183	44	66	331	82	227	459	37	168	314	327	11	278	152	368

Note: a) This table presents the mean and standard deviation of the key variables. b) Standard deviations are presented in parentheses.

Table A.4: Effect of Remittances on Household Investment Decision

	Probit				Recursive Biprobit			
	Human Capital				Human Capital			
	Education (=1 if yes)	Health (=1 if yes)	Physical Capital (=1 if yes)	Social Capital (=1 if yes)	Education (=1 if yes)	Health (=1 if yes)	Physical Capital (=1 if yes)	Social Capital (=1 if yes)
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Panel-A: Uganda								
Received remittances (=1 if yes)	0.198*	-0.058	0.137	0.157*	0.478	0.047	0.730	0.572
	(0.114)	(0.097)	(0.106)	(0.088)	(0.489)	(1.021)	(0.881)	(0.452)
Mean of the outcome variable	0.684	0.792	0.119	0.299	0.684	0.792	0.119	0.299
Observations	1,603				1,603			
Panel-B: Kenya								
Received remittances (=1 if yes)	0.067	0.043	0.259***	0.041	1.311***	1.414***	1.447***	1.332***
	(0.070)	(0.068)	(0.080)	(0.065)	(0.125)	(0.102)	(0.251)	(0.095)
Mean of the outcome variable	0.594	0.676	0.141	0.418	0.594	0.676	0.141	0.418
Observations	1,821				1,821			
Panel-C: Nigeria								
Received remittances (=1 if yes)	0.174**	0.070	0.186***	0.116*	1.205***	-0.632*	1.416***	-1.251***
	(0.068)	(0.068)	(0.070)	(0.062)	(0.137)	(0.337)	(0.183)	(0.073)
Mean of the outcome variable	0.729	0.764	0.185	0.374	0.729	0.764	0.185	0.374
Observations	2,029				2,029			
Panel-D: Burkina Faso								
Received remittances (=1 if yes)	0.282***	0.080	0.000	0.032	1.149***	1.316***	-1.178***	1.401***
	(0.065)	(0.080)	(0.067)	(0.063)	(0.221)	(0.125)	(0.207)	(0.055)
Mean of the outcome variable	0.645	0.875	0.231	0.649	0.645	0.875	0.231	0.649
Observations	1,895				1,895			
Panel-E: Senegal								
Received remittances (=1 if yes)	0.262***	-0.008	0.192**	-0.150**	1.204***	0.270	0.198	1.202***
	(0.071)	(0.081)	(0.094)	(0.071)	(0.383)	(0.417)	(0.760)	(0.140)
Mean of the outcome variable	0.672	0.825	0.096	0.734	0.672	0.825	0.096	0.734
Observations	1,705				1,705			

Note: (a) This table reports the coefficients of our probit and recursive bivariate probit models. (b) Robust standard errors are presented in parentheses. (c) The variable of interest, received remittances, is an indicator that takes one if a household received remittances and zero otherwise. (d) Outcome variables are also indicator variables that equal one if a household made capital investment, and zero otherwise. (e) Control variables are female household head, head is a paid employee, head is self-employed, head has secondary education, head has above secondary education, head's age is 45-60 years, head's age is above 60 years, log household income, number of children in the household, number of elderly in the household, and location is urban. (f) *** p<0.01, ** p<0.05, * p<0.10.

Table A.5: Nonlinear Effect of Remittances Amount on Household Investment Expenditure

	2SLS				2SLS			
	Human Capital				Human Capital			
	Log (Education Expenditure)	Log(Health Expenditure)	Log(Physical Capital Expenditure)	Log(Social Capital Expenditure)	Log (Education Expenditure)	Log(Health Expenditure)	Log(Physical Capital Expenditure)	Log(Social Capital Expenditure)
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Panel-A: Uganda								
Log(Cash remittances)	6.938	0.530	-3.109	-3.317	3.916	2.155	0.177	1.956
	(4.588)	(2.355)	(2.093)	(3.466)	(2.970)	(1.729)	(0.699)	(1.604)
Log(Cash remittances) squared	-0.986	0.045	0.577	0.735				
	(0.809)	(0.408)	(0.366)	(0.620)				
Log(Cash remittances) # High remittance					-2.933	-1.214	0.205	-1.627
					(2.719)	(1.656)	(0.824)	(1.560)
Observations	1,603				1,603			
Panel-B: Kenya								
Log(Cash remittances)	0.867	1.584	0.904	3.852*	0.996*	-0.057	0.507*	0.311
	(1.595)	(1.356)	(1.005)	(2.028)	(0.527)	(0.315)	(0.262)	(0.283)
Log(Cash remittances) squared	-0.032	-0.248	-0.065	-0.573				
	(0.281)	(0.240)	(0.177)	(0.358)				
Log(Cash remittances) # High remittance					-0.931	0.001	0.470	-0.707*
					(0.584)	(0.416)	(0.466)	(0.426)
Observations	1,821				1,821			
Panel-C: Nigeria								
Log(Cash remittances)	6.736	0.171	6.679*	4.603	0.787***	-0.579***	0.517***	-0.596***
	(4.127)	(1.493)	(4.012)	(2.884)	(0.203)	(0.178)	(0.181)	(0.197)
Log(Cash remittances) squared	-0.821	-0.090	-0.831	-0.689*				
	(0.540)	(0.197)	(0.525)	(0.383)				
Log(Cash remittances) # High remittance					-0.162	-1.911	3.061	-2.348
					(1.672)	(2.561)	(3.495)	(2.895)
Observations	2,029				2,029			
Panel-D: Burkina Faso								
Log(Cash remittances)	-1.690	-3.570	2.952	3.977	0.588***	0.517***	-0.248	0.573***
	(2.917)	(4.115)	(3.347)	(3.135)	(0.212)	(0.182)	(0.153)	(0.215)
Log(Cash remittances) squared	0.463	0.863	-0.682	-0.751				
	(0.614)	(0.863)	(0.704)	(0.662)				
Log(Cash remittances) # High remittance					2.096	0.060	0.565	0.300
					(2.325)	(1.659)	(1.551)	(1.624)
Observations	1,895				1,895			
Panel-E: Senegal								
Log(Cash remittances)	2.999	-1.285	-5.129	-7.571	-0.753	0.428	-0.293	-0.112
	(2.592)	(1.823)	(3.366)	(4.902)	(0.525)	(0.335)	(0.239)	(0.369)
Log(Cash remittances) squared	-0.415	0.190	0.645	0.969				
	(0.348)	(0.244)	(0.448)	(0.655)				
Log(Cash remittances) # High remittance					8.061	-3.989	2.626	1.752
					(6.029)	(3.602)	(2.747)	(4.266)
Observations	1,705				1,705			

Note: (a) This table reports 2SLS estimates. (b) Robust standard errors are presented in parentheses. (c) Outcome variables are capital investment expenditure in US dollar (in log scale) in past 12 months. (d) The variable of interest is amount of cash remittances received in US dollar (in log scale) in last 12 months. Columns 1-4 includes amount of cash remittances received in US dollar (in log scale) squared. Columns 5-8 includes an indicator of high remittances (above district level average remittances) and an interaction between cash remittances received (in log scale) and high remittances. (e) Control variables are female household head, head is paid employee, head is self-employed, head has secondary education, head has above secondary education, head's age is 45-60 years, head's age is above 60 years, log household income, number of children in the household, number of elderly in the household, and location is urban. (f) *** p<0.01, ** p<0.05, * p<0.10.

Appendix B

Migration, Remittances and Labour Force Participation: Evidence from Sub-Saharan Africa

Table B.1: Origin-Destination Country Matrix for Sub-Saharan Africa Migrants

Destination country (down), Origin country (across)				
Nigeria	**Kenya**	**Uganda**	**Senegal**	**Burkina Faso**
Nigeria(Urban)	Kenya (Urban)	Uganda(Urban)	Senegal (Urban)	Burkina Faso (Urban)
Nigeria (Rural)	Kenya (Rural)	Uganda (Urban)	Senegal (Urban)	Burkina Faso (Urban)
United Kingdom	United Kingdom	Australia	United Kingdom	Cote d'Ivoire
United States	Tanzania	Burundi	United States	Mali
Germany	United States	Canada	Germany	Niger
Italy	Uganda	Congo, Dem. Rep.	Italy	Ghana
Canada	Canada	France	Canada	Togo
Netherlands	Germany	Germany	Netherlands	Benin
Spain	Australia	India	Spain	Nigeria
Belgium	India	Iraq	Belgium	Gabon
France	Netherlands	Japan	France	Libya
Cote d'ivoire	Italy	Kenya	Cote d'Ivoire	Italy
Ghana	Rwanda	Libya	Ghana	France
South Africa	United Arab Emirates	Rwanda	Nigeria	Germany
Mali	South Africa	South Africa	South Africa	Switzerland
Togo	Sudan	Sudan	Mali	United States
Benin	Norway	Tanzania	Niger	
Senegal	United Arab Emirates	United Arab Emirates	Togo	
	Congo, Dem. Rep.	United Kingdom	Benin	
	Liberia	United States	Gabon	
	Sweden		Gambia, The	
	Israel		Morocco	
	Belgium		Mauritania	
	Switzerland		Guinea	
	China		Guinea-Bissau	
	Saudi Arabia		Burkina Faso	
	Somalia			
	Libya			
	Zimbabwe			
	France			
	Tanzania			
	Ethiopia			
	Netherlands			
	Denmark			
	Iraq			
	Egypt, Arab Rep.			
	Russian Federation			

Source: World Bank, African Migration Project (2009)

Table B.2: Top 20 destination countries (Bilateral Migration 2017)

Destination country (down), Origin country (across)				
Nigeria	**Kenya**	**Uganda**	**Senegal**	**Burkina Faso**
United States	United States	Kenya	Gambia, The	Cote d'Ivoire
United Kingdom	United Kingdom	South Sudan	France	Ghana
Cameroon	Uganda	Rwanda	Italy	Mali
Niger	Tanzania	United Kingdom	Spain	Niger
Ghana	Canada	United States	Mauritania	Togo
Italy	South Africa	Tanzania	United States	Italy
Benin	Australia	Canada	Gabon	Benin
Cote d'Ivoire	Germany	South Africa	Cote d'Ivoire	France
Spain	South Sudan	Congo, Dem. Rep.	Congo, Rep.	Nigeria
Togo	Italy	Sweden	Mali	Gabon
Canada	Sweden	Australia	Guinea-Bissau	Germany
South Africa	Switzerland	Germany	Cameroon	Belgium
Germany	Netherlands	Netherlands	Belgium	Spain
Ireland	Sudan	Botswana	Canada	Canada
Gabon	Rwanda	Malaysia	South Africa	Kenya
Sudan	India	Eritrea	Nigeria	Switzerland
United Arab Emirates	Norway	Sudan	Guinea	Guinea
Chad	Guinea	Denmark	Germany	United States
Mali	France	Norway	Burkina Faso	Russian Federation
Australia	New Zealand	Italy	Central African Republic	Netherlands

Source: World Bank Bilateral Migration Matrix 2017

Table B.3: IV Probit Estimates of Effect of International Remittances on Labour Supply

Dependent Variable: Labour Force Participation (=1 if yes)		
	Coefficients	Marginal Effects
	(1)	(2)
Panel A: Nigeria		
Received remittances (=1 if yes)	0.764*	0.217*
	(0.399)	(0.124)
Controls	Yes	Yes
District Fixed Effects	Yes	Yes
Mean of the outcome variables		0.587
Observations		7,502
Panel B: Kenya		
Received remittances (=1 if yes)	-0.511	-0.154
	(0.402)	(0.127)
Controls	Yes	Yes
District Fixed Effects	Yes	Yes
Mean of the outcome variables		0.654
Observations		4,564
Panel C: Uganda		
Received remittances (=1 if yes)	-0.194	-0.050
	(0.261)	(0.067)
Controls	Yes	Yes
District Fixed Effects	Yes	Yes
Mean of the outcome variables		0.660
Observations		4,735
Panel D: Senegal		
Received remittances (=1 if yes)	-0.517***	-0.157***
	(0.186)	(0.059)
Controls	Yes	Yes
District Fixed Effects	Yes	Yes
Mean of the outcome variables		0.541
Observations		9,446
Panel E: Burkina Faso		
Received remittances (=1 if yes)	0.278**	0.069**
	(0.122)	(0.030)
Controls	Yes	Yes
District Fixed Effects	Yes	Yes
Mean of the outcome variables		0.764
Observations		8,205

Note: a) This table reports the estimates of IV-probit estimation. (b) Standard errors are clustered at the household level and appear in parentheses (c) The treatment variable is a binary indicator variable that equals one if the household received remittances and zero otherwise. (d) The outcome variable is labour supply at the extensive margin. It is a binary indicator variable that equals if the individual participates in the labour market (employed, self-employed or looking for a job) and zero otherwise (e) Control variables are age, age squared, gender, marital status, education, asset index, share of household members below 15 years, share of household members above 65 and household's location. (f) IV probit coefficients are in column (1) and marginal effects are in column (2) (g) *** p<0.01, ** p<0.05, * p<0.10.

Table B.4: Descriptive Statistics for Left Behind Individuals by Household Migration Status

Variables	Nigeria		Kenya		Uganda		Senegal		Burkina Faso	
	Non-Migrant Household	Migrant Household	Non-Migrant Household	Migrant Household	Non-Migrant Household	Migrant Household	Non-Migrant Household	Migrant Household	Non-Migrant Household	Migrant Household
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Labour Force Participation (LFP)=1	0.578	0.610**	0.677	0.653	0.662	0.647	0.573	0.501***	0.766	0.761
Paid employment=1	0.265	0.347***	0.392	0.351**	0.281	0.420***	0.213	0.165***	0.063	0.067
Self employment=1	0.468	0.433**	0.394	0.327***	0.532	0.466***	0.461	0.381***	0.762	0.760
Age	32.622	33.028	31.273	33.174***	30.963	30.821	32.407	31.478***	32.419	32.640
Female=1	0.496	0.477	0.525	0.541	0.520	0.519	0.541	0.597***	0.559	0.565
Married=1	0.616	0.474***	0.591	0.477***	0.531	0.461***	0.545	0.540	0.728	0.690***
Remittances amount (in USD)	7.679	2027.72***	27.212	2123.271***	16.596	1149.3***	128.908	2055.489***	19.227	141.169***
International Remittances==1	0.013	0.653***	0.019	0.658***	0.024	0.489***	0.062	0.788***	0.088	0.581***
No formal educ=1	0.298	0.070***	0.110	0.120	0.428	0.267***	0.528	0.518	0.828	0.832
Primary Education=1	0.182	0.153***	0.373	0.276***	0.299	0.262*	0.213	0.196*	0.101	0.097
Secondary Education=1	0.372	0.461***	0.336	0.350	0.178	0.243***	0.198	0.235***	0.066	0.068
Post Secondary Education=1	0.148	0.316***	0.182	0.254***	0.095	0.228***	0.062	0.051**	0.005	0.003
Share of children below 15	0.336	0.220***	0.317	0.208***	0.362	0.286***	0.348	0.364***	0.472	0.474
Share of adults above 65	0.021	0.026***	0.011	0.026***	0.018	0.019	0.020	0.022	0.025	0.032***
Urban=1	0.449	0.508***	0.493	0.539***	0.419	0.702***	0.648	0.644	0.056	0.051
Observations	5449	2053	1540	1729	4060	675	5365	4081	4907	3298

Note: a) This table presents the mean of key variables. (b) We carry out a t-test for difference in means between the two groups. Difference = non-recipient household – recipient household. $H_0 : difference = 0$ and $H_1 :\neq 0$. (c)*** p<0.01, ** p<0.05, * p<0.10. Notes: ***p<0.01, **p<0.05, *p<0.10

Table B.5: Top 10 Trading Partners for Migrants Origin Country as of 2007

Trading partner (down), Reporting country (across)				
Nigeria	**Kenya**	**Uganda**	**Senegal**	**Burkina Faso**
USA	United Arab Emirates	United Arab Emirates	France	Cote d'Ivoire
Belgium	USA	Kenya	Nigeria	France
India	India	India	Mali	China
China	United Kingdom	China	Netherlands	Switzerland
Brazil	China	Japan	India	India
France	Japan	South Africa	China	USA
Germany	Uganda	Fmr Sudan	Thailand	Ghana
South Africa	South Africa	United Kingdom	Spain	Belgium
United Kingdom	Netherlands	Germany	Italy	Togo
Italy	United Rep. of Tanzania	Dem. Rep. of the Congo	Brazil	Germany

Note: Computed by author using data from COMTRADE

Appendix C

Remittances and Household Dependence: Evidence from Bangladesh

Table C.1: Remittance Dependence by Migrant Destination

Destination	Remittance Dependence (=1 if Yes)			Log (Non-remittance Income)			Change in Economic Fitness
	N	Mean	Std. Dev.	N	Mean	Std. Dev.	
Bahrain	202	0.287	0.454	144	10.459	1.214	0.024
Brunei	15	0.200	0.414	12	11.315	1.212	0.027
Greece	33	0.333	0.479	20	10.745	0.951	-
Iraq	14	0.286	0.469	10	11.079	1.182	0
Italy	128	0.234	0.425	95	10.911	1.085	-0.131
Jordan	13	0.462	0.519	7	10.041	1.234	0
kuwait	489	0.217	0.412	379	10.433	1.266	0
Lebanon	17	0.353	0.493	11	10.251	1.22	0
Libya	39	0.154	0.366	32	10.414	1.109	-
Malaysia	1,323	0.222	0.416	1,013	10.505	1.188	0.277
Maldives	85	0.200	0.402	66	10.616	1.079	-0.047
Oman	586	0.358	0.480	363	10.447	1.11	0.013
Qatar	145	0.310	0.464	98	10.601	1.243	0
Saudi Arabia	3,002	0.267	0.443	2,177	10.427	1.254	0.036
Singapore	381	0.192	0.394	306	10.828	1.233	-
South Afr	50	0.100	0.303	45	11.193	1.183	0.103
Spain	12	0.167	0.389	10	11.285	1.345	0.018
Syria	56	0.214	0.414	43	10.974	1.066	0.28
United Arab Emirates	2,061	0.304	0.460	1,410	10.536	1.19	0.071
United Kingdom	94	0.160	0.368	79	11.088	1.183	-0.145
United States	48	0.083	0.279	43	11.285	1.082	-

Table C.2: Effect of Remittances on Households' Dependence using Alternative Definitions

	Remittance Dependence (=1 if Yes)	
	Probit	IV-Probit
	(1)	(2)
Panel A		
Top Quintile Remittances (=1 if Yes)	-0.113**	-1.244***
	(0.047)	(0.322)
Marginal effect	[-0.030]	[-1.244]
Controls	Yes	Yes
District fixed effects	Yes	Yes
First-stage F-statistics	-	71.35
Observations	9,205	8,985
Panel B		
Top Tercile Remittances (=1 if Yes)	-0.070*	-1.116***
	(0.041)	(0.295)
Marginal effect	[-0.019]	[-1.116]
Controls	Yes	Yes
District fixed effects	Yes	Yes
First-stage F-statistics	-	78.39
Observations	9,205	8,985

Note: (a) This table present the effect of remittances on household dependence on remittance income. (b) The treatment variable is log(remittances). (c) Outcome variable in columns 1-2 is an extensive margin indicator of remittance dependence that equals one if household has no other income except remittances, and zero otherwise. (d) Outcome variable in columns 3-4 is an intensive margin indicator of remittance dependence (i.e., log(non-remittance income)). (e) Columns 1 and 3 show ordinary least square (OLS) estimates and columns 2 and 4 show two-stage instrumental variable estimates. (f) Standard errors are clustered at the household level and appear in parentheses. (g) All columns include district fixed effects. (i) The list of controls are household head's characteristics, household characteristics, and migrant's characteristics included in Table 4.1. (j) ***Significant at the 1 percent level, **Significant at the 5 percent level, and *Significant at the 10 percent level.

Table C.3: Principal Components

Factors	Component	Unexplained
Healthy Sanitation Facility (=1 if yes)	0.617	0.532
Healthy Cooking Facility (=1 if yes)	0.532	0.653
Healthy Lighting Facility (=1 if yes)	0.580	0.587
Healthy Water Facility (=1 if yes)	-0.015	1.000

Table C.4: Macroeconomic Fundamentals for Key Destination Countries

Destination	Change in Economic Fitness (2011/2012)	GDP Growth 2012	Average Employment rate (2011/2012	Share of migrants (2017)	Bangladeshi Migrants (2017)
Bahrain	0.024	3.728	70.319	6.723	100,444
Brunei	0.027	0.913	61.250	0.535	2,269
Greece	-	-7.087	39.541	0.157	16,871
Iraq	0.023	13.936	37.727	0.000	0
Italy	-0.131	-2.981	43.853	0.184	111,309
Jordan	0.011	2.429	34.719	0.120	11,715
Kuwait	0	6.626	69.987	9.410	381,669
Lebanon	0	2.565	39.533	0.055	3,747
Libya	-	86.827	38.663	0.019	1,277
Malaysia	0.277	5.473	60.659	1.175	365,600
Maldives	-0.047	2.517	49.320	9.660	47,951
Oman	0.013	8.863	63.889	5.926	276,518
Qatar	0	4.730	86.830	5.996	163,386
Saudi Arabia	0.036	5.411	51.133	3.496	1,157,072
Singapore	-	4.435	67.213	1.484	83,279
South Africa	0.103	2.396	39.524	0.007	4,182
Spain	0.018	-2.959	44.938	0.029	13,457
Syria	0.28	-26.339	39.670	0.000	0
UAE	0.071	4.484	77.755	11.010	1,044,505
United Kingdom	-0.145	1.470	57.557	0.374	247,000
United States	-	2.281	57.659	0.072	234,640

Note: Computed by author using data from World Bank World Development Indicators

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