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The Empirical Analysis of the Determinants of Migration and Remittances in Kenya and the Impact on Household Expenditure Patterns.

Farai Jena

Declaration

I hereby declare that this thesis has not been, and will not be, submitted in whole or in part to another University for the award of any other degree.

Signature:

Farai Jena

Abstract

This thesis conducts empirical analysis on the determinants of migration and remittance sending decisions in Kenya and the impact on the expenditure patterns of households using cross-sectional household survey data. The first empirical chapter explores the factors that influence the subsequent migration decisions of Kenyan siblings using binary logit models. The findings reveal that preceding sibling migrants have a strong negative effect on the probability of migration for other siblings. Evidence in support of migration as a joint household level decision is obtained as preceding sibling and non-sibling migrants are found to exhibit similar effects. Conditional on migrating, siblings are shown to utilize existing sibling networks by moving to the same internal or external destination as preceding migrants. Discrete failure time models are also employed so as to account for any neglected heterogeneity at the household level. Controlling for neglected heterogeneity, the overall effect of preceding sibling migrants is found to be statistically insignificant. However, non-sibling migrants are found to decrease the probability of migrating. The second empirical chapter examines the remittance behaviour of multiple compared to sole sibling migrants, and the motivations of Kenyan siblings in sending remittances to their household of origin. No evidence of selection bias in the decision to remit is detected when a Heckman selection model is estimated. Using probit and OLS models, the presence of other siblings is found to decrease the probability of remitting but to have no effect on the amount of remittances sent. The amount of remittances sent by other siblings is also found to have no statistically significant effect on the remittances sent by a sibling using IV regression methods. In the third empirical chapter, the expenditure patterns of Kenyan households are investigated according to whether the household is a migrant or non-migrant household, and whether a migrant household is in receipt of remittances or not using an Almost Ideal Demand System (AIDS) approach. The analysis reveals that remitters who are spouses and siblings of the household have higher bargaining power towards the allocation of remittances to physical investments and durable goods, respectively. The expenditure patterns also show that remittances are not pooled together with general income when allocating the household budget towards durable goods and physical investments. In addition, the findings reveal that the reported uses of remittances by Kenyan households contrast with their actual uses. In the fourth chapter, the uses of remittances for the acquisition of physical investments and durable goods are analysed in more detail using IV and bivariate probit models. Remittances are found to be exogenous for the durable goods category but endogenous for physical investments. The evidence obtained is supportive of remittances being used by households to purchase these categories of commodities.

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Finally, I would not have completed this PhD without the help of God. I am thankful that He graced me with strength to "do all things through Christ who strengths me" (Philippians 4:11).

This thesis is dedicated to my mother Tabeth Spiwe Jena (1960 – 1996).

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1 Introduction

The current thesis conducts empirical analysis on the factors that determine the migration and remittance sending behaviour of Kenyan siblings using cross-sectional household survey data. The uses of remittances and their impact on the expenditure patterns of Kenyan households are also investigated.

Globally, in 2013 there were 136 million international migrants in developed regions and 96 million in developing ones (United Nations 2013). Approximately 60% and 86% of the international migrants in developed and developing regions, respectively, originated from a developing country. Bilateral migration data from the World Bank indicate that in 2010, about 31 million Africans were living in countries other than the ones in which they were born (Ratha *et al.* 2011). However, it is acknowledged that these official migration figures are significantly underestimated because there are major gaps in the reported data. Officially recorded remittances to developing countries were estimated at USD 414 billion in 2013, an increase of about 6.3% over the previous year (Ratha *et al.* 2013). In Sub-Saharan Africa, the volume of remittances has increased steadily over the years, doubling in the most recent decade compared to the previous one, and surpassing private equity investments. Remittances have been more stable than foreign direct investment, private debt and equity flows in Sub-Saharan Africa (Gupta *et al.* 2009, Singh *et al.* 2011, and see Figure 1.1). In 2013 remittances to Sub-Saharan Africa were equivalent to 2.02 per cent of GDP, slightly more than the 1.8 per cent average for all developing regions (Ratha *et al.* 2011). Surveys of migrants, remittance recipients and other secondary sources suggest that informal remittance flows, which are not included in official estimates, could be equivalent to or exceed official figures for Sub-Saharan Africa (Page and Plaza 2006). The scale of global migrant and remittance flows exemplifies the importance of understanding the determinants of migration and remittances, and the mechanisms through which they potentially contribute to development.

Despite acknowledgements that it can be difficult to separate the effect of remittances from the overall effect of migration in empirical studies (McKenzie and Sasin 2007), it is argued that the primary economic benefits of migration accrue through the receipt of remittances (World Bank

2006, Ratha *et al.* 2011). At the macro-level, remittances are a vital source of finance for developing countries. Unlike other private capital flows, remittances tend to be counter-cyclical and act as a cushion or source of insurance against macroeconomic shocks in the receiving countries (Chami *et al.* 2009). For example, remittances increased during the financial crises in Mexico, Indonesia and Thailand (Ratha 2007). Remittances also tend to increase with natural disasters and political crises (Yang and Choi 2007, Yang 2008, Mohapatra *et al.* 2012). Remittance flows, therefore, behave differently from most other flows which tend to be pro-cyclical (Ratha 2003, Frankel 2011), mainly because they are predominantly sent between members of the same household and hence not driven by profit-seeking motives to the same extent as private capital flows (Ratha *et al.* 2011). Remittances are also not susceptible to the changing priorities and economic situation of official aid donors (World Bank 2006). They can also improve sovereign creditworthiness by increasing the level and stability of foreign exchange receipts (Ratha 2007). In addition, remittances can enhance economic growth by increasing consumption, improving human and physical capital investment levels, and contributing towards stabilizing consumption and output at both the household and macroeconomic level (Chami *et al.* 2009, Mohapatra *et al.* 2012).

Figure 1.1: Remittances and other resource flows to Sub-Saharan Africa (1990-2013)
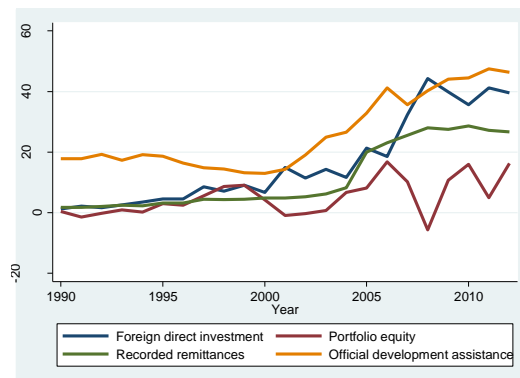
Source: Author's calculations based on data from World Development Indicators (May 2014) database.

However, some negative macro-level effects have been associated with the inflow of remittances. For example, remittances could reduce growth by causing the real exchange rate to appreciate thus reducing trade competitiveness (World Bank 2006, Acosta *et al.* 2011, and Gupta *et al.* 2009). The receipt of remittances may also reduce the supply of labour, though the evidence for this is not very convincing, especially for African countries (Azam and Gubert 2006). Clemens and

McKenzie (2014) illustrate how difficult it can be to detect the actual effect of remittances on economic growth. For example, changes in the measurement of remittances may account for a large proportion of the increase in recorded remittances, rather than changes in real financial flows. Also, cross-country panel regressions may have insufficient power to identify the true effect of remittances on growth. In addition, the growth in remittance inflows predominantly arises from the growth in the migrant stock. Thus, remittance receiving countries incur an opportunity cost which, if netted out, leaves remittances having a lesser impact on macroeconomic growth.

At the micro level, remittances have the potential to reduce poverty, raise household investment and increase access to health and education services (Ratha *et al.* 2011). Empirical studies generally reveal that remittances have reduced the share of people living in poverty in developing countries. The body of evidence compiled from 71 developing countries by researchers at the World Bank suggests that, on average, a 10 per cent increase in the share of international migrants in a country's population will lead to a 2.1 per cent decline in the share of people living in poverty (i.e., living on less than USD 1 per person per day) (Adams and Page 2005). The same research indicates that a 10 per cent increase in per capita formal international remittances will produce a 3.5 per cent decline in the share of people living in poverty. Anyanwu and Erhijakpor (2010), exploiting a sample of 33 African countries for the period 1990 to 2005, find that a 10 per cent increase in formal international remittances as a share of GDP not only led to a 2.9 per cent decrease in the share of people living in poverty but also to declines in the depth and severity of poverty.[1] Similar findings of the positive developmental roles of migration and remittances echo across many quantitative and qualitative studies in the literature.

Overall, there exists a large body of literature indicating that migration and remittances have a positive impact on the living standards of people in developing countries. Yet, country-specific policy frameworks related to migration and remittances remain relatively weak, especially for countries in Sub-Saharan Africa. A majority of central banks in Sub-Saharan Africa cite the need for better statistics and more studies on migration and remittances in order to improve the efficiency

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[1] The study corrects for the possible endogeneity of international remittances by using lags of the level of international remittances received as instrumental variables.

and delivery of remittances (Irving *et al.* 2010). There remain gaps in the understanding of the factors that drive migration and remittance flows as well as the impact that migration and remittances have at the household level. Therefore, there are a number of countries for which sound empirically based evidence is absent. More country specific empirical evidence is required so that policymakers are not confined to generalizing policies related to migration and remittances based on findings drawn from research conducted in other contexts. Furthermore, factors that influence migration and remittance trends tend to evolve over time. It is therefore imperative for scholars to conduct research that is both up-to-date and relevant to the context in which they intend to inform and influence policy. The objective of this thesis is to achieve this for the case of Kenya.

Kenya is a particularly compelling context to undertake empirical research on migration and remittances as the few studies that have conducted such research hitherto are quite dated and largely restricted to internal migration (e.g., Hoddinott 1994 and 1992, Knowles and Anker 1981, Johnson and Whitelaw 1974) though there are some relatively recent studies as well (e.g., Simiyu 2013). At the same time, the migration of Kenyans has increased over the past two decades. Recent evidence suggests that Kenyans living abroad represent 1.1% of the national population (World Bank 2011), with many profitably engaged in the socio-economic sectors of their host countries (Kinuthia and Akinyoade 2012). In addition, external remittances are the fourth-largest source of foreign exchange for the Kenyan economy after revenue from tea, horticulture and tourism (Bett 2013). And while revenue from tea and coffee exports has diminished in the past five years, the inflow of remittances has continued to increase. On average, Kenya receives 60 per cent of remittances to East Africa and 10 per cent of remittances to Sub-Saharan Africa (Ngugi 2011).

The Kenyan government largely recognizes the importance of migration. This is reflected by the incorporation of a diaspora policy in Kenya Vision 2030 - a national long-term development blue-print whose objective is to transform Kenya into a newly industrialising middle-income country by 2030. The objective of the diaspora policy is to provide the necessary legal and institutional framework for Kenyans living abroad to participate in the development of the country.

However, the dearth of evidence-based studies could decelerate the Kenyan government's progress in achieving its targets of harnessing the developmental potential of migration and remittances. Therefore, empirical studies can potentially complement government efforts to achieve these targets by enhancing the understanding of migration and remittance drivers in Kenya and flagging critical issues.

The current thesis conducts empirical analysis with the objective of enhancing the understanding of factors that determine migration and remittance sending decisions in Kenya in light of the aforementioned factors. In addition and importantly, the impact that remittances have on the expenditure patterns of Kenyan households is also examined. The thesis is organized into eight chapters. The next chapter provides an overview of the prevailing migration trends in Kenya, highlighting notable variations in these trends according to gender and type of migration. The patterns of remittance flows within Kenya and from external destinations are also the subject of discussion.

The data used to conduct the empirical analysis undertaken in this thesis are then discussed in chapter 3. The source, scope and coverage of these data, as well as the sampling framework and the survey design are reviewed. We also explain why the data are suitable for the current thesis and flag some of their limitations.

Chapter 4 conducts empirical analysis to investigate the determinants of Kenyan subsequent sibling migration decisions. Specifically, we determine what effect the presence of a preceding sibling migrant has on the probability of migration for other siblings. As per the new economics of labour migration (Stark and Bloom 1985), the migration of siblings is viewed from the perspective of the household. We thus interpret sibling migration as primarily motivated by the household desire to maximise expected net returns to migrating with networks facilitating subsequent migration, and/or the household need to minimize risk through diversifying income sources. We also investigate whether there are any gender differentials in the decisions of sibling migration and if migration motivations vary according to the type of migration (i.e., internal or external).

Chapter 5 examines the remittance behaviour of Kenyan multiple compared to sole sibling migrants, and the motivations of siblings in sending remittances to their household of origin. Empirical analysis are undertaken to ascertain whether the probability of remitting and the amount of remittances sent are influenced by the presence of other sibling migrants.

In chapter 6, we investigate the expenditure patterns of Kenyan households according to whether the household is a migrant or non-migrant household, and whether a migrant household is in receipt of remittances or not. The relative bargaining powers of remitters are investigated by determining whether different types of remitters (i.e., spouse, sibling or another relative of the household) exert differential impacts on the household allocation of remittances to budget shares. An investigation is also undertaken to ascertain whether Kenyan migrant households pool their remittance and general income together when allocating it to expenditure. Finally, an analysis comparing what Kenyan households report to have spent using the remittances they received to what they actually apportion their general income to expenditure is conducted. The analysis determines whether the reported uses of remittances are analogous to the actual uses.

We then narrow down the analysis of the uses of remittances by households to physical investments and durable goods in chapter 7. An investigation is undertaken to determine whether remittances should be treated endogenously within this framework. The analysis conducted addresses some of the shortcomings encountered in chapter 6 and enables a clarification of the uses of remittances for the acquisition of durable goods and physical investments.

Finally, chapter 8 summarizes the overall contribution of the research and suggests policy recommendations that emanate from it. The limitations of the research are also discussed in this chapter and an agenda for future research on the themes examined in this research proposed.

2   A Background of Migration and Remittance Patterns in Kenya

2.1   Migration patterns

2.1.1   Internal migration patterns

Historically, internal migration in Kenya has been dominated by rural-to-rural and rural-to-urban migration. Two main factors have propelled rural-to-rural migration. Firstly, soon after the attainment of independence in 1963, resettlement programs promoted the migration of indigenous Kenyans to areas of the country formerly reserved for white settlement during the colonial era. The large flows of migrants associated with resettlement programmes were largely one-off and terminated following the exodus of white-settler farmers in the years after independence. A second factor that has driven rural-to-rural migration has been the search for agricultural employment within the commercial farming sector. There is evidence suggesting that since 1963 migration flows for the purposes of working on large commercial farms have stagnated (see Knowles and Anker 1977).

The third and most prevalent type of internal migration in Kenya is rural-to-urban migration for the purpose of obtaining non-agricultural employment in the urban sector (Knowles and Anker *op. cit.*). Rural-to-urban migrants tend to be younger and more educated than rural-to-rural migrants. Figure 2.1 illustrates migrant education levels by province. It reveals that the proportion of migrants who never attained any education is highest in the largely rural North Eastern province at 54% and lowest in Nairobi province at 5%. The proportion of migrants with secondary and university education is highest for Nairobi province. Given that the current demographic profile in Kenya reflects a younger and better educated population, the current scale of rural-to-urban migration is projected to continue (Black and King 2004). Rural-to-urban migration is generally perpetuated by regional economic disparities (NCPD 2011). Agesa and Kim (2001) report that rural-to-urban migration is so prevalent in Kenya that migrants now comprise about 70% of the urban labour force.

Nairobi, Coast and Rift Valley were provinces of net in-migration for the period 1979-1999 (see Figure 2.2). These regions tend to be highly attractive for migrants due to the presence there of formal and informal industrial sectors. Conversely, over the same time period, Central, Eastern, Nyanza and Western were provinces of net out-migration (see Figure 2.3) due to their lack of economic activity. Other factors that drive rural-to-urban migration include high rural unemployment rates, particularly among the youth (IMF 2010), inequality at the community level, adverse climate conditions such as droughts and unpredictable rainfall, high population growth, and political instability (Ghai 2004).

Figure 2.1: Provincial distribution of migrants by education level
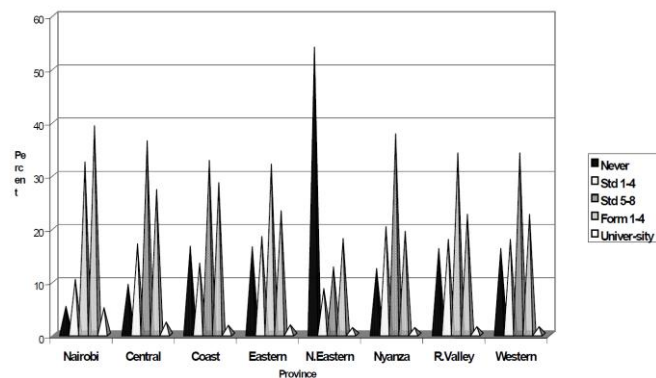
Source: Central Bureau of Statistics (2002).

Figure 2.2: In-migration trends by region (1979-1999)
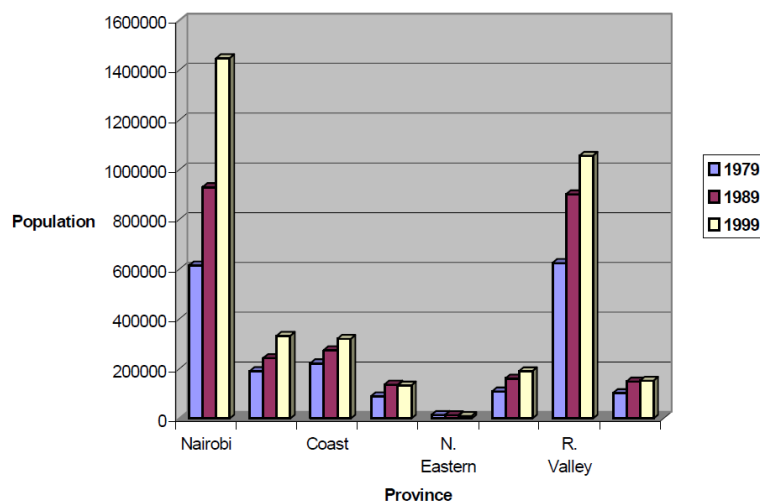
Source: Central Bureau of Statistics (2002).

Figure 2.3: Out-migration trends by region (1979-1999)
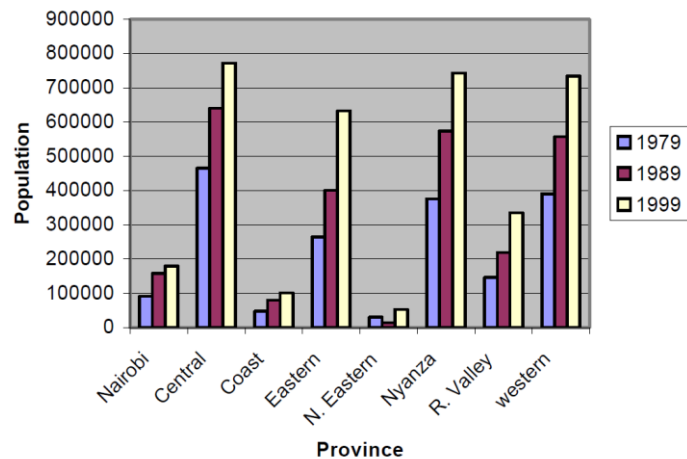
2.1.2   External migration patterns

In the aftermath of independence in 1963, a few Kenyans travelled abroad, mainly to the UK, in search of further education and training. These migrants returned to Kenya to fill high-level government and private sector jobs that became vacant with the replacement of a colonial administrative structure. Between 1963 and 1978, the first post-independence government under President Jomo Kenyatta funded many young Kenyans to receive higher education abroad with job guarantees upon return. The UK was a popular destination due to strong colonial ties and a similar education system as well as countries as diverse as the US and the Soviet Union. By the 1970s, India also emerged as a popular destination for Kenyans who could not independently finance their higher education in the US, the Soviet Union or the UK. Since then, the diversification of work and study destinations has continued with the US and Canada assuming greater popularity (Okoth 2003).

In the 1980s and 1990s, President Daniel Arap Moi introduced free universal primary education. However, by the 2000s higher education institutions could not meet the resultant demand and many Kenyans migrated abroad in pursuit of education. At the same time, the economy started to stagnate owing to government mismanagement and the failure of structural adjustment programs resulting in high levels of unemployment and under-employment. This led to widespread poverty that resulted in over half of the population living below the poverty line of USD 1 per day (Kagochi and Kiambigi 2012). General elections were characterised by politically

motivated ethnic violence. Driven by the need for political and economic freedom, many highly

qualified Kenyans migrated to Western Europe and to countries such as South Africa, Botswana,

Uganda, Australia, Canada, and the US. Kenyans also began taking low-skilled jobs such as bus

drivers, domestic servants, cruise ship attendants, and security guards in the Gulf States of Saudi

Arabia, Qatar, and Bahrain. The recruitment of Kenyan secondary and high school teachers to fill

shortages in locations such as the Comoros Islands, Seychelles, Rwanda, Burundi, and the Congo

also became a feature of the migration flows in the 1990s (Okoth 2003).

Presently, external migration continues in Kenya and mainly consists of cross border flows

within the East-African sub-region and movements to countries in the OECD region, and is largely

driven by the search for economic and educational opportunities (Black and King 2004). Figure 2.4

shows the trajectory from 1960 to 2000 in the stock of Kenyan migrants in the top five host

countries in 2000. It reveals a huge increase of Kenyans resident in the UK and sharp declines in

the number in Uganda and Tanzania. In 2010, the UK, Tanzania, the US, Uganda, Canada,

Australia, Germany, India, the Netherlands and Switzerland were the top 10 destination countries

for migrants (World Bank 2011).

Figure 2.4: Stocks of Kenyan born migrants in top five host countries
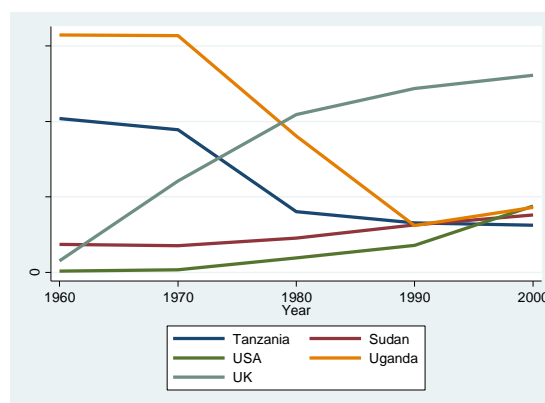
Source: Author's calculations based on statistics from the Global Bilateral Migration World Bank database accessed in
May 2014 (see Özden *et al.* 2011).

One of the main concerns among policymakers has been the migration of large numbers of

highly skilled workers from Kenya (Clemens 2007). According to Clemens (*op. cit.*), about 51% of

Kenyan physicians and 8% of nurses were resident in OECD countries in 2000 (mainly the UK, the

US, and Canada). The migration of skilled labour is also reflected by the fact that among the

255,000 Kenyans residing in OECD countries in 2010/11, 42% were highly educated (OECD-UNDESA 2013). In addition, a large number of Kenyans living in OECD countries in 2009 were in employment thus reflecting economic-driven migration motives.

Cross-border migration is also common within the East Africa sub-region as migrants search for better job and educational opportunities, and engage in trade (Black and King 2004, Masinjila 2009, Bell and Muhidin 2009). According to the United Nations Development Programme (2013), the number of qualified people in Kenya far exceeds the number of graduate-level jobs available and school leavers increasingly find themselves either unemployed or under-employed thus perpetuating the migration flows to other regions within Kenya and abroad. For example, in recent years Tanzania experienced a rise in employment opportunities owing to an increase in foreign direct investment and privatization. Given the local Tanzanian workforce lacks the skills required to take advantage of these opportunities, many Kenyans have migrated into the country to exploit these opportunities. Kenyan experts and entrepreneurs are also increasingly migrating to Rwanda and Burundi where the demand for skilled labour is high given buoyant economic growth and where the business sector is less competitive (Kanyangoga 2010).

The re-introduction of free primary education in 2003 has also perpetuated external migration due to the resultant increased demand for higher education. Kenyans often view the level of formal education as one of the most important factors determining economic success in life (Berg-Schlosser 1984). Thus, external migration in Kenya has been linked with the pursuit of higher education abroad owing to limited access to indigenous institutions of higher education (Okoth 2003). In 2012 about 13,573 Kenyan students were enrolled in universities abroad, mainly in the US, the UK, Australia, India and Germany (UNESCO 2014).

Table 2.1 provides statistics for the profile of Kenyan external migrants for the years 2000 and 2005. The statistics indicate that there are no large differences between the numbers of male and female Kenyans living abroad. Also, the majority of Kenyans residing abroad are between the ages of 25 and 64. In addition, individuals with relatively high education levels comprise a higher proportion of migrants in OECD destinations.

Table 2.1: People born in Kenya living abroad

| Population 15+ | 2000 | | | | | | 2005 | | |
| | All destinations | | | OECD destinations | | | OECD destinations | | |
	M	F	All	M	F	All	M	F	All
Emigrant population (thousands)	127	138	265	100	99	199	114	117	231
Recent emigrants (thousands)				11	10	21	19	20	39
15-24 (%)	15	17	16	11	11	11	11	11	11
25-64 (%)	79	77	78	84	83	84	83	81	82
65+ (%)	5.7	6.4	6.1	5	5.5	5.2	6.7	8.1	7.4
Low-educated (%)	35	45	40	24	30	27	16	27	22
Highly educated (%)	36	26	30	43	34	39	53	40	47
Total emigration rates (%)	1.4	1.5	1.5	1.1	1.1	1.1	1.1	1.1	1.1
Emigration rates of the highly educated (%)	13	21	16	13	21	15	14	20	16

Source: OECD migration statistics.

2.1.3   Gender differentials in migration patterns

Some of the determinants of migration in Kenya have been shown to differ by gender. Bigsten (1996) shows that while employment-related reasons are the major drivers of male migration, marriage is the dominant reason for females. In general, the literature suggests that in Kenya the delineation of labour is determined largely by custom and tradition. For example, males have traditionally engaged in formal labour-market activities and earned an income away from the home (Neitzert 1994 p. 403). There are marked variations in the responsibilities of women according to whether the household is located in an urban or a rural location (Agesa and Kim 2001). In rural areas where the majority of the female population in Kenya lives, women traditionally provide 80% of the labour necessary for household production (Henn 1983 p. 1045). However, in urban areas, household production usually involves much less labour (Kiteme 1992). Hence, the migration of rural women tends to be more restricted than that of urban women. In addition, some studies have documented that males receive larger monetary gains as a result of migration compared to women and consequently have greater incentives to migrate to urban areas (Agesa and Agesa 1999).

The reasons why rural men migrate to urban areas in far larger numbers than women also appear to have historical foundations. Before Kenya's independence in 1963, the colonial regime barred women from migrating to urban areas thus helping to ossify a pattern of migration that is pervasive in Kenya today. In the few instances where women migrated to urban centres during the colonial period, it was often to engage in informal trade as formal labour markets in the urban areas favoured men (Macharia 1997). Furthermore, in general, rural men have more education than women and because many formal sector urban jobs demand more education, men migrate in

disproportionately greater numbers than women (Agesa and Agesa *op. cit.*). Other factors that may explain gender differentials in migration patterns include the cultural expectation that men are the breadwinners and therefore expected to migrate to cater for the needs of the family. However, this may vary by tribe or ethnic group. For example, among the Luo, several generations of men have spent the bulk of their working lives as migrants while women were largely involved in household production (Francis 2002). On the other hand, Kikuyu women are more engaged in urban trade (Robertson 1996). The variation in migration patterns by gender has implications for the type of networks available to male and female migrants. Agesa and Agesa (*op. cit.*) argued that one of the main reasons why approximately 87 per cent of all women resided in rural areas as compared to about 54 per cent of men, even though women accounted for well over half of the country's population (about 56 per cent) [1], could be ascribed to gender differences in rural-to-urban migration. However, recent trends indicate that females, like males, are increasingly migrating both internally and externally in search of employment opportunities, education, and to join their relatives or spouse. The 2009 Kenya Housing and Population Census reflects similar migration trends for males and females, though the number of male migrants still surpasses those of female migrants.[2]

Figure 2.5 depicts the stock of male and female Kenyan born migrants residing in the top five host countries in 2000. It reveals that they are only minor differences by gender in the number of Kenyan migrants residing in these countries. Over the past few decades, the gender imbalance in migration participation has largely been reversed by political independence, female educational attainment, the acquisition of skills that have made women more competitive in migrant destinations, and the increased availability of migrant social networks that can be utilized by women (Macharia 2003).

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[1] However, recent statistics reveal that the male to female ratio is almost even now. World Bank estimates indicate that in 2012 women accounted for about 50.1 per cent of the Kenyan population.

[2] For example, the proportion of internal migrants who were male and female household heads respectively at the provincial level were as follows: Nairobi (33% and 29%), Central (42% and 41%), Coast (39% and 39%), Eastern (50% and 50%), North Eastern (68% and 72%), Nyanza (48% and 41%), Rift Valley (47% and 47%), and Western (56% and 51%). The proportion of internal migrants who were children of the household head were as follows: Nairobi (25% and 10%), Central (23% and 11%), Coast (24% and 9%), Eastern (17% and 9%), North Eastern (14% and 6%), Nyanza (18% and 10%), Rift Valley (20% and 10%), and Western (15% and 8%).

Figure 2.5: Stock of Kenyan male vs. female migrants in top five host countries (2000)
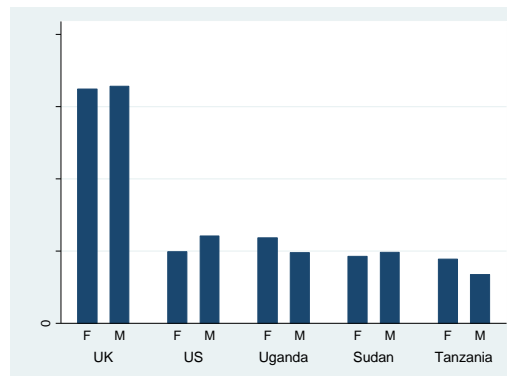
Source: Author's calculations based on statistics from the Global Bilateral Migration World Bank database accessed in May 2014 (see Özden *et al.* 2011).

Overall, migration plays an important role in Kenya's labour market (Black *et al.* 2006) and is often used to diversify the income sources of the poorer households (Crush *et al.* 2006). Households in Kenya, particularly those in rural areas, have also been shown to engage in migration in an effort to mitigate risk, especially as the lack of economic activity in rural areas inhibits households from diversifying income sources without migration (Bigsten 1996, Oniang'o 1995). Rural poverty has also increased due to a decrease in the ownership of farming and grazing land (IMF 2010). Thus, the rapid rate of urbanization experienced by Kenya in recent years has been primarily fuelled by rural-to-urban migration. External migration has also been subject to a steady increase as Kenyans migrate abroad in search of better employment and education opportunities. Studies such as Ackello-Ogutu (1997), Lucas (2007) and Masinjila (2009) suggest that these different types of migration have a positive impact on the well-being of Kenyan households.

2.2 Remittance patterns

A 2006 World Bank report estimates that remittances reduced the number of people living in absolute poverty (defined here as less than USD 1 per day) in Kenya by about two per cent. External remittances are reported to be the fourth-largest source of foreign currency for Kenya after revenue from tea, horticulture and tourism (see, e.g., Bett 2013). The International Organization for Migration reports that while revenue to the government from traditional exports such as tea and coffee has diminished in the past five years, remittance inflows continue to increase. World Bank estimates suggest that Kenya was the third largest recipient of remittances in Sub-

Saharan Africa in 2010, with only Nigeria and Sudan having larger remittance inflows. Inward remittance flows into Kenya are estimated to have been about USD 1.8 billion, exceeding net official development assistance (ODA) and net foreign direct investment (FDI), which were at USD 1.4 billion and USD 0.1 billion respectively. Kenya was also among the top ten remittance recipient countries in percentage of GDP, with remittances equalling 5.4% of its GDP.

Figure 2.6 reveals the progressive increase in the amount of formal remittance inflows into Kenya from abroad over the past decade. It is important however to bear in mind that the true size of remittances is larger than that portrayed by the formal estimates as remittances are also transmitted through informal channels (World Bank 2011, Kiiru 2010).

Internal remittances have also attracted more attention in Kenya in recent years. The introduction of the M-PESA mobile money service in 2007 led to profound changes in the types of domestic remittance channels used by Kenyans (Jack and Suri 2011, Mas and Radcliffe 2011). Due to low transmission costs and easy accessibility of M-PESA agents, 47% of Kenyans were using M-PESA to send internal remittances by 2008. By the end of 2009, 65% of Kenyan households were using M-PESA (Jack and Suri *op. cit.*). Its rapid growth is illustrated in Figure 2.7 which shows that by August 2010, M-PESA had registered about 12.6 million customers and 20,000 agents country-wide. Amounts equivalent to 40% of Kenya's GDP transactions are transmitted daily through M-PESA (Safaricom 2014).

The use of mobile phones to transfer money enabled the transmission of smaller amounts of money with higher frequency and therefore resulted in higher cumulative amounts. A 2010 World Bank-Central Bank of Kenya survey reported that 14% of Kenyan adults regularly receive remittances. The survey estimates that each adult receives an average of USD 735 from abroad per year. Two-thirds of remittance senders in this survey also reported sending remittances via mobile phones rather than conventional methods. A quarter of respondents who receive remittances in the survey revealed that they rely on them to cover at least some of their daily expenses such as food, clothing, housing, utilities, and medicine.

Figure 2.6: Annual remittance inflows into Kenya
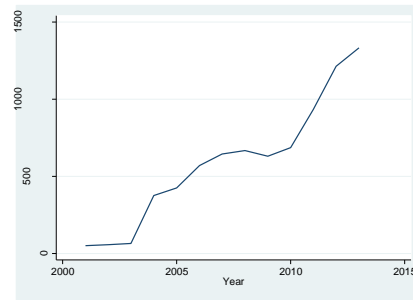
Source: Author's calculations based on data obtained from the World Bank annual remittances database (May 2014)

Figure 2.7: M-PESA agents and customers
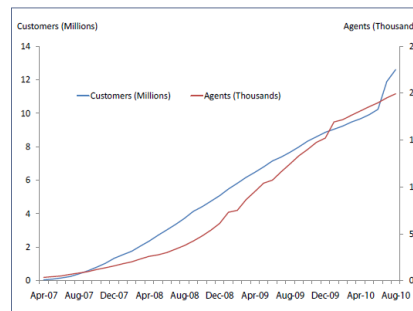
Source: World Bank Kenya Economic Update (2010).

3   Data Description

The data used in this thesis are obtained from the 2009 Migration and Remittances Household Survey in Kenya and were collected between 24 October and 22 December 2009. The survey is a single-round, cross-sectional survey capturing information about households with internal, external, and no migrants. It was conducted as part of the Africa Migration Project, which is a project jointly undertaken by the African Development Bank and the World Bank to improve understanding of migration and remittances in Sub-Saharan Africa.[1] The University of Nairobi was the primary investigator for the survey.

3.1   Scope and coverage

A total of 1,942 households in 17 districts[2] were surveyed in the eight provinces of Kenya. The main respondent to the survey was the head of the household, or his/her representative. Of the households that were surveyed, 49% were urban based and 51% in rural areas. The largest proportion of households were non-migrant (35%), followed by external (30%), internal (29%), and both internal and external (6%). At the individual level, information was obtained on a total of 8,343 non-migrants and 2,245 migrants. A local survey firm in Kenya conducted the fieldwork, which involved collecting the data, validating and inputting the responses, and then compiling datasets subsequently provided in STATA format.

The survey contains seven sections or modules. Section 1 is the household roster and collected data on all the members currently resident in the household. This included information related to their age, gender, relationship to the household head, marital status, education, work situation, the tribe, and religious affiliation of the household head. Section 2 elicited information on the housing situation and general housing conditions. This included the tenure status, type of dwelling, construction material, number of rooms, sanitation, and the availability of electricity and water. In

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[1] Similar surveys were undertaken in Burkina Faso, Nigeria, Senegal, South Africa and Uganda.

[2] These districts are Kiambu, Kisii, Machakos, Nakuru, Nairobi, Rachuonyo, Thika, Garissa, Lugari, Malindi, Embu, Siaya, Kilifi, Kakamega, Migori, Vihiga, and Mombasa.

section 3, information relating to the household's assets and expenditure was collected. The household respondents reported the assets owned and the amount of money (in Kenyan shillings) spent on various expenditure items in the previous six months (or past one week for food and transport expenditure).[3] Information on the use of financial services by the household was collected under section 4. This comprised data concerning bank account ownership, ATM usage and debit card ownership, and the use of mobile banking. In section 5, questions relating to internal and international migration and remittances from former household members (namely migrants) were asked. The data collected under this section included information on age, current location and living situation, highest education qualifications before departure, work situation before departure, and the current work situation of the migrant. The amount of cash and in-kind remittances sent by each migrant in the past 12 months (in Kenyan shillings), frequency and channels of transfer, and uses of cash remittances by the recipient household were also recorded. The household also indicated any activities it undertook that were enabled by the migrant (specifically whether the household opened a bank account, set up a business, or constructed a building for commercial purposes following the migration of a member). In addition, information relating to any cash transfers by the household to the migrant in the past 12 months was also recorded, including the amount of money sent (in Kenyan shillings), the frequency of transfers and the channel of transmission, and how the migrant spent the money. In section 6, remittance information similar to that of section 5 was collected in relation to non-household members.[4] Finally, section 7 recorded information on return migrants.[5] This included their previous migration destination, when they returned, reasons for return, and information relating to remittances they used to send to the household (specifically channels of transfer, uses of cash remittances, and types of in-kind remittances sent). Figure 3.1 in the appendix provides the full questionnaire used in the survey.

The following are some key definitions used in the survey:

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[3] A list of assets and expenditure items was provided and households indicated the assets owned and how much they spent, if anything, on each expenditure item.

[4] Non-household members are individuals who sent remittances over the past 12 months but have never been part of the household (e.g., friends and other relatives).

[5] Return migrants refer to all members of the household who used to live outside of the household for at least three months during the last five years, and have since returned to the household.

Household: A household is a person or group of persons who reside in the same homestead/ compound but not necessarily in the same dwelling unit, have similar cooking and eating arrangements and are answerable to the same household head.

Head of household: This is the most responsible/respectable member of the household who makes key decisions on behalf of the household on a day-to-day basis and whose authority is recognised by all members of the household.[6]

Household members: These are people currently living in the household and having common cooking and eating arrangements.

Migrant: This refers to any person who used to live in the household, but has lived outside the household in another place either within the country or in another country for more than six months. Nevertheless, it could be argued that this definition has some limitations which may potentially affect some of the empirical results obtained in chapter 4. For example, individuals who were part of the household in the past may not necessarily qualify as migrants in the conventional sense if, for example, they do not maintain links with any current household members. Therefore, it may be inappropriate to regard such individuals as representing a potential migrant network. However, the dataset does not contain any information that would enable us to distinguish whether a former household member is currently connected to the household or not. Thus, the definitions of 'migrant' and 'migrant network' employed in the current thesis do not discriminate on the basis of a current connection to the household of origin. The implications of these limitations are discussed in chapter 4 (see section 4.5.1).

Cash remittances: Both external (cross-border) and internal (within-country) transfers of cash by migrants (or non-household members) to the household.

In-kind remittances: Both external and internal transfers of in-kind resources by migrants (or non-household members) to the household.

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[6] This is often the father or the mother within the household, but could be a child or any other responsible adult member of the household, depending on the status of the household.

3.1.1 Sampling frame and survey design

Plaza *et al.* (2011) provide a detailed description of the sampling frame and the survey design. A two-stage sampling procedure was used. The 1999 Kenya Housing and Population Census was used to map survey areas. In addition, to account for population growth and migration as well as changes in administrative units (e.g., boundary changes and new districts) that had occurred since the 1999 census, the 2005 Kenya Integrated Budget Survey, the 2006 Financial Services Deepening Survey, and the locations of remittance service providers were also used in designing the sampling frame.

A major challenge was to ensure that households with international migrants were adequately captured. Officers from the Kenya National Bureau of Statistics, village elders, and administrative officers were consulted to help map out clusters with higher concentrations of international migrants resulting in 17 districts and 92 clusters in the districts being selected. As such, the survey is not nationally representative. Even in relatively high migration areas, there were not enough households with migrants for the sample to be drawn randomly therefore migrant households were over-sampled. The final selection of households to interview entailed relisting households in each cluster to identify external, internal, and non-migrant households. Each of these three groups of households were treated as an independent sub-frame and random sampling was used to select households within each group.

3.2 Suitability of survey for the thesis

A World Bank review of 70 African household surveys conducted between 1990 and 2006 reveals that most of the surveys fail to capture adequate data on migration and remittances (Plaza *et al.* 2011). In particular, migration and remittances data are generally spread across various sections of the surveys and are rarely linked together. For example, for the cases of Cameroon 2004, Gambia 1992, Guinea 1994, Mali 1994, Rwanda 1998, and Uganda 1993, migration modules are found in a separate section and thus have limited information compared to that of non-migrants obtained from questions in the main module. In other cases the topic of migration is appended to other modules such as literacy (Burkina Faso 1998), education (Ivory Coast 1998), and employment (Senegal 1991). Some of the studies also collect information on the migration history of the

household head only, rather than on all members of the household. Other studies limit inquiries to migratory movements during the preceding one year. In addition, many of the surveys do not distinguish between remittances and gifts (or other transfers) received by the households. The main advantage of the 2009 Kenya Africa Migration Project survey is that it was specifically targeted on migration and remittances in order to fill the gaps in knowledge highlighted above. The survey provides a rich and unique source of information on which to conduct empirical analysis on migration and remittances, thus its suitability for research use in this thesis.

A long-standing issue in the remittance literature is the challenge of capturing the amount of remittances that flow informally, given the acknowledgement that they are quite substantial in amount. It is important to capture informal remittances if the role of remittances as a source of development finance is to be fully understood. A large part of the constraint on migration research particularly in Africa is a lack of adequate data. For example, due to the scarcity of data on internal remittances most of the studies that have investigated the impact of remittances sent by Kenyan migrants have been limited to external remittances (e.g., Azam and Gubert 2006, Gupta *et al.* 2009, Kiiru 2010). It is also difficult for countries to keep track of migrant flows as much of the movement within Africa is unregulated. Few African countries have a well-articulated policy on international migration and are often unable to enforce their own migration laws and regulations (Lucas 2006). Thus, the use of household survey data, as in the current chapter, has been suggested as an approach that better enables remittances transmitted both formally and informally to be captured.

As far as the author knows, there is no other recent survey with a specific focus on internal and external migration and remittance flows in Kenya. The Africa Migration Project survey therefore presents a good opportunity to explore a set of research questions related to migration and remittance flows in Kenya using a recent and extensive survey. In addition, there are no existing studies that have employed the dataset used in the current thesis to conduct empirical analysis in the manner undertaken here.

However there are some limitations. One of the weaknesses relating to the survey concerns the respondent who is the head of the household, or any other member who is able to provide most, if not all, of the information about the household members at the time of the interview. An obvious shortcoming here is that such responses are potentially subject to recall bias. This raises a question on the accuracy of some of the information provided in the survey. However, psychology studies show that people are likely to remember events that arouse emotions better than others (Kensinger and Corkin 2004, Cahill and McGaugh 1998). The migration of a child of the household head and their attainments at the time of migration are likely to fall into this category. Hence, recall bias may not be a major problem in the current analysis. A more serious issue may be a lack of accurate information, particularly in relation to migrants. For example, the respondent may be misinformed about the current employment and/or living situation of the migrant.

Another shortcoming of the survey is that it does not contain information on the income levels of household members and migrants. As such, in the empirical analysis, proxies are constructed to provide economic welfare measures. In addition, due to the sampling strategy employed, as noted earlier and re-emphasized here, the survey is not representative of the national level.

An additional cause for concern is that in response to the question regarding their current work situation, 33% of non-migrants identify themselves as students. This seems to be relatively high, though it may be a reflection of the large proportion of the Kenyan population under 15[7], as well as the high primary and secondary school net enrolment rates of approximately 98% (UNICEF 2009). In the case of migrants, 16% are identified as students. We retain students in the sample because for many Kenyans, acquiring education is seen as a gateway to securing a more permanent status in the host countries. This is made possible by policies in many host countries that permit students to convert their student status into a work or residence permit if they find a job within a certain timeframe of completing their studies (Naujoks 2009).

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[7] This is supported by the data as 35% of non-migrants in the sample are aged 15 or below.

Lastly, the manner in which the survey was conducted does not enable us to differentiate between temporary and permanent migrants as there is no information on this type of migration.

Appendix

Figure 3.1: Copy of Kenya Migration Household Survey

HOUSEHOLD QUESTIONNAIRE

FOR

MIGRATION HOUSEHOLD SURVEY

IN KENYA

AFRICA MIGRATION PROJECT

DECPG

THE WORLD BANK

Working for a World
Free of Poverty

31 October 2009

1

TABLE OF CONTENTS

QUESTIONNAIRE FOR THE HEAD OF HOUSEHOLD

Section 1: Household Roster

We would like to make a complete list of household members. A household consists of a person or groups of persons, irrespective of whether related or not, who normally live together in the same housing units or group of housing units and have common cooking and eating arrangements.

The head of household is a person who is responsible for generating and managing the largest part of the household income. **Household members include only those persons who are currently living in the household.**

	1.1	1.2	1.3	1.4	1.5	1.6
PE RS O N I D	List all household members who <u>currently live</u> in the household. (Listing order) Head Spouse Children not married Children married Other relatives Domestic servant Employed guard Non relatives	What is the relationship of (NAME) to the head of the household? 1. Head 2. Spouse 3. Partner 4. Son/Daughter 5. Son/Daughter-in-law 6. Father/Mother 7. Brother/Sister 8. Parent-in-law 9. Grandson/granddaughter 10.Nephew/niece 11. Other Relative 12. Servant / employee 13. Other non-relative	What is the sex of (NAME)? 1. Male 2. Female	How old is (NAME) in completed years (age at last birthday)? YEARS	What is the present marital status of (NAME)? 1. Married 2. Engaged to be married 3. Cohabiting/consensual union 4. Separated 5. Divorced 6. Widowed 7. Single/Never Married	Where was (NAME) born? 1. Urban area within your country (place) 2. Rural area within your country (place) 3. Outside Kenya (specify)
1						
2						
3						
4						
5						
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7						
8						
9						
10						
11						
12						

Section 1: Household Roster *(Continued)*

PE RS O N I D	1.7 What is the religion of (NAME)? 1. Moslem 2. Catholic 3. Protestant 4. Traditional 5. Other 6. No religion	1.8 What is the tribe of (NAME)?	1.9 What is the highest level of schooling that (NAME) completed? 1. No formal education 2. Primary School 3. Secondary School 4. post primary Technical/Vocational School 5. Post-secondary Technical/Vocational School 6.University undergraduate 7. Graduate School 8. Other (Specify) 9. Don't know	1.10 How many total years of schooling has (NAME) completed in the indicated level?	1.11 If (NAME) has completed Tertiary or higher education, what is the highest diploma/degree that he/ she obtained? (specify the area e.g. nursing, carpenter, law etc) 1. Certificate 2. Vocational or technical training diploma 3. Bachelor's degree 4. Master's degree 5. PhD degree 6. Other (specify)
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					

Section 1: Household Roster (Continued)

PERSON ID	1.12 What is (NAME)'s current work situation? 1. Paid employment – full-time 2. Paid employment – part-time 3. Self employed (full or part time) 4. Full-time student 5. Part-time student 6. Unemployed / Looking for work 7. Retired from work altogether 8. Housewife 9. Long-term sick or handicapped 1o. Other (specify) (For Code 4 to 12, skip to NEXT SECTION)	1.13 What is (NAME)'s current occupation? 1. Managers 2. Professionals 3. Technicians and associate professionals 4. Clerical support workers 5. Service and sales workers 6. Agricultural, forestry and fishery workers 7. Craft and related trades workers 8. Plant and machine operators, and assemblers 9. Elementary occupations 10. Armed forces occupations 11. Others [ISCO-08 - Major Groups] (>>NEXT SECTION) Indicate the profession indicated e.g. teacher and code it appropriately
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		
11		
12		

Section 2: Housing Conditions

PERSON ID	2.1 What is the tenure status of this dwelling? 1. Owned 2. Rent-free or subsidized from employer 3. Rented from employer 4. Rent-free or subsidized from relatives 5. Rented from relatives 6. Rented from an individual Agency/quarters 7. Rented from other 8. Other (specify)	2.2 What type of dwelling does your household live in? 1. Family house 2. Apartment in a building 3. Single Room 4. Rooms in a house 5. Huts 6. Other (specify)	2.3 What is the major construction material of the exterior walls? 1. Bricks/Stones 2. Wood/off cuts 3. Mud 4. Pre-fabricated 5. Tin 6. Straw 7. Iron sheets 8. Other (specify)	2.4 Do you have a separate room for cooking? 1. Yes 2. No	2.5 How many separate rooms do you have in total, excluding bathrooms, corridors, and storage areas (this refers to separate living and dining rooms, bedrooms, etc.)?		2.6 Does your household have electricity? 1. Yes 2. No	2.7 What is the primary source of your drinking water? 1. Piped water to resident 2. Public pump 3. Well stream 4. River or stream 5. Water truck/vendors 6. Rain water 7. Boreholes 8. Other
					Main house	Other Rooms		
1								

Section 3: Household Assets and Expenditure

Type of Household Assets	3.1 Does your household own the following asset at present? (Code 1 for Yes, 2 for No.)	3.2 How much in total has your household spent on the following items in the given period? In the past one week:	
		Category	Amount (In local currenc
		1. Food (e.g. grains, cassava, plantain, yam, pulses, fruits, vegetables, including self-consumption)	
		2. Meat (fish, chicken, red meat including self-consumption)	
IMMOVABLE ASSET		3. Cooking fuels (e.g. kerosene)	
1. Agricultural land		4. Transportation (e.g. bus/taxi, gasoline)	
2. Non-agricultural land		5. Personal care/leisure/entertainment(e.g. cigarettes, alcohol, beauty salon)	
3. House		In the past 6 months:	
4. Other Buildings		Category	Amount (Kshs)
		6. Clothing and footwear	
MOVABLE ASSET		7. Household appliances (e.g. furniture, kitchen ware, refrigerators, air conditioners, bedding, carpet)	
1. Tuk Tuk		8. Car/motorcycle/vehicle/tuk tuk	
2. Radio		9. Cell phone/mobile phone (Initial cost)	
3. Television		10. Computer	
4. Refrigerator		11. Other electronic goods (e.g. DVDs, TV)	
5. Air conditioner		12. Productive assets (e.g. sewing machine, water pump)	
6. Sound system		13. Farming Equipment (e.g. trucks, tractor, ox plough, harvester, spraying machines, water pumps)	
7. VCR/DVD player		14. Luxury goods (Jewelry and luxury cars)	
8. Computer		15. Rent for housing (imputed rent)	
9. Cell phone / mobile phone		16. Payments for utilities (e.g. gas, water, electricity)	
10. Non-mobile telephone		17. Education / apprenticeship (including tuition fees, tutor fees, school uniforms, books, and supplies)	
11. Bicycle		18. Health (doctor, fees, hospital fees, medicines, drugs)	
12. Animal drawn cart		19. Wedding/ Engagement / Funerals	
13. Car		20. Setting up a business / Opening a store	
14. Motorcycle		21. House or land purchase	
15. Tractor/harvester		22. Home improvements (e.g. roof, floor, plumbing)	
16, bus		23. Mortgage and loan repayment	
17 lorry		24. Other (specify)	
18 truck			
19 boat			
20 canoe			

Section 4: Household Use of Financial Services

P E R S O N I D	4.1 Does anyone in your household have a bank account? If yes, copy ID of each person with bank account.	4.2 How long has he/she had the bank account?	4.3 What was the purpose of opening his/ her bank account? 1. Savings 2. Sending money 3. Receiving money 4. Taking loans 5. Salary 5. Other (specify)	4.4 Does this person have an ATM or Debit card? 1. Yes 2. No	4.5 Does this person ever use mobile phone to make bank transactions? 1. Yes 2. No
	Roster ID	Years			
1					
2					
3					
4					
5					

Section 5: Internal and International Migration and Remittances from Former Household Members

	5.1	5.2	5.3	5.4	5.5	5.6	5.7
P E R S O N I D	Does your household currently have a member not living within the household? 1. Yes 2. No If Yes, list all household members living outside your household. If No Members, skip to Section 6 A member who has lived outside for more than six months	What is the sex of (NAME) who is currently living outside your household? 1. Male 2. Female	How old is (NAME) who is currently living outside your household? YEARS	What is the relationship of (NAME) to the head of the household? 1. Spouse 2. Son/ Daughter 3. Son/ Daughter-in-law 4. Father/ Mother 5. Brother/ Sister 6. other (specify)	In what country was (NAME) born? 1. Urban area within your country (place) 2. Rural area within your country (place) 3. Outside Kenya specify	What is the primary reason why (NAME) is currently living outside your household? 1. Education 2. Search for work 3. Job transfer/job opportunity 4. Civil conflict/ war 5. Marriage 6. Divorce/marriage dissolution 7. Death of spouse or partner 8. Family problems 9. Moved to join other family members 10. Return to original or previous home 11. Do not own agricultural land to work here / don't have enough land 12. Poor quality of land or depleted soils 13. Health problems 14. Drought 15. Political factors 16. Other (specify)	Is (NAME) who is currently living outside your household working or looking for work? 1. Yes, currently working 2. Yes, currently looking for work 3. No (>>next person) 4. Don't know
1							
2							
3							
4							
5							
6							
7							
8							
9							

Section 5: Internal and International Migration and Remittances from Former Household Members

P E R S O N I D	5.8	5.9	5.10	5.11	5.12	5.13	5.14
	At present where does (NAME) live? 1. Urban area within the country (specify) 2. Rural area within the country (specify) 3. Outside (specify) a) UK b) Tanzania c) US d) Uganda e) Canada f) Germany g) Australia h) India i) Netherlands j) Italy k) other specify	How long has (NAME) lived in his/her current location? Years (YR) Months (Mon) YR Mon	What is the present marital status of (NAME)? 1. Married 2. Engaged to be married 3. Cohabiting/consensual union 4. Separated 5. Divorced 6. Widowed 7. Single/Never Married 8. Dont know	Who does (NAME) live with in his/her current location? 1. Alone 2. Spouse 3. Children 4. Brother or sister 5. Other relatives 6. Other (specify) 7. Don't know	What was the highest level of schooling that (NAME) completed before he/ she left the household? 1. No formal education 2. Primary School 3. Secondary School 4. Post primary Technical/Vocational School 5. Post-secondary Technical/Vocational School 6. Undergraduate University 7. Graduate School 8. Other (specify) 9. Don't know If 1-3 then 5.14 is not applicable	How many total years of schooling had (NAME) completed at the time of migration? YEARS	If (NAME) completed tertiary or higher education before he/ she left the household, what was the highest qualification 1. Bachelor's degree 2. Vocational or technical diploma 3. Master's degree 4. PhD degree 5. MBA 6. Teaching certificate 7. Medical degree 8. Nursing degree 9. Law degree 10. Other (specify)
1							
2							
3							
4							
5							
6							
7							
8							
9							

Section 5: Internal and International Migration and Remittances from Former Household Members

P E R S O N I D	5.15 Before (NAME) left the household, what was his/her work situation? 1. Paid employment – full-time 2. Paid employment – part-time 3. Self employed (full or part time) 4. Full-time student 5. Part time student 6. Unemployed / Looking for work 7. Retired from work altogether 8. Housewife 9. Long-term sick or handicapped 10. Other (specify)	5.16 What is (NAME)'s current work situation? 1. Paid employment – full-time 2. Paid employment – part-time 3. Self employed (full or part time) 4. Full-time student 5. Part time student 6. Unemployed / Looking for work 7. Retired from work altogether 8. Housewife 9. Long-term sick or handicapped 11. Other (specify) 12. Don't know (For Code 6 to 12, skip to 5.18)	5.17 What is (NAME)'s current occupation? 1. Managers 2. Professionals 3. Technicians and associate professionals 4. Clerical support workers 5. Service and sales workers 6. Agricultural, forestry and fishery workers 7. Craft and related trades workers 8. Plant and machine operators, and assemblers 9. Elementary occupations 10. Armed forces occupations 11. Don't know Indicate the profession indicated e.g. teacher and code it appropriately	5.18 Does (NAME) send any money to your household? 1. Yes 2. No (>>Q5.23) If No, skip to Q. 5.23
1			
2			
3			
4			
5			
6			
7			
8			
9			

Section 5: Internal and International Migration and Remittances from Former Household Members

P E R S O N I D	5.19 In the past 12 months, how many times has (NAME) sent money to your household?	5.20 How does (NAME) usually send money to your household?	5.21 In the past 12 months, how much money in total has (NAME) sent to your household?	5.22 How did your household spend the money sent by (NAME) in the past 12 months?
		1. Western Union 2. MoneyGram 3. Other money transfer operator 4. Postal money order 5. Direct transfer to bank account 6. Bank as paying agent for money transfer operator (e.g. Western Union or Money Gram) 7. Foreign exchange bureau 8. Credit union 9. Travel agency 10. Informal individual agents 11. Mobile phone/ telecommunications service providers (MPESA, ZAP) 12. Through friend or relative 13. Courier, bus, or other transport 14. Brought back himself during visit 15. Pre-paid cards/ ATM card, re-loadable card, smart card 16. Internet Money Transfer 17. Other (Please specify)		**Category** / **Amount (In local currency)** 1. Food 2. Education 3. Health 4. Rent (house, land) 5. Marriage/funeral 6. Cars/trucks 7. Rebuild house 8. Build new house 9. Business 10. Land purchase 11. Livestock purchase 12. Improved farming ......13. Migrant physical investment 14. financial assets (bonds, stocks) 15 transfering to intended recipient 16 Other (specify)
	TIMES		**AMOUNT (In local currency)**	
1				
2				
3				
4				
5				
6				
7				
8				
9				

Section 5: Internal and International Migration and Remittances from Former Household Members

P E R S O N I D	5.23 Does (NAME) send/bring food and/or goods to your household?	5.24 What is the value of food and goods that (NAME) has sent/brought to your household in the past 12 months?	5.25 Which of the following goods were sent/brought to your household in the past 12 months? (MULTIPLE RESPONSES)
	1. Yes 2. No (>>Q5.26)	VALUE (LOCAL CURRENCY)	

		Yes or No 1: yes 2: no	QUANTITY	Value
a. Refridgerators				
b. Deep freezers				
b. TV				
c. HiFi System				
d. Washing machine				
e. Set of furniture				
f. Stove/cooker				
g. Microwave				
h. Air conditioners				
i. Computer and accessories				
j. DVCD/DVD/Video				
k. Motorbike				
l. Cars				
m. Buses				
n. Trucks				
o. posh mill				
p. Set of hair dressing equipment				
q. Sewing machine				
r. Tractor				
s. Other agriculture equipment				
t. Mobile phones				
u. Other (specify)				

Person ID rows: 1, 2, 3, 4, 5, 6, 7, 8, 9

Section 5: Internal and International Migration and Remittances from Former Household Members
[Ask questions 5.26-29 to each household adult]

PERSON ID	5.26	5.27	5.28
	Did any member of your household open a bank account after a migrant went to work outside the household? 1. Yes 2. No	Did your household set up a business or open a store after a migrant went to work outside the household? 1. Yes, set up a business 2. Yes, opened a store 3. No	Did your household build a dwelling to rent to others or for other commercial uses after a migrant went to work outside the household? 1. Yes, for rent 2. Yes, for other commercial uses 3. Yes, for both 4. No
1			

Section 5: Internal and International Migration and Remittances from Former Household Members

PERSON ID	5.29	5.30	5.31	5.32	
	In the past 12 months, how many times have you sent money to (NAME)?	How did you send money to (NAME)? 1. Western Union 2. MoneyGram 3. Other money transfer operator 4. Postal money order 5. Direct transfer to bank account 6. Bank as paying agent for money transfer operator (e.g. Western Union or Money Gram) 7. Foreign exchange bureau 8. Credit union 9. Travel agency 10. Informal individual agents 11. Mobile phone/ telecommunications service providers (MPESA, ZAP) 12. Through friend or relative 13. Courier, bus, or other transport 14. Brought back himself during visit 15. Pre-paid cards/ ATM card, re-loadable card, smart card 16. Internet Money Transfer 17. Other (Please specify)	In the past 12 months, how much money in total have you sent to (NAME)? AMOUNT (In local currency)	How did (NAME) spend the money send in the past 12 months?	
				Category	Amount (In local currency)
				12. Food	
				13. Education/fee	
				14. Health	
				15. Rent (house, land)	
				16. Marriage/funeral	
				17. Cars/trucks	
				18. Rebuild house	
				19. Build new house	
				20. Business	
				21. Land purchase	
				22. Livestock purchase	
				12. Improved farming	
				......13. Migrant physical investment	
				14. financial assets (bonds, stocks)	
				15 transfering to intended recipient	
	TIMES			16 Other (specify)	
1					
2					
3					
4					
5					
6					
7					
8					
9					

Section 5: Internal and International Migration and Remittances from Former Household Members

[Ask questions 5.26-29 to each household adult]

P E R S O N I D	5.26 Did any member of your household open a bank account after a migrant went to work outside the household? 1. Yes 2. No	5.27 Did your household set up a business or open a store after a migrant went to work outside the household? 1. Yes, set up a business 2. Yes, opened a store 3. No	5.28 Did your household build a dwelling to rent to others or for other commercial uses after a migrant went to work outside the household? 1. Yes, for rent 2. Yes, for other commercial uses 3. Yes, for both 4. No
1			

Section 5: Internal and International Migration and Remittances from Former Household Members

P E R S O N I D	5.29 In the past 12 months, how many times have you sent money to (NAME)?	5.30 How did you send money to (NAME)? 1. Western Union 2. MoneyGram 3. Other money transfer operator 4. Postal money order 5. Direct transfer to bank account 6. Bank as paying agent for money transfer operator (e.g. Western Union or Money Gram) 7. Foreign exchange bureau 8. Credit union 9. Travel agency 10. Informal individual agents 11. Mobile phone/ telecommunications service providers (MPESA, ZAP) 12. Through friend or relative 13. Courier, bus, or other transport 14. Brought back himself during visit 15. Pre-paid cards/ ATM card, re-loadable card, smart card 16. Internet Money Transfer 17. Other (Please specify)	5.31 In the past 12 months, how much money in total have you sent to (NAME)?	5.32 How did (NAME) spend the money send in the past 12 months?

5.32 table:

Category	Amount (In local currency)
12. Food	
13. Education/fee	
14. Health	
15. Rent (house, land)	
16. Marriage/funeral	
17. Cars/trucks	
18. Rebuild house	
19. Build new house	
20. Business	
21. Land purchase	
22. Livestock purchase	
12. Improved farming	
......13. Migrant physical investment	
14. financial assets (bonds, stocks)	
15 transfering to intended recipient	
16 Other (specify)	

5.29 column label: TIMES
5.31 column label: AMOUNT (In local currency)

Row numbers 1–9.

Section 6: Internal and International Migration and Remittances from Non-Household Members
[Ask questions 5.26-29 to each household adult]

PERSON ID	6.1	6.2	6.3	6.4	6.5	6.6	6.7
	In the last 12 months, did your household receive any money and/or goods from any non-household migrant members? 1. Yes 2. No (If NO, go to Q7.1) If yes, write name of each non-household member	If yes to 6.1, where does this non-household migrant member currently live? 1. Urban area within the country (place) 2. Rural area within the country (place) 3. Outside a) UK b) Tanzania c) US d) Uganda e) Canada f) Germany g) Australia h) India i) Netherlands j) Italy k) Other specify	If Yes to 6.1, what was the relationship of this non-household migrant member? 1. Parent 2. Brother/sister 3. Parents/grand parent 4. In laws 5. Other relative 6. Ex-spouse 7. Non-relative	If Yes to 6.1, what is the sex of this non-household migrant member? 1. Male 2. Female	What is the highest level of schooling that this non-household migrant member has completed? 1. None 2. Primary School 3. Middle School 4. Secondary School 5. post primary Technical/Vocational School 7. Post-secondary Technical/Vocational School 6.Undergraduate University 8. Graduate School 9. Other (Specify) 10. Don't know	In the past 12 months, how many times did your household receive this money? Times	How did this non-household migrant usually send money to your household? 1. Western Union 2. MoneyGram 3. Other money transfer operator 4. Postal money order 5. Direct transfer to bank account 6. Bank as paying agent for money transfer operator (e.g. Western Union or Moneygram) 7. Foreign exchange bureau 8. Credit union 9. Travel agency 10. Informal individual agents 11. Mobile phone/ telecommunications service providers (MPESA, ZAP) 12. Through friend or relative 13. Courier, bus, or other transport 14. Brought back himself during visit 15. Pre-paid cards/ ATM card, re-loadable card, smart card 16. Internet Money Transfer 17. Other (Please specify)
1							
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3							
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5							
6							
7							
8							
9							

Section 6: Internal and International Migration and Remittances from Non-Household Members
[Ask questions 5.26-29 to each household adult]

PERSON ID	6.9	6.10		6.11	6.12
	In the past 12 months, how much money in total has your household received from this non-household migrant? Amount (in local currency)	How did your household spend this money sent by this non-household migrant over the past 12 months?		Did your household receive any food and/or goods from this non-household member? 1. Yes 2. No	What was the total value of food and goods received by your household from this non-household migrant over the last 12 months? Value (local currency)
		Category	Amount (Kshs)		
		1. Food			
		2. Education			
		3. Health			
		4. Rent (house, land)			
		5. Marriage/funeral			
		6. Cars/trucks			
		7. Rebuild house			
		8. Build new house			
		9. Business			
		10. Land purchase			
		12. Improved farming			
		……13. Migrant physical investment			
		14. financial assets (bonds, stocks)			
		15. Transfering to the intended recipient			
		……….16. Other (specify)			
1					
2					
3					
4					
5					
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P E R S O N I D	6.13 In the past 12 months, <u>how many times</u> have you sent money to (NAME)?	6.14 How did you send money to (NAME)? 1. Western Union 2. MoneyGram 3. Other money transfer operator 4. Postal money order 5. Direct transfer to bank account 6. Bank as paying agent for money transfer operator (e.g. Western Union or Money Gram) 7. Foreign exchange bureau 8. Credit union 9. Travel agency 10. Informal individual agents 11. Mobile phone/ telecommunications service providers (MPESA, ZAP) 12. Through friend or relative 13. Courier, bus, or other transport 14. Brought back himself during visit 15. Pre-paid cards/ ATM card, re-loadable card, smart card 16. Internet Money Transfer 17. Other (Please specify) TIMES	6.15 In the past 12 months, how much money <u>in total</u> have you sent to (NAME)? AMOUNT (In local currency)	6.16 How did (NAME) spend the money send in the past 12 months?

6.16 sub-table:

Category	Amount (In local currency)
23. Food	
24. Education/fee	
25. Health	
26. Rent (house, land)	
27. Marriage/funeral	
28. Cars/trucks	
29. Rebuild house	
30. Build new house	
31. Business	
32. Land purchase	
33. Livestock purchase	
12. Improved farming	
......13. Migrant physical investment	
14. financial assets (bonds, stocks)	
15 transfering to intended recipient	
16 Other (specify)	

ID	6.13	6.14	6.15	6.16
1				
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Section 7: Return Migrants

Note: Please interview the return migrant(s) directly for this section. If the return migrant is not available for the interview, please copy and mark the ID of the person who answers the questions on his/her behalf.

P E R S O N I D	7.1 Does your household currently have a member who lived in another country or another place in this country for at least 6 months (Please copy person ID). If None, END INTERVIEW. 1=Yes 2=no	7.2 What was the last place that (NAME) lived in before he/she returned to your household? 1. Urban area within the country 2. Rural area within the country 3. Outside a) UK b) Tanzania c) US d) Uganda e) Canada f) Germany g) Australia h) India i) Netherlands j) Italy k) Other specify	7.3 When did (NAME) last move to (PLACE)? Year Month	7.4 When did (NAME) return to this household? Year Month	7.5 What was the primary reason why (NAME) left the household in the last migration episode? 1. Education 2. Search for work 3. Job transfer/job opportunity 4. Civil conflict/ war 5. Marriage arrangement 6. Divorce/marriage dissolution 7. Death of spouse or partner 8. Family problems 9. Moved to join other family members 10. Return to original or previous home 11. Do not own agricultural land to work here / don't have enough land 12. Poor quality of land or depleted soils 13. Health problems 14. Drought 15. Political factors 16. Other (specify)	7.6 What was the <u>main</u> reason why (NAME) chose (PLACE)? 1. I knew people there 2. I had information about the place 3. I had a job offer there 4. Better wages there 5. Better job opportunities there 6. More/better land there 7. Better quality of life there 8. Better education opportunities there 9. Better climate 10. Better medical care 11. Close to family, friend 12. Cost of moving is low 13. Other (specify)
1						
2						
3						
4						
5						
6						
7						
8						
9						

Section 7: Return Migrants *(Continued)*

PERSONID	7.7	7.8	7.9	7.10	7.11
	What was the highest level of schooling that (NAME) completed before he/she left the household? 1. None 2. Primary School 3. Secondary School 4. Secondary Level Technical/Vocational School 5. Tertiary/University 6. Post-secondary Technical/Vocational School 7. Graduate School 8. Other (specify) 9. Don't know	Did (NAME) go to school in (Place) 1. Yes 2. No 3. Don't know	If (NAME) completed Tertiary or higher education in (PLACE), what was the highest diploma/degree that he/she obtained? 1. Bachelor's degree 2. Vocational or technical training 3. Master's degree 4. PhD degree 5. MBA 6. Teaching certificate 7. Medical degree 8. Nursing degree 9. Law degree 10. Other (specify)	What was (NAME's) last work situation while residing in (PLACE)? 1. Paid employment – full-time 2. Paid employment – part-time 3. Self employed (full or part time) 4. Unemployed / Looking for work 5. Retired from work altogether 6. Full-time student 7. Part time 8. Housewife/husband 9. Long-term sick or handicapped 10. In military service 11. Other (specify) 12. Don't know (For Code 4 to 12, skip to 7.12)	What is (NAME's) last occupation while residing in (PLACE)? 1. Managers 2. Professionals 3. Technicians and associate professionals 4. Clerical support workers 5. Service and sales workers 6. Agricultural, forestry and fishery workers 7. Craft and related trades workers 8. Plant and machine operators, and assemblers 9. Elementary occupations 10. Armed forces occupations 11. Don't know
1					
2					
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Section 7: Return Migrants *(Continued)*

PERSONID	7.12	7.13	7.14
	Why did (NAME) return? 1. Could not get residence there 2. Could not get work permit there 3. Work permit expired there 4. Residence permit expired there 5. No intention to stay there longer 6. Had accumulated enough money while living there 7. To take up temporary work here 8. Temporary work there had come to an end for the season 9. Got expelled from there 10. Family reasons/problems here/there 11. Missed family/partner/friends here 12. Other (specify)	Did (NAME) send any money to this household when he/she was in (PLACE)? 1. Yes 2. No	How did (NAME) usually send money to this household? 1. Western Union 2. MoneyGram 3. Other money transfer operator 4. Postal money order 5. Direct transfer to bank account 6. Bank as paying agent for money transfer operator (e.g. Western Union or Moneygram) 7. Foreign exchange bureau 8. Credit union 9. Travel agency 10. Informal individual agents 11. Mobile phone/ telecommunications service providers (MPESA, ZAP) 12. Through friend or relative 13. Courier, bus, or other transport 14. Brought back himself during visit 15. Pre-paid cards/ ATM card, re-loadable card, smart card 16. Internet Money Transfer 17. Other (Please specify)
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Section 7: Return Migrants *(Continued)*

P E R S O N I D	7.15	7.16	7.17
	Did (NAME) send money to this household <u>for particular purposes</u> when he/she was in (PLACE)? 1. Yes 2. No	If yes, what were the main categories that (NAME) specified?	Was the money that (NAME) sent used in the way that he/she specified?

7.16

Category	Yes or No 1=Yes, 2=No
1. Education	
2. Health	
3. Rent (house, land)	
4. Marriage/funeral	
5. Cars/trucks	
6. Rebuild house	
7. Build new house	
8. Business	
9. Land purchase	
10. Other	

7.17

Category	Yes or No 1=Yes, 2=No
1. Education	
2. Health	
3. Rent (house, land)	
4. Marriage/funeral	
5. Cars/trucks	
6. Rebuild house	
7. Build new house	
8. Business	
9. Land purchase	
10. Other	

ID	7.15	
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Section 7: Return Migrants *(Continued)*

P E R S O N I D	7.18	7.19	7.20
	Has (NAME) ever sent money to your household for expenses specifically in response to the following events? (Check all that apply.) 1. Drought 2. Flood 3. Earthquake 4. Cyclone / storm 5. Other (specify)	Did (NAME) send/bring goods to your household when he/she was in (PLACE)? Yes ....1 No..........2 (>>Q7.27)	Which of the following goods did you send/bring to your household? (Check all that apply)

7.20

	Yes or No 1: yes 2: no	QUANTITY	Value (Kshs)
a. Refridgerators/Deep freezers			
b. TV			
c. HiFi System			
d. Washing machine			
e. Set of furniture			
f. Stove/cooker			
g. Microwave			
h. Air conditioners			
i. Computer and accessories			
j. DVCD/DVD/Video			
k. Motorbike			
l. Cars			
m. Buses			
n. Trucks			
o. Corn mill			
p. Set of hair dressing equipment			
q. Sewing machine			
r. Tractor			
s. Other agriculture equipment			
t. Mobile phones			
u. Other (specify)			

ID	7.18	7.19
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4 The Determinants of the Subsequent Migration of Kenyan Siblings

4.1 Introduction

The current chapter uses the World Bank Migration and Remittances survey (2009), as described in the previous chapter, to empirically investigate the factors that motivate the subsequent migration decisions of siblings.[8] Subsequent sibling migration is a prevalent characteristic of the sample data in this case with 42% of those households with sibling migrants having more than one sibling migrant (see Table 4.1). Moreover, there is a high concentration of siblings in the sample with 44% and 67% of non-migrants and migrants, respectively, being siblings. Examining the migration behaviour of siblings enables us to understand how decisions to migrate are made within the Kenyan family context. In particular, we regard sibling migration as a strategy pursued by siblings as part of their livelihood and that of the household of origin and thus influenced by intra-household decision making processes regarding the allocation of the labour of adult children. The current research is thus intended to provide a better understanding of how individual and household factors interact to influence the migration decisions of Kenyan siblings. The research also contributes in explaining the key drivers of migration in Kenya using a relatively recent dataset.

Table 4.1: Households with sibling migrants

No. of sibling migrants	No. of households
1	435
2	191
> 3	128
Total	754

Source: Author's own calculations from the World Bank Migration and Remittances Survey (2009).

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[8] Subsequent sibling migration refers to the migration of a sibling after the preceding migration of a sibling from the same household.

4.1.1   Research questions

The main research objective of this chapter is to investigate whether sibling migration is primarily motivated by the desire to maximise expected net returns to migrating with networks facilitating subsequent migration, and/or if the household's need to minimize income risk through diversifying income sources, as articulated in the new economics of labour migration (NELM), dominates.

The investigation undertaken in this chapter is two-pronged. Firstly, the aforementioned migration motives are differentiated through conducting empirical analysis to determine the effect of the presence of a preceding sibling migrant on the probability of subsequent sibling migration. The study also explores whether these migration motives vary by sibling gender and the type of migration[9] undertaken. In addition, we investigate whether the effect of the presence of a preceding migrant on the probability of migration differs according to the relationship of the migrant to the sibling. Specifically, we differentiate between the effects exerted by preceding sibling and preceding non-sibling migrants. Secondly, the research examines the impact of the migration of a preceding sibling on the probability of exiting the state of non-migration by any other siblings present in the household using discrete failure time analysis. In a similar vein to the migration probability analysis, we determine whether the effects on the probability of exiting the non-migration state vary according to the type of migration undertaken and according to the relationship of the preceding migrant to the sibling. The discrete failure time analysis has the advantage that it allows any unobservable variables at the household level to be accounted for.

4.1.2   Research contribution

The study of sibling migration behaviour is important because it provides new insights into the migration decisions of individuals belonging to the same origin household. The exclusive focus on siblings in this chapter enables a more effective interrogation of migration decisions exploiting a smaller and more uniform sub-sample.

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[9] In the current context, we simply distinguish between internal and external migration.

Despite the vast literature on migration, to the author's knowledge, Palloni *et al.* (2001), Bras and Neven (2007) and Kesztenbaum (2008) represent the few studies that have analysed subsequent sibling migration in a similar spirit to the current analysis. The latter two studies are on European sibling migration, while the former is on Mexico-US migration. Thus, the contexts of past studies are different with respect to the one undertaken here. The current chapter therefore contributes towards filling the gap in the literature on sibling migration within an exclusively African context by analysing the determinants of, and time to, sibling migration for the case of Kenya.

The chapter proceeds as follows: section 4.2 discusses the main theories of migration in the literature, provides a review of the empirical evidence on sibling migration, and highlights a conceptual framework for subsequent sibling migration. The data used and the key variables proposed for the analysis, including summary statistics, are described in section 4.3. Section 4.4 presents the econometric models, details the estimation procedures and discusses the potential endogeneity of the preceding sibling migrant variable. The empirical findings are presented and discussed in section 4.5. Finally, section 4.6 offers some concluding comments.

4.2   Literature review

In this section the dominant theories of migration found in the literature and relevant to the analysis undertaken in the current chapter are discussed. The findings of selective empirical studies that have focussed on the migration of siblings are also reviewed in the current section. At the end of the section, we discuss a conceptual framework for subsequent sibling migration that emanates from the theories and the extant empirical evidence in the literature.

4.2.1   Review of theory

Three main theories dominate the migration literature: neo-classical cost-benefit theories, the new economics of labour migration (NELM) theory, and network theory. In addition, some concepts from the life cycle model[10] also help to explain factors influencing migration.

The models that used a cost-benefit framework were among the first to examine the individual decision-making processes of migration. Individual rational actors decide to migrate because a cost-benefit calculation leads them to anticipate a positive net return from migration, where the net return is usually expressed in monetary terms. Thus, migration is viewed as an investment in which the income gain and other benefits that accrue from migration must exceed the associated costs for migration to occur (Sjaastad 1962, Borjas 1989). Harris and Todaro (1970) explain migration within the context of rural-urban wage differentials, which emphasizes the expected income gains to migrating. However, the basic theoretical considerations underlying the model can also be applied to external migration. A major criticism of cost-benefit models has been that they rely too heavily on the role of wage differentials and lack strong empirical support.

Sjaastad (1962) formulated the human capital migration model, which treats migration as an individual investment decision that increases the productivity of human capital in the labour market. In this model, individuals make a rational cost-benefit analysis of the expected discounted gross returns of migration over future time periods, migrating only when these expected returns net of costs are positive. Migration costs include both non-monetary[11] and monetary[12] costs. The returns in each future period are estimated by taking the observed earnings corresponding to the individual's skills in the destination country and multiplying these by the probability of obtaining a job there to obtain expected earnings in the destination. These expected earnings are then subtracted from those expected in the origin country (conceptualised as observed earnings in the

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[10] The life cycle model views the beginning or end of certain stages of life, which typically occur at specific ages, to be important determinants of migration (Mincer 1978, Kan 1999).

[11] Non-monetary costs can be taken to include psychological costs due to differences in cultural, linguistic or political proximity factors.

[12] Monetary costs consist of travel costs and the earnings forgone while travelling, searching for and/or learning how to perform a new job.

origin multiplied by the probability of employment). The difference is summed over a time horizon, then discounted by a factor that reflects the greater utility of money earned in the present compared to the future. From this difference in integrated values, the estimated costs are subtracted to yield the expected net return to migration.

The NELM approach was pioneered by Stark and Bloom (1985). It shifts the focus of the migration decision from the individual (as in neoclassical theory) to one of mutual decision making by viewing migration as a calculated strategy and placing emphasis on the family as the decision-making unit (Stark 1991). Migration decisions are often made jointly by the migrant and the family in the form of a mutually beneficial self-enforcing contractual arrangement where the costs and returns of migration are shared. This arrangement is possible due to a different time profile of risks where first the migrant is supported until a job has been found, and then the household receives remittances. Risk sharing is an important feature of the NELM model (Stark and Levhari 1982, Stark 1984, Katz and Stark 1986, Lauby and Stark 1988, Taylor 1987, Stark 1991). Because the family is a small group within which to pool risk, diversification is achieved by the migration of one or more members into a sector where earnings are not perfectly correlated with those in the origin sector (Stark and Bloom 1985). Just as risk sharing explains migration by part of the family, it also explains non-migration by the remainder. Because skill-related attributes of individual family members influence the costs and benefits of migration for households as well as for the individual, human capital theory has been incorporated into NELM models. As such, the household's decision is made in terms of interactions between individual and household variables such as household assets and the human capital levels of members.

In contrast to the neoclassical model, which assumes that all markets are complete and well-functioning, the NELM assumes that key markets besides the labour market (i.e., futures, capital, and insurance markets) are either imperfect, inaccessible or missing (Stark 1991). Migration is thus seen as a response to income risk and failures in insurance, credit and labour markets, which together constrain local income opportunities and inhibit risk-spreading. As households are assumed to depend on wages earned by family members, sending members abroad is a form of

unemployment insurance. If employment conditions in foreign and local labour markets are imperfectly correlated, then migration provides a way of reducing the risk to family income and guarantees a reliable stream of income in the form of remittances used to support the family.

The network theory of migration considers the factors that perpetuate rather than initiate migration. A dependence upon "network and kinship capital" is often a major characteristic of migrant behaviour and the first cohorts of migrants decrease the costs of subsequent migration (Stark 1991). Migrant networks comprise sets of interpersonal relationships that connect migrants, former migrants, and non-migrants in origin and destination areas through ties of kinship, friendship, and shared community origin. Network connections constitute a form of social capital that people can draw upon to gain access to foreign employment (Massey *et al.* 1994) but also potentially employment elsewhere within the country of origin.

There exists a connection between neoclassical and network theory in that migrant networks increase the likelihood of migration by lowering the costs and risks of movement and thus increasing the expected net returns to migration (Massey and Espinosa 1997). A proposition of network theory is that controlling for a person's individual migrant experience, the probability of international migration should be greater for individuals who are related to someone who has prior international experience, or for individuals connected to someone who is actually living abroad. Moreover, the likelihood of movement should increase with the closeness of the relationship (Massey *et al.* 1994).[13]

Finally, the life cycle model has shown that life-course events such as the beginning of a new job or retirement (Mincer 1978, Kan 1999) or the start or end of educational stages (Sjaastad 1962) can influence the decision to migrate or stay. Young adults have also been shown to move in order to leave the parental home or form relationships such as cohabitation or marriage (Mulder and Wagner 1993).

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[13] In other words, having a brother in Germany, for example, is more likely to induce a Kenyan to migrate there than having a cousin, a neighbour, or a friend in that country.

4.2.2   Review of empirical evidence

Only a few empirical studies in the migration literature have examined the phenomenon of subsequent sibling migration to the author's knowledge. The author is not aware of any studies that have analysed subsequent sibling migration in an African context, as proposed in this chapter. The current study, therefore, makes an important contribution to this particular literature.

Palloni *et al.* (2001) analyse the risk of migrating from Mexico to the US for sibling pairs. They employ a multistate hazards model which enables control for unobserved heterogeneity in the hazard of migration. The various sibling migration states are: (i) neither sibling migrated, (ii) the older sibling migrated, (iii) the younger sibling migrated, and (iv) both siblings migrated. They use panel data from the Mexican Migrant Project undertaken in 1982-83, and then in successive years from 1987 to 1995. Their findings reveal that having an older sibling who migrated to the US triples the probability of younger siblings migrating to the US. The existence of a sibling migrant increases the speed of transition to international migration, reduces the age of first departure and lowers the percentage of siblings who never migrate. Their study differs from the current one in that their aim is to demonstrate the validity of network theory by comparing it with other theories that predict the same outcomes, namely human capital theory, neoclassical income maximization and NELM risk diversification.

Stecklov *et al.* (2010) focus on the causes of international migration using data from the Albania 2005 Living Standards Measurement Study. They analyse the timing of the first migration of siblings between 1990 and 2004 and employ discrete-time hazard models using a logistic regression. They specify the baseline hazard model using dummy variables for each year at risk. To control for the endogeneity of network variables, the study does not include migration from the most recent year. Their findings reveal that women are less likely than men to migrate and that the gender migration gap is larger for temporary compared to permanent migration. Also, both male and female migration is found to be strongly influenced by the availability of family networks of the same gender. As a robustness check, the study controls for unobserved heterogeneity by estimating a random-effects logistic model. They find their results to be robust to the control for unobserved

heterogeneity. The analysis in this thesis employs similar empirical methods to those of Stecklov *et al. (op. cit.)*. However, their focus is on external migration and their emphasis on siblings appears to have been undertaken for convenience rather than as a central part of their analysis. In addition, they conflate family migrant networks, whereas in the analysis conducted for this thesis a distinction is made between sibling and non-sibling networks. In addition, and a more obvious point, Albania and Kenya provide very different and distinct settings for migration analysis.

Curran and Rivero-Fuentes (2003) compare the impact of family migrant networks on the migration of siblings to the US and within Mexico using data from the 1999 Mexican Migration Project. Their analysis is conducted using the never married children of the household head aged between 17 and 25. Each migrant is matched to one or more non-migrants according to the age at the time of the survey and the community of origin. They exploit logistic regression models and also take into account the potential serial correlation between observations of individuals of the same age and from the same community. Their findings reveal that family migrant networks within Mexico increase the odds ratio of internal migration by 46%, on average and *ceteris paribus*. Female migrant networks are found to positively affect the internal migration of both men and women while male migrant networks are found not to affect the odds ratio of internal migration for either men or women. For migration to the US, having family members in the US increases the odds ratio of migration by over a factor of two compared to those having no migrant networks. Male migrant networks are found to be more important than female migrant networks for predicting international migration. Individuals with male migrant networks are approximately twice as likely to migrate internationally compared to those without access to such networks. On the other hand, the presence of female migrants was not found to significantly increase the odds ratio of international migration.

Kesztenbaum (2008) exploits data from the TRA survey[14] which reconstitutes families in 19th century France and uses military registers to study the migration pattern of male siblings according to their birth position. Using failure time analysis with a parametric Weibull hazard model, birth

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[14] The 3000 families survey was launched in the early 1980s. It is based on the systematic reconstitution of the trajectories and the descendants of all individuals whose last name begins with the letters T, R, and A.

rank is found to have no effect on the migration decisions of brothers. The study also finds that the migration of a brother has an overall positive influence on the migration of the remaining brothers. The study proceeds to make a distinction between network effects and a risk diversification strategy by comparing the destinations of successive migrants. In particular, the study investigates whether male siblings move to the same destination or to a different destination from brothers that migrated before them. There is no evidence found of the use of networks as the migration is not to the same destination. Rather, because the migrant destinations are different their evidence is suggestive of risk diversification. However, the authors are cautious in interpreting their findings because their estimates are not corrected for any unobserved heterogeneity at the family level. The study acknowledges that any correlation observed between the migrations of brothers could be due to a causal effect or to specific characteristics that are shared within the same family. Although the empirical methodology of this study is broadly comparable with the current chapter of this thesis, there are some major differences. Firstly, the datasets and time periods are evidently quite distinct and different in nature. Secondly, as acknowledged by Kesztenbaum (2008), the absence of sisters from the sample is an important omission. In addition, the study restricts the analysis to internal migration only.

Bras and Neven (2007) analyse the extent to which the presence and activities of siblings influence the chances of women migrating internally from the rural areas of Belgium (Pays de Herve) and the Netherlands (Zeeland) during the second half of the nineteenth and the first decades of the twentieth century. Using longitudinal data obtained from historical population registers, they exploit failure time analysis in applying a Cox proportional hazards model to estimate the risk of a first migration. Their findings reveal that moves made previously by sisters increased the migration prospects of women encouraging them to move to the same destinations as their sisters. For Pays de Herve, the greater the number of brothers who had migrated previously to rural and urban destinations, the more likely were women to migrate too. However, the influence of a brother's migration experience was less location-specific than that of a sister's previous movement. For Zeeland, the previous migration of brothers did not affect female migration risk. However, the greater the number of brothers who had formerly migrated to rural locations, the smaller were a

woman's chances of migrating to a city. Their econometric analysis finds no evidence of unobserved heterogeneity at the family level. This study differs from the analysis to be undertaken in this thesis given its emphasis on the internal migration behaviour of female siblings. In addition, and again fairly self-evidently, the time periods and datasets are different.

Randell and VanWey (2014) employ a discrete time hazard model and sibling data from a survey of 1,000 households in the Altamira and Santarem urban areas of Brazil collected in 2010 and 2009, respectively, to estimate the effect of sibling and parent networks on migration. The authors find that sibling networks are significant in determining out-migration in Altamira. In particular, individuals with a sibling living outside of the municipality are almost three times as likely to migrate in any given year as those whose siblings live within the municipality. Also, individuals born outside the state (this is used as a proxy for extra-local networks)[15] are found to be more likely to migrate compared to those born outside the city. However, parental networks (proxied by having at least one parent born outside the city) are not found to have any significant effect in determining migration. On the contrary, in the case of Santarem, individuals with siblings living outside of the municipality are found to be no more likely to migrate than those without such siblings. Extra-local networks are not found to have a positive effect on migration as individuals born within the city are found to be more likely to migrate than those born elsewhere. Finally, in contrast to the case for Altamira, parental networks are shown to have a positive effect on migration in Santarem as individuals with at least one parent born outside the city are found to be more likely to migrate.

Table 4.2 provides a summary of the studies discussed above. Overall, the literature review reveals that they are but a handful of studies that have investigated sibling migration and none has done so using data for an African country. Among these studies, most have found a positive network effect on the probability of migrating. The exception is Kesztenbaum (2008) who reports a negative effect on the migration of subsequent siblings to the same destination as preceding sibling migrants. Thus, the current chapter is unique both in the research questions it seeks to address, the dataset it uses, and the context to which it is applied. However, while the absence of studies for a

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[15] Extra-local networks refer to ties that link a potential migrant to friends and family in other parts of Brazil.

similar context to the current one allows us to make a unique contribution to the literature, it also

presents something of a limitation given we are unable to undertake a comparison with any existing

studies for Africa.

Table 4.2: Summary of studies on sibling migration

Paper	Data source & time period	Data type	Estimation methods	Network variables & effects
Palloni *et al.* (2001)	Mexican Migration Project (1982-1995)	Panel data	Multistate hazards model (single risk)	Older sibling in the US (positive effect) Younger sibling in the US (positive effect but lower than the older sibling effect).
Stecklov et al. (2010)	2005 Albania Living Standards Measurement Study (1990 - 2004)	Cross-sectional retrospective data	Discrete time hazard models (single risk)	Household male migrants (1.284 to 1.395) Household female migrants (1.193 to 1.323) Share of male migrants from community (1.005 to 1.006) Share of female migrants from community (0.993 to 0.985) Migrant family friends pre-1990 (insignificant) Migrant relatives pre-1990 (1.211 to 1.245)
Curran and Rivero-Fuentes (2003)	1999 Mexican Migration Project (1982-1997)	Panel data	Logit model with fixed effects (single risk)	No. of family migrants within Mexico (1.456) No. of family migrants in the US (2.408 to 2.333) Female family migrants within Mexico (1.841 to 1.807) Male family migrants within Mexico (insignificant) Female family migrants in the US (insignificant) Male family migrants in the US (2.21 to 2.52)
Bras and Neven (2007)	Longitudinal data from population registers (19th and 20th century)	Panel data	Cox proportional hazards model (single risk)	No. of sister migrants in rural areas (2.1 to 2.18) No. of sister migrants in urban areas (1.71 to 3.94) No. of brother migrants in rural areas (0.25 to 1.79) No. of brother migrants in urban areas (1.63 to 1.66)
Kesztenbaum (2008)	TRA survey (19th century France)	Panel data	Weibull proportional hazards model (single risk)	Presence of male siblings (positive overall effect; negative effect of migrating to same destination; positive effect of migrating to a different destination)
Randell and VanWey (2014)	Altamira and Santarem household survey (2010 and 2009)	Retrospective data	Discrete time hazard model (single risk)	Sibling networks (positive effect for Altamira, insignificant for Santarem) Non-sibling networks (positive effect for Altamira, negative effect for Santarem) Parental networks (insignificant for Altamira, positive effect for Santarem)

4.2.3   A conceptual framework for subsequent sibling migration

As per the NELM, we view the decision by Kenyan siblings to migrate as a decision made at

household level. Various empirical studies have reported evidence revealing that migration

represents a household-utility maximizing strategy (Rempel and Lodbell 1978, Stark and Levhari

1982, Hoddinott 1994). For a household to afford sending a migrant, the expected returns to

migrating must exceed the costs of migration borne by the household. Thus, unsurprisingly, the

poorest households are unlikely to send migrants since they cannot afford to finance the cost of

migration, especially external migration which tends to be more costly (Stark and Taylor 1991).

The expected returns to the migration of a household member primarily accrue to the household in the form of subsequent migrant remittances. In sending a migrant, the household bears several costs. For example, the household may contribute financially towards transportation costs, visa fees (in the case of external migration) and any costs associated with the migrant settling down in the destination. The household also incurs psychological costs due to the migrant's physical separation from the household of origin. In addition, since non-migrant members contribute towards household production, the household incurs costs related to the loss of labour.

To maximize the expected returns to migration, we expect households to send members with the highest expected wage differential. Because both internal and external migration are generally characterised by positive selection in Kenya,[16] migrants with the highest wage differentials tend to be those who are more skilled and with higher levels of education. Thus, households will send those members with higher levels of human capital as they have a better chance of getting a job in the destination and are more likely to obtain higher wages if they secure a job. At the same time, by sending members with higher levels of education, the household is likely to face a lower cost of migration as these members are in a better position to handle the administrative processes of migration (e.g., visa applications in the case of external migration) and are likely to assimilate more easily in the destination. Expected wages in the destination may also be a function of labour market experience which is often a function of an individual's age. In addition, in the Kenyan cultural context, older siblings are usually responsible for the welfare of the household and obliged to contribute towards household utility more than younger siblings. Thus, it can be expected that older siblings will be more likely to migrate.

We anticipate the preceding migration of a sibling to occur only when there is a positive overall effect on the expected utility of the household as a result of their migration. That is, migration will occur if the increase in household utility induced by the potential income gain from the migration outweighs the decrease in utility that results from the cost of migrating. The costs associated with subsequent sibling migration include the loss of additional labour, as well as the psychological and

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[16] The positive selection of migrants in Kenya is reflected in the observables of those who tend to migrate as noted in chapter 2.

financial costs associated with migration. Psychological costs and costs of losing additional labour are cumulative, while financial costs can be regarded as one-off. Given the presence of a preceding sibling migrant, the subsequent migrant should fully utilise the network by migrating to the same destination as the preceding migrant. Migration to the same destination lowers financial costs substantially as the preceding migrant can, for example, provide information on housing, or even accommodate the sibling, as well as provide administrative information concerning the migration process. In addition, the knowledge that the subsequent migrant is located in the same destination as the preceding one may lower the psychological costs incurred by the household. On the other hand, we expect that subsequent sibling migrants are unlikely to migrate to a different destination than the preceding migrant since, if this did occur, the subsequent migrant would not fully utilise the network and lower the costs of migrating to the household.

It is important to note that the type and nature of migration has implications for the relative magnitude of costs and benefits incurred. For example, the financial and non-financial costs of internal migration may be substantially lower. This is because internal migrants may be in a position to visit the household on a regular basis thus lowering the psychological costs, and/or enabling them to contribute to household production.

4.3   Data and summary statistics

The unit of observation for the empirical analysis is the individual (either migrant or non-migrant) aged more than 15 years and who is a child of the household head (namely, siblings). The age limit we impose is based on the assumption that prior to the age of 15 individuals are unlikely to make an independent decision to migrate (i.e., they are more likely to migrate as dependents and so their decisions are influenced by their parents or other adults). In addition, as the focus is on subsequent sibling migration, we restrict the analysis to those who are in households that have at least two siblings.[17]

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[17] This is obviously because there is no empirical identification of sibling effects for those households with just one sibling.

The subsequent discussion relates to the variables used in the empirical analysis. The choice of variable is determined by their relevance in capturing the research questions of interest using the theory discussed in section 4.2 above. In addition, the choice of variable is also governed by their availability in the dataset used for this analysis. The variables that are used in the probability of migration analysis and their summary statistics are first discussed. We then discuss the construction of the dataset for the failure time analysis and also present the summary statistics for the variables employed for that analysis.

4.3.1   Variables for modelling migration

4.3.1.1   *Predicting household expenditure*

In estimating migration models, it is commonly recognized that there is likely to be a reverse causality running between the levels of income (or poverty) and migration. That is, does migration determine one's living standards or do living standards determine migration. This issue is clearly apposite for this chapter but particularly challenging given the cross-sectional nature of the data available.

A household welfare metric is expected to be an important determinant of migration as emphasized in the migration theory. However, our data do not enable us to infer anything about asset ownership and other household status variables at the time of migration. Therefore, we cannot use these directly in the empirical analysis. The income levels of households are also absent from the survey. We therefore use expenditure levels as a measure of household welfare. Development economists generally agree that expenditure is a more accurate predictor of household welfare as, in contrast to income, it is less prone to shocks (Deaton and Zaidi 2002) and volatility. However, we do not know what the expenditure levels of those households with migrants were at the time of migration given such retrospective information is not available in this dataset. An obvious problem we have is that for households with migrants, the expenditure figures reported need to be adjusted for the value of any remittances received. An attempt to adjust for remittances through deducting the value of remittances received from total expenditure yielded a large number of negative values for the migrant households. These negative outcomes are not surprising given

that remittances represent income and not expenditure, and are thus not directly comparable. Further, it is possible that other earnings may adjust in response to the migration of a member (e.g., some family members may stop participating in the labour market or reduce their hours of work or *vice versa*).

In order to try and resolve this problem, we impute household expenditure per capita[18] at the time of migration for those individuals who migrated. In the literature, Adams *et al.* (2008) use predicted household expenditure per capita to analyse the impact of remittances on poverty and inequality using data from the 2005/06 Ghana Living Standards Survey. To control for selection bias in the expenditure estimates, Adams *et al.* (*op. cit.*) employ a two-stage multinomial logit model with instrumental variables.[19] In the first stage, they estimate the receipt of remittances by household status (i.e., receiving internal, external, or no remittances). Equations for the level of annual per capita household expenditure (including remittances) are estimated in the second stage for each household group and selection control terms obtained from the first stage are included here. The predicted expenditure is then estimated from the second stage equations and used to obtain counterfactual expenditure estimates for the different household categories.

In order to obtain predicted expenditure for the current analysis, the approach adopted is different from that of Adams *et al.* (*op. cit.*). First, using OLS we estimate the coefficients for a log of household per capita expenditure model using individuals belonging to households that do not have any migrants. We then fit these coefficients to all individuals and predict the log of household per capita expenditure for individuals belonging to both migrant and non-migrant households. However, the migrant characteristics used for prediction purposes are adjusted back to the realizations that prevailed at the time of their migration. Thus, we predict what the per capita household expenditure for migrants would have been at the time of migration, using predictors that

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[18] Expenditure per capita is obtained by dividing the total expenditure by the total number of household members. We are unable to adjust the per capita measure for children as we do not have this information for migrants at the time of their migration. We refrain from inferring the number of children as it is very likely that such inferences will not be precise. This would thus add a measurement error bias to any estimated coefficients for the expenditure variable.

[19] The instruments are obtained from partitioning the data into ethno-religious groups. The resulting instrumental variables used are: (i) external remittances received as a per cent of household income in the ethno-religious group and (ii) external migrants as a per cent of the population of the ethno-religious group.

are measured at the time of migration (see discussion below). As already discussed, a potential econometric problem encountered when predicting household expenditure this way is that of selection bias. A potential solution to this is to use a Heckman selection model in a manner broadly akin to the method employed by Adams *et al.* (*op. cit.*) discussed above.

Past research has found that migration networks are important in migration decisions and the receipt of remittances (e.g., Woodruff and Zenteno 2007, Munshi 2003). However, it is quite difficult to obtain suitable identifying variables in the current dataset. Unlike Adams *et al.* (*op.cit.*), our application requires the measurement of expenditure per capita at the individual and not the household level. Adams *et al.* (*op.cit.*) compare the welfare of remittance versus non-remittance receiving households by computing counterfactual expenditures using variables measured in the year of the survey. However, because we require a measure of expenditure at the time of migration for each migrant, in the current analysis we rely on backtracking the variables used to predict the per capita expenditure. It is difficult for us to construct the network variables employed by Adams *et al.* (*op.cit.*) because it would require tracing them back to the time of migration for each migrant and there is inadequate information available in the dataset to permit this. We are thus unable to address the potential selection bias in a meaningful or persuasive way in the current analysis. Therefore, the approach adopted exploits an uncorrected OLS procedure under the assumption of no selection bias. An additional assumption that is required in our application in using the OLS model to predict expenditure is that the relationship between the explanatory variables and expenditure has not changed over time. That is, the estimated parameters of the per capita expenditure function are assumed to be stable over the entire time period governing the migration episodes we model.

It is hypothesized in the log expenditure model that households with heads who are more educated will have higher per capita expenditure due to their greater earnings capacity. Male-headed households are expected to have higher per capita expenditure levels compared to female-headed ones as the latter are generally poorer in Kenya (see International Monetary Fund 2010). Household size is likely to exert a negative effect with the age of the household head expected to have a non-

linear effect. The proportion of elderly people in the household is envisaged to have a negative effect due to the high poverty levels prevalent among elderly people in Kenya (see, e.g., Kakwani *et al.* 2006). The effect for the proportion of children is expected to be non-linear because of economies of scale in consumption. The expenditure levels are also expected to vary by region (i.e., Nairobi, Central, Eastern, North-eastern, Coast, Rift Valley, Nyanza, and Western) and by urban/rural location due, among other things, to regional differences in the cost of living. In addition, we also introduce a set of interaction terms where the urban/rural and region of location binary variables are interacted with the aforementioned variables. The realizations of all the variables, with the exception of the gender and education level of the head and the urban/rural and regional dummy variables, are inferred for migrants through tracing their outcomes back to reflect their status at the time of migration.

The prediction of per capita household expenditures in this way obviously has some shortcomings. The size of the household and the numbers of children and elderly people may not be accurate if some members died between the time of migration and the time the survey was conducted, so a degree of measurement error is potentially introduced. The household head may have changed between the time a migrant left the household and the time the survey was conducted. The regional and urban/rural location variables may not accurately reflect the location of the household at the time a migrant left if the household of origin subsequently moved to a new location. The education variables for the head of household may have some degree of error as well, though it seems innocuous to assume that the head acquired no further education after the migration of a child aged more than 15 years.

As noted above, the log of per capita expenditure regression model is conducted at the individual level, and for all individuals (i.e., both siblings and non-siblings). It is necessary to conduct the analysis at the individual, and not the household, level because for most households with more than one migrant, migrants left at different times implying that household expenditure is different for each migrant depending on when they left. The summary statistics for the variables used in the per capita expenditure model are reported in the Appendix (see Table A4.1). The first,

second and third columns of the table report summary statistics for the pooled sample, and for non-migrants and migrants, respectively. The fourth column reports t-tests/z-scores for the differences in means/proportions between migrants and non-migrants. The table reveals that non-migrant households are more likely to be headed by males and to have younger heads. Migrant households have a larger household size. Household heads in migrant households are more likely to have no education and to have post-secondary and university education. On the other hand, non-migrant household heads are more likely to have primary and secondary education. The proportion of elderly people is larger and the proportion of children is smaller for migrant households.

The OLS regression estimates for the per capita expenditure model are presented in the Appendix (see Table A4.2). Specification (I) does not include any interactive terms and is provided as a benchmark permitting a more meaningful interpretation of the results. All the statistically significant coefficients in this specification have the expected signs. Specification (II) contains the interactive variables and is used to predict the log of per capita expenditure for all individuals. The model is very well determined with an R-squared of 0.545. In the empirical analysis, to distinguish between the differing expenditures of households, the predicted expenditure per capita variable is decomposed into five splines based on log expenditure quintiles. Splines one and five represent 20% of households with the lowest and highest welfare respectively.

As already highlighted, there are shortcomings that are associated with predicting expenditure in the manner just discussed. We accept that the predicted expenditure variable is unlikely to be a precise measure of household welfare. To check whether this variable at least provides an acceptable measure of household welfare, we compare the Gini coefficient computed from the predicted expenditure variable to that provided by the World Bank. The latest World Bank Gini coefficient estimates for Kenya are for 2005 and provide an estimate of 0.48 (see World Bank 2014). The Gini coefficient based on our estimate of predicted expenditure is 0.62 and appears high relative to the World Bank estimate. This may be because our sample of individuals is not representative of Kenya. In addition, the World Bank estimate is based on income not consumption expenditure. However, the fact that we use splines to delineate the expenditure of

households reduces concerns about whether the approach used over-predicts or under-predicts provided the household rankings within quintiles are correct.

4.3.1.2   *Other explanatory variables*

The other variables that are central to the empirical analysis are now discussed. The household characteristics that are incorporated in the model include those capturing whether the household is located in an urban or a rural settlement and a set of regional dummy variables. We also include dummy variables capturing the religious affiliation of the household head (i.e., Muslim, Catholic or Protestant). The proportion of adults, defined as the proportion of individuals in the household aged between 16 and 59 years, is used as a proxy for the availability of labour for household production. A variable capturing whether or not the household had a bank account at the time the migrant moved, or currently for non-migrants, is constructed. The ownership of a bank account is used to proxy for access to financial markets which is a key determinant of migration in the NELM model. It is possible that this variable is endogenous if individuals open bank accounts in anticipation of migrating. We address the potential endogeneity problem by lagging the bank account variable by two years. Another household level variable used is the total number of siblings which is adjusted to the number prevailing at the time of migration.

The individual characteristics include the age, birth rank[20] and gender of the sibling. A set of human capital variables comprising the education level and the employment status of the sibling are also included. We also incorporate the following life cycle model variables: whether or not the sibling is a female in the early stage of adulthood[21] and whether or not the sibling is a young adult who just completed the last year of high school.[22]

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[20] In the current analysis, the oldest sibling is allocated the highest rank. The birth rank variable is constructed using the ages of individuals. In sections 1 and 5 of the survey (see figure 3.1 of chapter 3) the respondent is asked to provide the ages of all current and former household members respectively. Using this information, we rank the ages of siblings in descending order with the oldest sibling assigned the highest birth rank value.

[21] This variable takes a value of one for women aged 20 to 30, and zero otherwise. Brockerhoff and Eu (1993) show that peak reproductive ages are between 20 and 29 in Kenya, and rural-to-urban migration is highest for women in this age group.

[22] We assign the value of one to this variable for siblings who are 18 or 19 years old, and whose highest schooling level currently (or at the time of migration) is secondary education.

The realizations for all these variables are backtracked to the time of migration for the sub-sample of migrants. The backtracking of variables is done by adjusting the variables so that they are representative of the situation prevailing at the time of migration for migrants. Some of the questions in the survey are asked about the current situation of the migrant. For example, in section 5 of the survey (see figure 3.1 of chapter 3) the respondent is asked to provide the age of the migrant (Q5.3) and how long the person has been a migrant (Q5.9). From this, we can calculate the age of the individual at the time they migrated from the household. The ages of current household members are provided in section 1 of the survey (Q1.4). Because we know the length of migration, we compute the ages of current household members at the time of migration. However, variables such as the employment and education status of the migrant are not back-tracked as responses to questions relating to these are provided for the situation at the time of migration (see Q5.12 and Q5.15 of the survey).

Lastly, a set of network variables are incorporated as follows: a dummy variable for the presence of a preceding non-sibling migrant and a dummy variable for the presence of a preceding sibling migrant. We also include variables that identify the gender and destination (i.e., internal or external) of preceding sibling migrants. We account for return migrants by determining whether a current returnee had not yet returned at the time of migration, in which case they would be counted as a preceding migrant for the current migrant. Dummy variables capturing the ethnicity of the household head (i.e., Kikuyu, Luhya, Kalenjin, Luo, or Kamba) are also included.

After eliminating missing values for the variables discussed above, imposing the lower age threshold at 15 years of age, and restricting the sample to siblings from households with at least two siblings, the final sample consisting of usable data for all the relevant variables consists of 1,731 siblings from 752 households. The first column of Table 4.3 reports selected summary statistics for the pooled sample. The second, third and fourth columns report summary statistics for non-migrants, migrants, and t-tests/z-scores[23] for the difference in means/proportions between

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[23] In all the summary statistics tables throughout this thesis, even though t-tests are also provided for multiple outcome variables, the chi-squared goodness-of-fit test is the more appropriate test. The chi-squared test-statistics are provided in the tables where relevant.

migrants and non-migrants, respectively. The first seven rows provide summary statistics for the various dependent variables used in the empirical analysis. We see that 43% of siblings in the sample are migrants. There are slightly more internal than external migrants. The statistics also reveal that the majority of migrants migrated to an internal or external destination where there is no other sibling migrant present.

The table provides interesting contrasts between sibling migrants and non-migrants. Siblings from the poorest households are more likely to be non-migrants, while those from richer households are more likely to be migrants. We note that household bank account ownership is lower for migrants than non-migrants. Older siblings and those siblings belonging to households with a higher proportion of adults are more likely to be migrants. It is surprising that the total number of siblings in the household is lower for migrants than non-migrants as we expect the probability of migration to be higher in households with more siblings. Also, fewer migrants are from households located in urban areas compared to non-migrants.

The variables for the individual characteristics reveal that siblings between 26 and 45 years and females in early adulthood are more likely to be migrants than non-migrants. There are fewer migrants than non-migrants who are young adults who just completed high school. Migrants are more likely to have higher levels of education. From the employment status variables, we observe that more siblings who were unemployed and employed migrated. On the other hand, students and self-employed siblings are less likely to be migrants. Finally, the network variables reveal that siblings with preceding non-sibling and sibling migrants are actually less likely to be migrants.

Table 4.3: Select summary statistics for migration probability analysis

Variables	All	Non-migrants (0)	Migrants (1)	t-test/z-score†
Dependent variables:				
= 1 if sibling migrated; = 0 otherwise	0.43 (0.5)			
= 1 if sibling migrated internally; = 0 otherwise	0.23 (0.42)			
= 1 if sibling migrated externally; = 0 otherwise	0.20 (0.40)			
= 1 if migrated to same internal place as preceding sibling migrant; = 0 otherwise	0.06 (0.24)			
= 1 if migrated to same external place as preceding sibling migrant; = 0 otherwise	0.04 (0.20)			
= 1 if migrated to diff internal place from preceding sibling migrant; = 0 otherwise	0.17 (0.38)			
= 1 if migrated to diff external place from preceding sibling migrant; = 0 otherwise	0.16 (0.36)			
Household characteristic variables:				
Predicted log of per capita expenditure splines:				
Spline 1	9.69 (0.44)	9.7 (0.38)	9.67 (0.49)	1.56*
Spline 2	0.23 (0.14)	0.24 (0.14)	0.23 (0.14)	0.98
Spline 3	0.17 (0.16)	0.17 (0.16)	0.16 (0.16)	0.94
Spline 4	0.14 (0.2)	0.14 (0.2)	0.13 (0.2)	1.54*
Spline 5	0.17 (0.52)	0.13 (0.44)	0.2 (0.61)	-2.77***
=1 if household has bank account; = 0 otherwise	0.54 (0.5)	0.56 (0.5)	0.51 (0.5)	2.05**
Birth rank	2.12 (1.32)	1.95 (1.19)	2.35 (1.43)	-6.43***
Proportion of adults	0.67 (0.2)	0.66 (0.2)	0.67 (0.2)	-1.37*
Total number of siblings	3.75 (1.81)	3.86 (1.97)	3.6 (1.56)	3.02***
= 1 if household in urban area; = 0 otherwise	0.46 (0.5)	0.49 (0.5)	0.41 (0.49)	3.60***
Individual characteristic variables:				
Age dummy variables:				
= 1 if aged 15 to 25; = 0 otherwise	0.69 (0.46)	0.74 (0.44)	0.62 (0.49)	5.09***
= 1 if aged 26 to 35; = 0 otherwise	0.25 (0.44)	0.22 (0.41)	0.3 (0.46)	-4.10***
= 1 if aged 36 to 45; = 0 otherwise	0.05 (0.22)	0.04 (0.19)	0.07 (0.25)	-2.50***
= 1 if aged 46 plus; = 0 otherwise	0.01 (0.09)	0.01 (0.09)	0.01 (0.1)	-0.26
χ^2 test for age dummies				25.90***
= 1 if male; = 0 otherwise	0.57 (0.5)	0.56 (0.5)	0.58 (0.49)	-0.78
= 1 if female in early adulthood; = 0 otherwise	0.26 (0.44)	0.22 (0.42)	0.31 (0.46)	-4.15***
= 1 if young adult just completed high school; = 0 otherwise	0.07 (0.26)	0.1 (0.3)	0.03 (0.18)	5.65***
Education dummy variables:				
= 1 if university education; = 0 otherwise	0.11 (0.32)	0.07 (0.25)	0.18 (0.38)	-7.21***
= 1 if secondary education; = 0 otherwise	0.60 (0.49)	0.56 (0.50)	0.66 (0.48)	-4.16***
= 1 if primary education; = 0 otherwise	0.29 (0.45)	0.38 (0.48)	0.17 (0.37)	9.74***
χ^2 test for education dummies				115.87***
Employment status dummy variables:				
= 1 if employed; = 0 otherwise	0.15 (0.36)	0.11 (0.31)	0.21 (0.41)	-5.78***
= 1 if self-employed; = 0 otherwise	0.1 (0.3)	0.11 (0.32)	0.08 (0.27)	2.54***
= 1 if student; = 0 otherwise	0.42 (0.49)	0.48 (0.5)	0.33 (0.47)	6.42***
= 1 if unemployed; = 0 otherwise	0.33 (0.47)	0.29 (0.46)	0.38 (0.49)	-3.89***
χ^2 test for employment dummies				67.07***
Network variables:				
= 1 if non-sibling migrant present; = 0 otherwise	0.18 (0.38)	0.25 (0.43)	0.08 (0.27)	8.70***
= 1 if sibling migrant present; = 0 otherwise	0.42 (0.49)	0.49 (0.5)	0.33 (0.47)	6.76***
= 1 if male sibling migrant present; = 0 otherwise	0.28 (0.45)	0.33 (0.47)	0.23 (0.42)	4.48***
= 1 if female sibling migrant present; = 0 otherwise	0.22 (0.41)	0.26 (0.44)	0.16 (0.37)	4.73***
= 1 if internal sibling migrant present; = 0 otherwise	0.24 (0.43)	0.26 (0.44)	0.21 (0.4)	2.66***
= 1 if external sibling migrant present; = 0 otherwise	0.22 (0.42)	0.28 (0.45)	0.15 (0.35)	6.86***
N	1731	980	751	

Notes to the table:

(i)   Standard deviations are reported in parentheses.

(ii) † The hypothesis under test here is: H_0: $\mu_0 = \mu_1$/H_0: $\pi_0 = \pi_1$. The column provides the t-ratios/z-scores for mean/proportion differences between non-migrants and migrants. *, **, *** represent the statistical significance of the differences for the 10%, 5% and 1% significance levels respectively.

(iii) The χ^2 tests are testing for differences between non-migrants and migrants for categorical variables.

4.3.2   Discrete failure time analysis variables

In order to conduct failure time analysis, we reorganize the dataset from the individual to spells at risk. The retrospective nature of the survey enables us to identify the timing of migration episodes. We create a variable measuring the year in which a migrant left the household using this information. Hence, a sibling is exposed to migration in discrete year intervals for each year from the time they turn 15 years until either the time they migrate or not. The time-varying covariates constructed include age, a dummy variable for year in which high school was completed, and a dummy variable for woman in early adulthood.

The education dummy variables are also reconstructed and this requires making a number of assumptions. In order to clarify how this is done, we will use an example of an individual who migrated at 35 years and had university as the highest schooling level. The primary education level dummy always takes the value of zero for this individual because it is assumed that they would have completed their primary education by age 15. The secondary education dummy assumes a value of one from age 15 to 19 because it is assumed that they were in secondary schooling at this time. The university education dummy takes a value of one from age 20 onwards as we assume they commenced university around that time, and then carried the qualification throughout the rest of the period observed in the data. There are obvious limitations associated with constructing the education dummy variables in this way. For example, there could be cases where a sibling acquired a certain level of education after the generic age at which individuals in Kenya acquire such a level of education. For instance, some individuals return to secondary school in adulthood or acquire a university degree when a mature student. However, we are unable to correct for this possibility as the information available in the dataset is limited in this respect but note it is likely to be small in scale.

A dummy variable for the presence of a non-sibling migrant is also constructed. We are able to determine the time before and after departure since we know the time at which the non-sibling migrated from the household. The same procedure is used to create the dummy variable for the presence of a preceding sibling migrant, which is the variable of primary interest here. We also incorporate any current return migrants who had not yet returned. Despite using discrete time intervals, the variables capturing the presence of a preceding migrant do not suffer from interval censoring in the case where siblings migrate in the same year but one migrated prior to the other. This is because we take into account the actual time of migration in constructing these variables. Hence, siblings from the same household may be observed to migrate in the same year but the one who migrated later in a particular year will have the preceding migrant dummy variable equal to one, while the other sibling will have it equal to zero in the year of migration.

The variables which did not require re-construction are the time invariant ones. These include gender, location of the household (urban/rural), regional dummy variables, ethnicity dummy variables, and dummy variables capturing the religion of the household head. Unfortunately, there are several variables used in the migration analysis above that cannot feature in the current analysis, as we are unable to recreate them on a temporal basis. For example, we only know the sibling employment status at the place of origin in 2009 for non-migrants, and in the year of migration for migrants. We are also unable to include variables measuring the income of the household or to predict it, as in the analysis above, given we do not have adequate information to do so for each time period.[24]

Table 4.4 provides summary statistics for the set of variables used in the failure time analysis. A spell begins when the sibling turns 15. We exclude siblings with a spell length that is less than three years in order to ensure that there is some variation in the explanatory variables for each sibling.

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[24] We are unable to undertake a spells at risk analysis in this application unless variables are back tracked. The spells at risk analysis entails reconstructing the dataset into a panel rendering the back tracking unavoidable in this case. Moreover, the spells at risk analysis only employs a select set of variables in order to limit the amount of back tracking undertaken.

Table 4.4: Select summary statistics for failure time analysis

Variables	All	Non-migrants (0)	Migrants (1)	t-test/z-score†
Dependent variables:				
= 1 if migrated; = 0 otherwise	0.06 (0.24)			
= 1 if migrated internally; = 0 otherwise	0.03 (0.18)			
= 1 if migrated externally; = 0 otherwise	0.03 (0.17)			
Explanatory variables:				
Age dummy variables:				
= 1 if aged 15 to 25; = 0 otherwise	0.71 (0.45)	0.71 (0.45)	0.72 (0.45)	-0.63
= 1 if aged 26 to 35; = 0 otherwise	0.23 (0.42)	0.23 (0.42)	0.23 (0.42)	0.06
= 1 if aged 36 to 45; = 0 otherwise	0.04 (0.2)	0.04 (0.2)	0.04 (0.2)	0.13
= 1 if aged 46 plus; = 0 otherwise	0.01 (0.11)	0.01 (0.12)	0.01 (0.1)	2.14**
χ^2 test for age dummies				4.67
= 1 if male; = 0 otherwise	0.6 (0.49)	0.59 (0.49)	0.6 (0.49)	-1.98**
= 1 if female in early adulthood; = 0 otherwise	0.26 (0.44)	0.25 (0.44)	0.27 (0.44)	-1.60*
= 1 if young adult just completed high school; = 0 otherwise	0.14 (0.35)	0.17 (0.38)	0.11 (0.32)	9.71***
Education dummy variables:				
= 1 if university education; = 0 otherwise	0.09 (0.28)	0.05 (0.22)	0.12 (0.32)	-13.30***
= 1 if secondary education; = 0 otherwise	0.71 (0.46)	0.64 (0.48)	0.77 (0.42)	-15.38***
= 1 if primary education; = 0 otherwise	0.24 (0.42)	0.32 (0.47)	0.16 (0.36)	21.42***
Network variables:				
= 1 if preceding non-sibling migrant present; = 0 otherwise	0.09 (0.28)	0.14 (0.35)	0.04 (0.19)	19.68***
= 1 if preceding sibling migrant present; = 0 otherwise	0.26 (0.44)	0.33 (0.47)	0.19 (0.39)	19.05***
= 1 if preceding male sibling migrant present; = 0 otherwise	0.17 (0.38)	0.22 (0.41)	0.13 (0.33)	13.33***
= 1 if preceding female sibling migrant present; = 0 otherwise	0.12 (0.32)	0.16 (0.36)	0.08 (0.27)	12.90***
= 1 if preceding internal sibling migrant present ; = 0 otherwise	0.13 (0.34)	0.16 (0.37)	0.1 (0.3)	9.32***
= 1 if preceding external sibling migrant present; = 0 otherwise	0.15 (0.35)	0.2 (0.4)	0.09 (0.29)	17.61***
Spell length (years)	9.08 (6.48)	9.08 (6.91)	9.09 (6.05)	-0.06
Spells at risk	12150	5876	6274	
No. of households	700	232	468	

Notes to the table:
(i) Standard deviations are reported in parentheses.
(ii) † The hypothesis under test is: H_0: $\mu_0 = \mu_1$/ H_0: $\pi_0 = \pi_1$. The column provides the t-ratios/z-scores for mean/proportion differences between non-migrants and migrants. *, **, *** represent the statistical significance of the differences for the 10%, 5% and 1% significance levels respectively.
(iii) The χ^2 tests are testing for differences between non-migrants and migrants for categorical variables.

The sample consists of 12,150 spells at risk for 1,525 siblings[25] and the average spell length is nine years. The first column provides the mean and standard deviation for the pooled sample and the second and third columns provide the same statistics respectively for non-migrants and migrants. The fourth reports the t-ratios/z-scores for mean/proportion differences between non-

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[25] The number of siblings is 206 less than that for the migration probability analysis (see Table 4.3) because we exclude siblings with a spell length that is less than three years.

migrants and migrants. The summary statistics reveal similar patterns to those originally reported in Table 4.3 of section 4.3.1.

4.4   Empirical methodology

The main empirical methods employed in this chapter to model the migration determinants of siblings exploit univariate and multiple outcome probability models, and discrete failure time models.

4.4.1   Univariate probability analysis for migration decision

In the univariate probability analysis, the binary dependent variable y has two possible outcomes (0 and 1) so a qualitative response model is therefore an appropriate regression model. The simplest approach to estimating a binary outcome model is to use the Linear Probability Model (LPM). However, there are some limitations inherent in the LPM. For example, the disturbance terms are binomially distributed and not normal (though will be so if the sample size is sufficiently large), and are inherently heteroskedastic. In addition, the conditional expectation is not bounded between zero and one. A solution to these limitations is provided by either a probit or a logit model. Given the subsequent multiple outcome analysis conducted in the current chapter uses a multinomial logit model, we also opt for a logit model for the univariate analysis. The deterministic model incorporating the type of migration variables discussed previously is represented as follows (see Greene 2003):

$$Prob(y_i = 1|z_i) = \frac{\exp(z_i)}{1+\exp(z_i)} \tag{4.1}$$

where $\qquad z_i = a + b_1 W_i + b_2 X_i + b_3 V_i$

and where:

y_i is the dependent variable and takes the value of 0 for a sibling who is a non-migrant and 1 for a migrant sibling.

W_i is a vector of variables capturing the characteristics of the household as listed in Table 4.3 for the ith individual.

X_i is a vector of variables capturing the individual characteristics of the sibling as listed in Table 4.3.

V_i is a vector of network-related variables as listed in Table 4.3, and also comprises a set of regional, ethnicity, and religious affiliation dummy variables.

4.4.2 Multiple outcome probability analysis

The multiple outcome analysis helps investigate the determinants of subsequent sibling migration by type of migration (i.e., internal versus external migration). To do this, the following multinomial logit (MNL) model is specified:

$$Prob(y_i = j|z_i) = \frac{\exp(z_i)}{1+\sum_{k=1}^{j} \exp(z_i)} \qquad (4.2)$$

where:

$j = 0, 1, 2$ if a sibling does not migrate (= 0); migrates internally (= 1); or migrates externally (= 2). z_i is as defined in equation (4.1) above.

Further, we also employ the MNL model to analyse the migration destinations of subsequent sibling migrants. The following categories of dependent variable are used: $j = 0, 1, 2, 3, 4$ if a sibling does not migrate (= 0); migrates to an internal destination with no siblings (= 1); migrates to an external destination with no siblings (= 2); migrates to an internal destination where there is a sibling (= 3); or migrates to an external destination where there is a sibling (= 4). In the case of internal migration, the data report the exact town or city within Kenya where a migrant resides. For external migration, we know the country where a migrant resides but not the town. The fact that we only know the destination of migrants at the country level for external migration may be problematic because we treat siblings who migrated to the same country as having migrated to the same destination. If they are located in different towns within the same country, it may be inappropriate to treat them as residing in the same location. Unfortunately we are unable to

distinguish by location given that the dataset does not contain the exact location within the country abroad (see Table A4.3 in the Appendix for a list of the internal and external migrant destinations).

4.4.3 Discrete failure time analysis

We also employ a logit model to undertake the duration analysis as this model is commonly used in discrete failure time analysis. We assume a single risk outcome, which is estimable using a univariate probability model. The use of the logit model exploits the empirical methods adopted above in sections 4.4.1 and 4.4.2 and is also comparable with the techniques used by some studies in the existing literature (e.g., Stecklov *et al.* 2010). The dependent variable is a measure of migration risk at given time periods. It is denoted by $y_{i,t}$ and equals one if the ith sibling exits the state of non-migration at time period t, and zero otherwise. It represents the probability of sibling i migrating in an infinitesimal small interval after period t conditional on having survived to period t.

The discrete time logit model can be expressed as follows:

$$prob\left(y_{i,t} = 1\right) = \frac{\exp\left[\beta' x_{i,t} + \Upsilon' D_{i,t}\right]}{1 + \exp\left[\beta' x_{i,t} + \Upsilon' D_{i,t}\right]} \tag{4.3}$$

$x_{i,t}$ is a vector of the sibling and household characteristics (some of which do not vary by time) that may affect the migration risks of siblings (see Table 4.4). The vector $D_{i,t}$ denotes the baseline hazard which is specified by a set of dummy variables in five year intervals. This flexible baseline hazard might capture individual level heterogeneity in this application.

In the estimation of equation (4.3), a major concern is that there may be unobserved household level variables (i.e., neglected heterogeneity) that may influence the risk of migration (see Jenkins 2005). If these effects are important but ignored in the modelling, the estimates obtained will be biased. To resolve this, we treat household effects as random and employ a random-effects logit model. In estimating such a model incorporating heterogeneity, we assume the error term follows a Gaussian distribution. The random-effects logit model can thus be expressed as follows:

$$prob\left(y_{i,t} = 1\right) = \frac{\exp\left[\beta' x_{i,t} + \Upsilon' D_{i,t} + u_h\right]}{1 + \exp\left[\beta' x_{i,t} + \Upsilon' D_{i,t} + u_h\right]} \tag{4.4}$$

where u_h is an unobservable random variable that captures neglected heterogeneity at the household level. $u_h \sim N(0, \sigma_u^2)$, where $\sigma_u^2 = \frac{\rho}{1-\rho}$ and ρ captures the correlation in the unobservables across the households. If $\rho = 0$, this implies that the panel-level variance component is unimportant and that the random-effects logit estimates are not different from the pooled logit model specified in equation (4.3). The test for the statistical significance of ρ therefore provides a formal test for the presence of random effects (see Baltagi (2008) for further details).

4.4.4 Potential endogeneity of the preceding sibling migrant decision

A potential endogeneity problem arises if the unobservables that determine a sibling's own migration decision and having a preceding sibling migrant are correlated. If this is the case, the estimates obtained from a regression model will be biased and inconsistent (Wooldridge 2010). For example, having a preceding sibling migrant is likely to be correlated with unobserved variables such as a pre-disposition to migrate, a risk-taking aptitude, certain intrinsic preferences, or other characteristics shared by members of the same family due, for instance, to a common upbringing, or parental experiences that influence the decisions of siblings to migrate (see, e.g., Manski 1993). In this case, a positive correlation between the unobservables for siblings in the same family will result in an upward bias in the estimated coefficient.

Selection bias could also arise. For example, if individual ability is positively correlated with migrating, then higher ability siblings will migrate as preceding migrants. As such, there will be a negative correlation between a sibling's unobserved ability and the presence of a preceding sibling migrant. Low ability siblings will be less likely to migrate and also more likely to have a preceding sibling migrant. This would result in a downward bias in the estimated coefficient on the preceding sibling migrant variable. This downward bias can be expected to be potent in the case where there exists a strong substitution effect in the migration of family members. However, the direction of bias could vary depending on whether low or high ability siblings are migrating.[26] It is quite likely that unobserved ability would be correlated with observables like education, and so controlling for

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[26] For example, McKenzie and Rapoport (2007) find that Mexico-US migration tends to be characterised by positive self-selection in communities with low migrant networks due to high migration costs and negative self-selection in communities with high migrant networks.

education in the regression analysis should capture a large part of the unobserved ability.[27] Therefore, it is arguable that unobserved ability may not present as a significant problem for the interpretation of the regression estimates reported here.

However, the putative endogeneity of preceding migration is an empirical question that is testable under certain conditions. A natural way of investigating the potential endogeneity problem would be to use an instrumental variables (IV) approach which entails obtaining an instrument(s) that is (are) correlated with the endogenous variable but uncorrelated with the error term in the migration equation (Wooldridge 2010). However, in the current application, as in other such applications, valid instruments are difficult to obtain using cross-sectional data.[28] In the absence of relevant instruments, an alternative and tentative solution to the endogeneity problem would be to treat the unobservables as fixed or random effects within a discrete time framework. This is essentially what is anticipated in our failure time analysis outlined in the previous section.

In spite of the foregoing econometric concerns, it remains the subject of debate whether the preceding sibling migrant variable is actually endogenous or not in a conceptual sense. Firstly, it seems plausible that households will re-optimize their strategy after the migration of a member thus weakening the correlation in unobservables in the separate migration decisions for siblings. In this case, it implies that what is estimated is the probability of migrating conditional on having a preceding sibling migrant. Re-optimization of the migration strategy is likely if there is a long enough time interval between separate migrations. Robustness checks are conducted to determine if the estimates we obtain are sensitive to the amount of time that passed since a preceding sibling migrant left the household.

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[27] The data reveal that more educated siblings are migrants. The correlation coefficients for being a migrant and having university, secondary and primary education are 0.16, 0.05, and -0.22, respectively.

[28] For example, the dataset employed does not contain any information on previous income shocks to the household that may have influenced the migration of preceding sibling migrants but not that of subsequent migrants. An attempt to use rainfall shocks and unemployment rates in the year prior to the migration of a preceding migrant as instrument variables proved futile as no statistically significant effects were registered on the probability of preceding sibling migration. A limitation encountered is that these variables could only be obtained at aggregated levels such as the enumeration area or the regional location.

Secondly, it is possible that the destination intentions of preceding sibling migrants are not always realized and they may ultimately migrate to an alternative destination, not by choice but by chance. If the destinations of preceding siblings are random, this implies that the unobservables relating to having a preceding sibling migrant in a certain destination are unlikely to be correlated with those of subsequent siblings as they would have been correlated only if the preceding sibling migrated to the destination of his/her choice. In this case, the preceding sibling variable would simply proxy for a 'pure' network effect in the migration decision of the subsequent migrant. It is possible that in the data there may be preceding siblings who, for example, intended or attempted to migrate to OECD countries but failed to do so and ended up migrating to another country in Africa instead. There is a vast literature on migration intentions showing that intentions are not always realised or are realised differently than first anticipated.[29] This is especially true in the case of external migration where the realization of intentions is subject to additional constraints and immigration policies may prevent many people from realizing their original intentions (Avato 2009). Unintended destination outcomes are also a possibility in the case of migrants who move to an initial destination, and then relocate to another destination, especially owing to unfulfilled expectations (DaVanzo and Morrison 1981). In the case of Kenya, preceding sibling migrants could move to a certain country and face hostility, and/or unfavourable conditions there, causing them to relocate to an alternative destination. For example, there have been reports of xenophobic attacks against Kenyan investors in South Sudan (Otieno 2012). As such, preceding migrants who moved to South Sudan initially may relocate to other areas in Kenya, for example, where subsequent migrants then join them. In the current analysis, the absence of information on the actual destination intentions of migrants prevents us from testing this proposition.[30]

Furthermore, it seems that endogeneity is a lesser concern in the case where the presence of a preceding sibling migrant decreases the migration probability of siblings. This is because while

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[29] For example, Beenstock (1996) notes that Israel is a default destination for many migrants from the formerly communist regimes who intended to migrate to the West but were inhibited from doing so by immigration controls, resulting in them settling in Israel instead.

[30] Unless we assume, for example, that all preceding migrants in Africa would have intended to migrate to OECD countries instead. However, this assumption seems untenable.

correlated unobservables may dictate that both siblings migrate, the family strategy overrides such unobservables so that these same unobservables do not influence the remaining siblings to migrate and they end up remaining at home. Hence, in the case of households using migration as a risk diversification strategy where a sibling migrates and the rest stay at home, it is possible that unobservables that drive the preceding sibling migrant are different from those that dictate that the rest of the siblings remain at home. This would act to at least attenuate but possibly render uncorrelated these unobservables. Thus, given difficulties in empirically testing the proposition of endogeneity, the regression estimates reported in the empirical analysis for this chapter are best interpreted as conditional on the presence of a preceding sibling migrant. However, the foregoing discussion emphasized that it is not implausible to argue that the perceived presence of such an endogeneity is more 'imagined' than 'real'.

4.5   Empirical results

4.5.1   Univariate probability analysis

Table 4.5 reports the results for the univariate logit model as specified in equation (4.1). In the first specification the preceding sibling migrant dummy variable is the variable of primary interest for our research question. In the second and third specifications respectively, the preceding sibling migrant dummy variable is split into male or female, and internal or external preceding sibling migrant. In all regression models, the standard errors are clustered at the household level in order to control for any unobserved family level effects influencing migration correlated across the same household.

The findings in regard to networks in the first specification indicate that the presence of a preceding sibling migrant (compared to the absence of one) decreases the probability of migrating by 23 percentage points on average and *ceteris paribus*. The sample average migration rate is 0.43. Thus, the effect of the presence of a preceding sibling migrant corresponds to a 53% decrease relative to the mean. In the second specification, we see that if the preceding sibling migrant is female (male), the probability of migrating decreases by 16 (19) percentage points, on average and

ceteris paribus. Again, these represent sizable decreases in the probability of migrating relative to the mean.

Table 4.5: Binary logit model estimates (marginal/impact effects)

Variables	Specification I	Specification II	Specification III
Household characteristic variables:			
Predicted expenditure: spline 1	-0.0505	-0.0666*	-0.0729**
	(0.0355)	(0.0343)	(0.0350)
Predicted expenditure: spline 2	0.0130	0.0462	0.0556
	(0.160)	(0.160)	(0.160)
Predicted expenditure: spline 3	0.256	0.223	0.210
	(0.160)	(0.163)	(0.163)
Predicted expenditure: spline 4	-0.203*	-0.214**	-0.182*
	(0.109)	(0.109)	(0.110)
Predicted expenditure: spline 5	0.118***	0.124***	0.112***
	(0.0405)	(0.0390)	(0.0407)
= 1 if hh has bank account	-0.0782***	-0.0757**	-0.0654**
	(0.0300)	(0.0301)	(0.0299)
Proportion of adults in household	-0.160*	-0.167**	-0.148*
	(0.0824)	(0.0816)	(0.0824)
Total number of siblings	-0.0416***	-0.0424***	-0.0399***
	(0.00967)	(0.00962)	(0.00956)
= 1 if household located in urban area	-0.0485	-0.0434	-0.0509*
	(0.0298)	(0.0310)	(0.0305)
Individual characteristic variables:			
= 1 if aged 26 to 35	-0.0104	-0.0137	-0.00910
	(0.0294)	(0.0298)	(0.0293)
= 1 if aged 36 to 45	0.0311	0.0284	0.0384
	(0.0601)	(0.0612)	(0.0600)
= 1 if aged 46+	0.0132	-0.00931	0.0186
	(0.0942)	(0.0944)	(0.0982)
Birth rank	0.0527***	0.0552***	0.0513***
	(0.00980)	(0.0101)	(0.00989)
= 1 if male	0.0863***	0.0856***	0.0826**
	(0.0329)	(0.0331)	(0.0325)
= 1 if female in early adulthood	0.133***	0.130***	0.129***
	(0.0371)	(0.0375)	(0.0366)
= 1 if just completed high school	-0.182***	-0.177***	-0.185***
	(0.0489)	(0.0490)	(0.0468)
= 1 if university	0.109***	0.102***	0.107***
	(0.0385)	(0.0385)	(0.0376)
= 1 if primary	-0.216***	-0.217***	-0.218***
	(0.0283)	(0.0288)	(0.0276)
= 1 if employed	0.00133	0.00412	0.00939
	(0.0372)	(0.0373)	(0.0373)
= 1 if self-employed	-0.0988*	-0.101*	-0.0966*
	(0.0524)	(0.0527)	(0.0509)
= 1 if student	-0.104***	-0.103***	-0.0995***
	(0.0306)	(0.0303)	(0.0303)
Network variables:			
=1 if prec non-sib mig present	-0.301***	-0.297***	-0.302***
	(0.0437)	(0.0431)	(0.0429)
=1 if prec sib mig present	-0.234***		

	(0.0250)		
=1 if int prec sib mig present			-0.164***
			(0.0316)
=1 if ext prec sib mig present			-0.269***
			(0.0312)
=1 if male prec sib mig present[31]		-0.193***	
		(0.0291)	
=1 if female prec sib mig present		-0.156***	
		(0.0346)	
Regional dummy variables	Yes	Yes	Yes
Religion dummy variables	Yes	Yes	Yes
Ethnicity dummy variables	Yes	Yes	Yes
Pseudo R-squared	0.237	0.231	0.244
N	1,731	1,731	1,731

Notes to the table:

(i)   ***, ** and * denote statistical significance from zero at the 0.01, 0.05 and 0.10 level respectively using two-tailed tests.

(ii)   Robust standard errors clustered at the household level are reported in parentheses.

(iii)   The regression model also includes other explanatory variables that are not shown here in order to conserve space (see text for details).

A Wald test reveals that the effect of a male preceding sibling migrant is not statistically distinguishable from that of a female (chi2(1) = 0.42) in the second specification. The relationship between the gender of preceding and subsequent migrants is investigated further below.

In the third specification in this table, we see that having an internal preceding migrant and having an external one decrease the probability of migrating by 16 and 27 percentage points respectively, on average and *ceteris paribus*. A Wald test reveals that the coefficients on the internal and external preceding sibling migrant variables are statistically different from each other at the 5% significance level (chi2(1) = 6.76). The effect of the presence of an external migrant corresponds to a 63% decrease relative to the mean, while that of an internal migrant corresponds to a 37% decrease. External sibling migrants therefore induce very large deterrence effects on the migration of subsequent siblings. The multiple outcome analysis presented below explores further the case of internal versus external migration.

The finding of a strong negative effect for the preceding sibling migrant is inconsistent with network theory predictions. It also contradicts most of the studies in the literature to date which

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[31] The coefficients for the male and female (internal and external) preceding sibling variables do not necessary span across the coefficient for the preceding sibling migrant variable as the former are not mutually exclusive. That is, a sibling may have both a male and female (internal and external) preceding sibling migrant.

have found a positive network effect for current migrants. However, the contrast in our result could be explained by differing contexts. The absence of any previous studies in the literature on multiple sibling migration in an African setting implies we have no comparable benchmark against which to compare our results.

The negative effect obtained here appears more consistent with the NELM proposition of households using migration as part of a diversification strategy in sending some siblings to other destinations, while retaining others at home to engage in work in either the local labour market or in other domestic activities. However, given our discussion earlier, some caution should be exercised when interpreting this particular effect as there is potential for a downward bias on the preceding sibling migrant coefficient owing to selection bias caused by unobserved individual ability. If, however, unobserved ability is correlated with observable education, this kind of bias may not be too severe as we do control for the education levels of siblings.[32]

We conduct a number of robustness checks on the estimated sibling effects. Firstly, we vary the amount of time that has elapsed since the migration of a preceding sibling migrant. Thus, we alter the definition of a preceding sibling migrant according to whether the migrant moved (i) more than a year ago, (ii) more than two years ago, and (iii) more than three years ago. The strong and negative estimated coefficient on the preceding sibling migrant dummy variable remains invariant to the use of these three different criteria (see Table A4.4 of the Appendix). We also exclude siblings with an age gap of two or fewer years from the sample. The purpose of restricting the samples in this way is to reduce potential endogeneity bias due to a potential correlation in the unobservables between siblings. For instance, unobserved variables relating to the household migration strategy are likely to be strongly correlated in those cases where siblings are closer in age to one another. If, for example, a household determines who migrates and who stays at a fixed point in time, this strategy is likely to be enforceable for those siblings who are closer in age. For example, while the household may decide a specific migration strategy *ex ante*, by the time younger siblings are of migrating age, the household may have had to re-optimize its strategy thus implying a weaker correlation in any

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[32] In addition, this kind of selection bias is only plausible under the assumption that unobserved ability can be ranked within a family.

unobservables determining preceding sibling migration and subsequent migration. The regression estimates we obtain for these restricted samples are comparable to those reported for the original sample (see Table A4.5 of the Appendix). This set of findings mitigates our concern that the reported negative estimate corresponding to the preceding sibling migrant dummy variable is subject to a downward bias attributable to a correlation in unobservables.

As a further robustness check, we vary the age threshold for siblings in the sample.[33] The key results we obtain are invariant to the use of samples where the age threshold is 18 or 21 years (see Table A4.6 of the Appendix). In addition, given that there may be concerns with the inclusion of students as migrants (see chapter 3), we exclude all full-time students from the sample and re-estimate the models above (see Table A4.7 of the Appendix). We again find that the key results are invariant to the exclusion of students. This therefore attenuates the concerns raised previously regarding the inclusion of students as migrants in our sample.

It could be argued that the finding of a negative effect of preceding migrants on the probability of sibling migration many be driven by first-born children who are unlikely to have preceding sibling migrants.[34] To test if there is empirical content to this notion, we construct a binary variable indicating whether or not a sibling is the first born and interact this with the preceding sibling dummy variable. Table A4.8 in the appendix reports the estimates obtained for this model. We see that, controlling for whether or not a sibling is the first born, the negative effect of a preceding sibling migrant appears robust. Moreover, the coefficient for the interaction term is statistically insignificant suggesting that the effect of preceding sibling migrants on the probability of migrating is statistically similar for both first born and the subsequent younger siblings. Therefore, it does not seem to be the case that the main negative result is being driven by a 'first born effect'.

We now turn to a discussion on other estimates in the binary logistic model. The presence of a non-sibling migrant (compared to not having one) decreases the probability of migrating by at least

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[33] It may be argued that if the migration age threshold is greater than 15, including siblings aged below the migration age threshold in the sample may induce a downward bias on the preceding sibling migrant coefficient.

[34] In the sample 6% of first born siblings have a preceding sibling migrant.

30 percentage points on average and *ceteris paribus*. A Wald test is conducted to determine if the effect of a preceding non-sibling migrant is statistically different from that of a preceding sibling migrant.[35] The estimated coefficients are not found to be statistically different from each other (chi2(1) = 2.14). This finding seems to support the NELM characterisation of migration as representing a decision made at the household level such that there is no distinction in the probability of migrating whether the preceding migrant is a sibling or not. As a robustness check, we exclude parents from the non-sibling migrant variable. The findings obtained are invariant to the exclusion of parents (see Table A4.9 of the Appendix). Thus the migration decisions of siblings appear to be joint decisions made by the household collectively, regardless of the type of relationship between household members.

It could be argued that the strong negative effect of preceding migrants on the probability of sibling migration may be driven by the definition of a migrant (see discussion in section 3.1 of chapter 3). That is, some individuals who are classified as migrants may not have maintained any connection with the household from the time they left. However, this seems unlikely from a Kenyan cultural perspective as it would require former household members to completely disconnect from the origin household. In the Kenyan culture, there is a large dependence on kinship relationships and networks across extended family lines (for example, see Kilbride and Kilbride (1990)). The nature of relationships in Kenya is such that even in the case where the persons involved are not part of the same nuclear family or are not in continual contact with each other, support networks will be invoked when the need arises. On this basis, it is not inconceivable to classify all former household members as migrants in the current thesis.

In addition, a robustness check to determine whether the definition of a migrant may be driving the findings is also undertaken. We restrict the sample to more recent migration by excluding any members who left the household longer than ten years ago. It seems reasonable to assume that individuals who left the household within the past ten years are more likely to retain existing connections with current members and thus provide more effective networks. Table A4.10

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[35] Only 4% of siblings (i.e., 69 siblings) in the sample have both preceding non-sibling and sibling migrants, and 14% (i.e., 235 siblings) have only preceding non-sibling migrants with 38% (i.e. 664 siblings) having only preceding sibling migrants.

of the appendix reports the results obtained for this restricted sample. Again, we see that the negative effect of preceding migrants persists providing some assurance that the manner in which migrants are defined does not exert any detrimental effect on the key findings in this chapter.

We now discuss the remaining results from Table 4.5. The estimates for the household characteristic variables reveal that being a sibling in a household in the top expenditure quintile (spline 5) exerts a positive effect on the probability of migrating, on average and *ceteris paribus*. This suggests that siblings from households who are most able to incur migration costs have a higher chance of migrating in Kenya.[36] Siblings in households that have a bank account are less likely to migrate, which is consistent with predictions from the NELM literature where households send migrants in response to missing or incomplete financial markets. Surprisingly, both an increase in the proportion of adults and an increase in the total number of siblings in the household decrease the probability of migrating. These findings are unexpected as both variables reflect labour availability in the household and we would anticipate siblings from households with more labour to have higher chances of migrating.[37]

For the individual characteristic variables, we see that older siblings are more likely to migrate than younger ones. In the Kenyan culture, older siblings assume responsibilities within the family from an early age and it seems natural that they would be given priority when it comes to a decision as to which siblings are to migrate. Both males and females in early adulthood are more likely to migrate. However, being a female in early adulthood has a stronger effect than being a male, with the estimated coefficients statistically different from each other at the 10% significance level. In comport with the life cycle model, women in Kenya have been shown to move mainly for marriage-related reasons (Bigsten 1996). Because most ethnic groups in Kenya are patrilocal, with women physically relocating to the household where their husband is resident upon marriage (Berg-Schlosser 1984), the finding obtained is to be anticipated. The estimates obtained for young adults

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[36] The findings on the expenditure variables conform to the Kenyan migration context discussed in chapter 2 thus confirming that the rankings of the predicted expenditure variable are not misinformative.

[37] It is unclear what the explanations are for these negative findings. The way we construct the variables for migrants may play a role in this. Since we trace back these variables to their values at the time of migration, it is possible that they may not be entirely accurate for migrants as we lack full information on the numbers and ages of household members at this time. Thus, it is not inconceivable they are measured with error.

who have just completed high school are at variance with the life cycle model, which predicts that they should be more likely to migrate in search of further education or employment opportunities. However, in comport with predictions from the human capital model, having a university education has a positive effect on the probability of migrating, relative to secondary education, while primary education exerts a negative relative effect. This is consistent with our priors as more educated siblings are likely to incur lower migration costs than less educated ones, as they have a higher chance of obtaining jobs and earning more income in the destination.

Being employed, relative to being unemployed, exerts no effect on the probability of migrating. This implies that there is no differential in the migration propensities of employed and unemployed individuals. This seems to be driven by the fact that employed individuals are likely to be more skilled while unemployed individuals are likely to migrate in search of employment because they have a lower opportunity cost of migrating. Being in self-employment or being a student (relative to being unemployed) have negative effects on the probability of migrating. The employment status dummy variables can be seen as proxies for the wages commanded by siblings at home. We expect that siblings with higher wages at home are more likely to migrate compared to those with lower wages as they potentially have more experience and are more skilled, though this is already controlled for by the inclusion in the specification of human capital variables. However, the type of migration may determine the extent to which this is valid. Hence, since the barriers to internal migration are lower, siblings with low schooling and/or skill levels at home may still be in a position to migrate. We explore this further in the multiple outcome probability model section below, where the analysis is differentiated across these types of migration.

We also estimate some alternative models to ensure that our key results are robust to different specifications of the model. Firstly, as there may be some concerns about predicting (or simulating) expenditure in the manner undertaken here, we replace the predicted expenditure variable with the actual variables used to predict it (see Table A4.1 of the appendix for a list of these variables). The results obtained are reported in specification I of Table A4.11 in the appendix. Secondly, we check whether the back-tracking of variables has any effect on our main results. We estimate a model

which does not feature any back-tracked variables where current realizations of the variables are now used for both migrants and non-migrants. Specification II of Table A4.11 provides the results obtained. In both specifications, we see that the main findings reported of a strong negative effect of preceding migrants hold. Thus, the key results obtained in the empirical analysis are invariant to both use of predicted expenditures or its instruments as well as to whether back-tracking of variables is used or not.

We now proceed to discuss findings obtained when the logit model is estimated for the male and female samples separately in order to examine whether there are gender differences in the probability of migrating. The impact effects are reported in Table 4.6 for only a sub-set of variables.

Table 4.6: Binary logit model estimates by gender (marginal/impact effects)

Variables	Females (0)	Males (1)	t-test: $H_0: \pi_0 = \pi_1$
= 1 if prec non-sib mig present	-0.222***	-0.354***	1.78*
	(0.0576)	(0.0470)	
= 1 if male prec sib mig present	-0.183***	-0.200***	0.30
	(0.0462)	(0.0343)	
= 1 if female prec sib mig present	-0.0923**	-0.201***	1.69*
	(0.0468)	(0.0442)	
Regional dummy variables	Yes	Yes	
Religion dummy variables	Yes	Yes	
Ethnicity dummy variables	Yes	Yes	
Pseudo R-squared	0.200	0.274	
N	749	982	

Notes to the table:

(i)   ***, ** and * denote statistical significance from zero at the 0.01, 0.05 and 0.10 level respectively using two-tailed tests.
(ii) Robust standard errors clustered at the household level are reported in parentheses.
(iii) The regression model also includes other explanatory variables that are not shown here in order to conserve space (see text for details).

We see that the presence of male or female preceding sibling migrants and the presence of non-sibling migrants all have a deterrence effect on the migration of both male and female siblings. The likelihood ratio test value suggests the null hypothesis of common effects across gender is upheld[38] thus revealing that there is no empirical justification for separating the samples by gender. This seems to provide evidence that both males and females participate in the household income source

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[38] The chi-square test statistic for the likelihood ratio test is 39.74 and this is distributed with 36 degrees of freedom. The corresponding prob-value for this test is 0.307.

diversification strategy in an identical manner. This finding is unsurprising given that Kenyan men and women are increasingly participating in equal proportions in migration as discussed in chapter 2. In the literature, Curran and Rivero-Fuentes (2003) also find that there are no statistically significant differences between male and female migration effects for the case of Mexico.

The t-tests (see table) for the differences in the effects obtained reveal that male preceding sibling migrants do not induce any differential effect on the probability of migrating of male and female siblings. On the other hand, male subsequent sibling migration is deterred more in the case where non-sibling and female sibling preceding migrants are present. This may be driven by the different motivators of male and female sibling migration. As Kenyan society is mainly patrilocal women migrate for marriage purposes. Thus, it seems rational that the migration of female siblings is not deterred by preceding female sibling and non-sibling migration to the same extent as male sibling migration. However, the fact that the presence of preceding migrants still produces a negative effect on female migration, and particularly the fact that male preceding sibling migration deters female subsequent sibling migration by the same effect as it does male sibling migration, seems to point to the fact that females also participate in the household income source diversification strategy.

4.5.2 Multiple outcome probability analysis

In order to determine how the factors introduced above influence the type of migration, we estimate a multinomial logit model using three mutually exclusive categories as follows: not migrating (= 0); migrating internally (= 1) and migrating externally (= 2). The Small Hsiao test of the independence of irrelevant alternatives (IIA) suggests the IIA proposition is upheld by the data and therefore the use of the multinomial logit model for this analysis appears justified. The marginal and impact effects for these three categories are reported in Table 4.7.

The results indicate that being employed relative to being unemployed decreases the probability of internal migration and increases the probability of external migration, on average and *ceteris paribus*. Because unemployed siblings are likely to be less skilled and/or experienced, they migrate

internally given the low barriers to internal migration. On the other hand, employed siblings are in a

better position to overcome the barriers to external migration.

Table 4.7: Migration type multinomial logit model (marginal/impact effects)

Variables	Not migrating (0)	Migrating internally (1)	Migrating externally (2)
Household characteristic variables:			
Predicted exp: spline 1	0.0766**	-0.0103	-0.0663***
	(0.0318)	(0.0263)	(0.0242)
Predicted exp: spline 2	-0.111	-0.0672	0.178*
	(0.122)	(0.108)	(0.108)
Predicted exp: spline 3	-0.183	0.148	0.0358
	(0.133)	(0.120)	(0.108)
Predicted exp: spline 4	0.174*	-0.141	-0.0328
	(0.0966)	(0.0917)	(0.0738)
Predicted exp: spline 5	-0.0832**	0.0112	0.0720***
	(0.0356)	(0.0369)	(0.0228)
= 1 if household has bank account	0.0590**	-0.0634***	0.00435
	(0.0240)	(0.0218)	(0.0196)
Birth rank	-0.0498***	0.0310***	0.0187**
	(0.0104)	(0.00934)	(0.00897)
Proportion of adults in household	0.147**	-0.0898	-0.0574
	(0.0603)	(0.0551)	(0.0503)
Total number of siblings	0.0384***	-0.0235***	-0.0149*
	(0.00815)	(0.00768)	(0.00766)
= 1 if household located in urban area	0.0539**	-0.00395	-0.0499**
	(0.0257)	(0.0231)	(0.0220)
Individual characteristic variables:			
= 1 if aged 26 to 35	0.0102	-0.0637***	0.0535**
	(0.0271)	(0.0245)	(0.0210)
= 1 if aged 36 to 45	-0.0389	-0.0166	0.0554
	(0.0519)	(0.0449)	(0.0419)
= 1 if aged 46+	-0.0259	-0.00453	0.0304
	(0.113)	(0.0935)	(0.105)
= 1 if male	-0.0769**	0.0385	0.0383
	(0.0300)	(0.0290)	(0.0277)
= 1if female in early adulthood	-0.125***	0.0414	0.0839***
	(0.0342)	(0.0326)	(0.0303)
= 1 if just completed high school	0.183***	-0.144***	-0.0388
	(0.0467)	(0.0502)	(0.0421)
= 1 if university	-0.100***	0.0818***	0.0185
	(0.0340)	(0.0304)	(0.0234)
= 1 if primary	0.227***	-0.0628***	-0.164***
	(0.0251)	(0.0237)	(0.0260)
= 1 if employed	-0.0106	-0.0927***	0.103***
	(0.0313)	(0.0278)	(0.0227)
= 1 if self-employed	0.102**	-0.0301	-0.0714*
	(0.0396)	(0.0346)	(0.0399)
= 1 if student	0.0936***	-0.147***	0.0533***
	(0.0245)	(0.0221)	(0.0206)
Network variables:			
=1 if prec non-sib mig present	0.297***	-0.111***	-0.187***
	(0.0287)	(0.0297)	(0.0294)
=1 if prec sib mig is internal	0.212***	0.0472**	-0.260***
	(0.0263)	(0.0215)	(0.0291)

=1 if prec sib mig is external	0.279***	-0.202***	-0.0768***
	(0.0257)	(0.0282)	(0.0204)
Regional dummy variables	Yes	Yes	Yes
Religion dummy variables	Yes	Yes	Yes
Ethnicity dummy variables	Yes	Yes	Yes
Pseudo R-squared		0.255	
N		1,731	

Notes to the table:

(i)   ***, ** and * denote statistical significance from zero at the 0.01, 0.05 and 0.10 level respectively using two-tailed tests.

(ii)   Robust standard errors clustered at the household level are reported in parentheses.

(iii)   The regression model also includes other explanatory variables that are not shown here in order to conserve space (see text for details).

Students are shown to be either more likely to stay at home or migrate externally, and less likely to migrate internally, relative to unemployed siblings. This finding may reflect the high demand by Kenyans for higher education abroad as discussed in chapter 2. Being self-employed increases the probability of not migrating. This seems reasonable as self-employed individuals often have location specific skills and a clientele base.[39]

The possession of a university education (compared to the base group comprised of secondary education) decreases the probability of staying at home and increases that of migrating internally but has no effect on external migration. On the other hand, having only a primary education increases the probability of staying at home and decreases that of external and internal migration. This is contrary to an expectation that higher schooling levels would substantially lower the cost of external migration, thus inducing a positive effect on external migration. It is likely that the finding is a feature of the reasons for external migration in the Kenyan context. As already discussed above, as well as highlighted in chapter 2, most Kenyans migrate externally in search of higher education. However, individuals who already possess Kenyan higher education qualifications may find it difficult to obtain recognition for their qualifications abroad and thus opt to migrate for work purposes within Kenya.

We also note that having a preceding non-sibling migrant increases the probability of staying at home and decreases the probability of migrating internally and externally. The presence of an

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[39] In the survey, the common occupations for those who are self-employed are farming, carpentry and buying and selling goods.

internal preceding sibling migrant increases the probability of staying at home and migrating internally but decreases the probability of migrating externally. Having an external sibling migrant increases the probability of not migrating, and decreases the probability of migrating internally and externally. Thus, the deterrence effect of preceding sibling migrants appears stronger in the case of external migration. This is probably attributable to the fact that external migration is more costly than internal migration which is supported by the finding that better off households have a higher, while the poorest ones have a lower, probability of sending external migrants. The finding also points to the household income diversification strategy where some siblings migrate and others remain at home being stronger in the case of external migration.

In order to examine the determinants of subsequent sibling migration further, and to differentiate network effects from income source diversification motives, we investigate whether siblings migrate to the same destination (either internally and externally) as preceding sibling migrants, or to another location where there are no preceding sibling migrants. Estimates are obtained for the following mutually exclusive categories: not migrating (= 0), migrating to an internal destination with no preceding sibling migrants (= 1), migrating to an external destination with no preceding sibling migrants (= 2), migrating to the same internal destination as a preceding sibling migrant (= 3) and migrating to the same external destination as a preceding sibling migrant (= 4). The estimates are presented in Table 4.8 for the preceding sibling migrant variable and they represent respectively the five outcomes described above. We see that the presence of a preceding sibling migrant increases the probability of not migrating by 23 percentage points on average and *ceteris paribus*. This is again supportive of the NELM view that the motive for sibling migration is to diversify household income sources by having some siblings migrate while others remain at home. The estimates also reveal that the presence of a preceding sibling migrant decreases the probability of migrating internally to a destination with no siblings by 12 percentage points and that of migrating externally to a location with no siblings by 21 percentage points, on average and *ceteris paribus*. Thus, households are not likely to diversify income sources through sending migrants to diverse destinations.

In Table 4.8 we also note that having a preceding sibling migrant increases the probability of migrating internally to the same destination as the preceding migrant by six percentage points and increases the probability of migrating externally to the same location as the preceding sibling migrant by four percentage points. A Wald test to determine whether the coefficients on these two variables are equal is upheld (chi2(1) = 0.26, p-value = 0.610).This suggests that if households send additional sibling migrants, they will send them to the same location as preceding siblings, whether this is internal or external.[40] Thus, we find evidence of networks playing a role in the migration of subsequent siblings for both external and internal migration. These findings are in contrast to those of Kesztenbaum (2008) who reports no evidence of the use of networks as the migration of male siblings is not to the same destination. Rather, the study obtains evidence suggestive of risk diversification as the migrant destinations are different.

Table 4.8: Multinomial logit model for different migration destinations (marginal/impact effects)

Variables	Not migrating (0)	Int mig to destination with no sibling (1)	Ext mig to destination with no sibling (2)	Int mig to destination with sibling (3)	Ext mig to destination with sibling (4)
=1 if prec sib mig present	0.233***	-0.120***	-0.212***	0.0590***	0.0391***
	(0.0198)	(0.0172)	(0.0182)	(0.0112)	(0.00926)
Regional dummy variables	Yes	Yes	Yes	Yes	Yes
Religion dummy variables	Yes	Yes	Yes	Yes	Yes
Ethnicity dummy variables	Yes	Yes	Yes	Yes	Yes
Pseudo R-squared			0.253		
N			1731		

Notes to the table:
(i) ***, ** and * denote statistical significance from zero at the 0.01, 0.05 and 0.10 level respectively using two-tailed tests.
(ii) Robust standard errors clustered at the household level are reported in parentheses.
(iii) The regression model also includes other explanatory variables that are not shown here in order to conserve space (see text for details).

4.5.3 Discrete failure time analysis

The use of failure (or duration) time models allows us to address some of the limitations encountered in the preceding empirical analysis. A major concern with the earlier probability

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[40] However, caution needs to be exercised in the case of external migration because we only observe the country where siblings are located, and not the town or city. The findings may be compromised by the fact that for external migration siblings actually migrate to different places within the same country. Nevertheless, even if the sibling is in a different town, the fact that he/she is in the same country provides an important network effect.

analysis is that it fails to control for unobservable variables that vary across households. If these omitted variables are important in determining the migration decisions of siblings, a failure to control for them will induce a bias on the coefficient for the preceding sibling migrant variable. For example, it seems plausible that households with sibling migrants may have common influences which determine the migration decisions of siblings. If this is the case, there is likely to be a positive correlation between the unobservable variable and the preceding sibling migrant variable. That is, households with sibling migrants are likely to have some common factors which determine both preceding and subsequent sibling migration. If so, failure to control for this unobservable will yield an upward bias on the preceding migrant parameter. A key advantage of the discrete failure time analysis undertaken here is that it enables us to account for any neglected heterogeneity at the household level. Therefore, we are able to control for the unobservable common influences that may characterize households with preceding sibling migrants as well as any other unobservable variables at the household level. In undertaking the failure time analysis we model the probability of exiting the state of non-migration. The literature reviewed in section 4.2 revealed that several studies have analysed the determinants of sibling migration using such duration analysis (e.g. Stecklov *et al.* 2010, Bras and Neven 2007, Palloni *et al.* 2001). Therefore, the use of failure time modelling here enables us to compare the findings to those of other studies.

Prior to examining the econometric estimates for equations (4.3) and (4.4) we first explore the non-parametric hazards for siblings with and without preceding sibling migrants. We capture the baseline hazard function non-parametrically through use of duration interval-specific dummy variables. To ensure that migration occurs within each time interval we group the dummy variables into five year intervals. Comparable studies in the literature have also used year dummy variables to capture the baseline hazard (e.g., Stecklov *et al.* 2010). This pair of smoothed hazard functions is illustrated in Figure 4.1. The hazard functions show that there is positive duration dependence in the initial periods followed by negative duration dependence thereafter. The shape of the hazard functions is broadly comparable to the baseline hazard reported in the study by Stecklov *et al.* (*op.*

cit.). The migration hazards are higher for siblings without a preceding sibling migrant.[41] A log-rank test also reveals that the hazard functions are statistically different (chi2(1) = 14.59). This is quite compatible with the findings of the logit analysis reported in the preceding sections.

Figure 4.1: Smoothed hazard function estimates
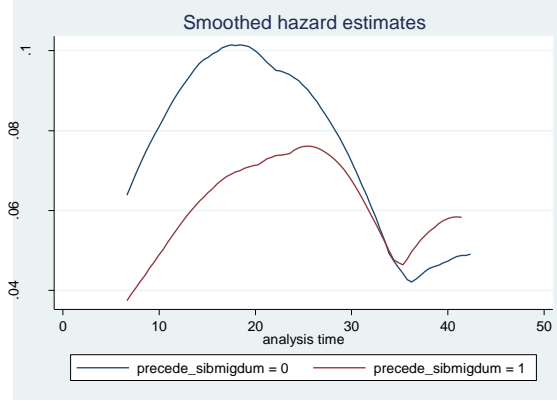
All the estimation undertaken here is for single risk models. As a complementary alternative, a competing risk model could permit the modelling of exits into internal and external migration destinations. This would have involved the use of a multinomial logit model in conjunction with the spell at risk data. However, several factors render the estimation of competing risk models with discrete data complicated (see Jenkins 2005). For example, it is not straightforward to adjust for neglected heterogeneity in such competing risk models. In order to circumvent these problems, we estimate the different exit options using single risk models. The estimates obtained are reported in the first instance as logit coefficients rather than marginal or impact effects. Positive coefficients are associated with a shorter spell and therefore correspond to a higher migration risk. Negative coefficients relate to an increase in the spell and therefore a reduction in the probability of migrating. Thus, to determine the effect exerted by a preceding sibling migrant on the probability of migrating, we convert the coefficient to an impact effect when interpreting the results. The impact effect for the preceding sibling migrant on the probability of migrating is given by the difference between the two logistic cumulative distribution function values as follows:

$$\Delta = \frac{\exp(\bar{x}_i\hat{\boldsymbol{\beta}} + \hat{y})}{1 + \exp(\bar{x}_i\hat{\boldsymbol{\beta}} + \hat{y})} - \frac{\exp(\bar{x}_i\hat{\boldsymbol{\beta}})}{1 + \exp(\bar{x}_i\hat{\boldsymbol{\beta}})} \qquad (4.5)$$

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[41] However, starting around period 37, the migration hazards for siblings with a preceding sibling migrant become higher. Given that only a few migrants are in this age range, some interpretational caution is required here.

where $\overline{x_i}\widehat{\beta}$ are the sample average characteristics of the explanatory variables and $\widehat{y}$ is the coefficient for the preceding sibling migrant dummy variable.

Table 4.9 reports the coefficients obtained for three alternative specifications. The preceding sibling migrant dummy variable is the variable of main interest in the first specification. In the second and third specifications, dummy variables capturing the gender and destination (i.e., internal or external) of the preceding sibling migrant respectively provide the key interest. The coefficients obtained for the logit estimator (4.3) and the random-effects logit model (4.4) are reported under each specification. The likelihood ratio tests for neglected heterogeneity reveal that it is statistically significant and therefore the random-effects model is a more appropriate choice of model compared to the standard logit.

In the pooled logit model in the first specification, the presence of a preceding sibling migrant is shown to increase the probability of exiting the state of non-migration and thus increase the probability of migrating. This finding is in contrast to the findings we obtained in the earlier analysis in section 4.5.1. However, we note that the samples are slightly different given the exclusion of siblings with only one or two spells at risk in the failure time models. Moreover, the random-effects model reveals that after controlling for neglected heterogeneity, having a preceding sibling migrant does not exert any statistically significant effect on the probability of migrating. Therefore, as we anticipated, we see that failing to control for unobservable variables at the household level results in an upward bias in the estimated coefficient for the preceding sibling migrant variable. We see similar contrasts between the logit model and the random-effects logit model across all the different specifications in Table 4.9. In all specifications, there is an upward bias in the coefficients for the preceding sibling migrant variable when household level neglected heterogeneity is not controlled for.

The random-effects model in the second specification reveals that neither male nor female preceding sibling migrants exhibit any statistically significant effect on the probability of migrating. Having controlled for neglected heterogeneity in the third specification the estimates indicate that the presence of an internal preceding sibling migrant increases the probability of migrating.

Table 4.9: Discrete failure time logit estimates (coefficients)

Variables	Specification I		Specification II		Specification III	
	Pooled logit	Random-effects logit	Pooled logit	Random-effects logit	Pooled logit	Random-effects logit
Age dummies (omitted group: aged 15 to 25):						
= 1 if aged 26 to 35	-1.090***	-0.843***	-1.089***	-0.851***	-1.071***	-0.827**
	(0.315)	(0.322)	(0.315)	(0.321)	(0.314)	(0.322)
= 1 if aged 36 to 45	-0.881	-0.303	-0.891	-0.329	-0.824	-0.293
	(1.165)	(1.157)	(1.170)	(1.156)	(1.173)	(1.159)
= 1 if aged 46 plus	-1.242	-0.459	-1.261	-0.494	-1.220	-0.469
	(1.284)	(1.284)	(1.286)	(1.284)	(1.292)	(1.286)
= 1 if male	-0.0736	-0.0402	-0.0618	-0.0382	-0.0773	-0.0525
	(0.159)	(0.165)	(0.161)	(0.165)	(0.160)	(0.165)
= 1 if female in early adulthood	0.175	0.232	0.184	0.235	0.175	0.232
	(0.174)	(0.178)	(0.175)	(0.178)	(0.174)	(0.178)
= 1 if young adult just completed hs	-1.163***	-1.069***	-1.164***	-1.072***	-1.161**	-1.071***
	(0.219)	(0.224)	(0.219)	(0.223)	(0.219)	(0.224)
= 1 if university education	0.221*	0.290*	0.223*	0.288*	0.263**	0.306**
	(0.127)	(0.149)	(0.126)	(0.149)	(0.127)	(0.149)
= 1 if primary education	-0.613***	-0.644***	-0.609***	-0.645***	-0.614***	-0.655***
	(0.124)	(0.139)	(0.124)	(0.138)	(0.124)	(0.139)
= 1 if household in urban area	-0.0231	0.00493	-0.0357	0.00304	-0.0356	-0.0100
	(0.115)	(0.142)	(0.116)	(0.142)	(0.117)	(0.142)
Duration specific dummies (omitted group: spell 26 plus):						
Spells 1 to 5	-1.369	-2.019*	-1.379	-2.007*	-1.366	-2.059*
	(1.236)	(1.220)	(1.240)	(1.219)	(1.247)	(1.223)
Spells 6 to 10	-1.214	-1.600	-1.226	-1.598	-1.203	-1.630
	(1.233)	(1.215)	(1.237)	(1.214)	(1.244)	(1.218)
Spells 11 to 15	0.186	-0.0965	0.175	-0.0965	0.178	-0.146
	(1.181)	(1.169)	(1.186)	(1.168)	(1.193)	(1.172)
Spells 16 to 20	0.209	0.171	0.199	0.166	0.211	0.136
	(1.175)	(1.169)	(1.178)	(1.168)	(1.185)	(1.172)
Spells 21 to 25	0.383	0.241	0.360	0.238	0.343	0.209
	(0.393)	(0.403)	(0.394)	(0.403)	(0.400)	(0.404)
Network variables:						
= 1 if preceding non-sib mig present	-0.274	-0.523**	-0.302	-0.537***	-0.309	-0.534**
	(0.202)	(0.208)	(0.201)	(0.208)	(0.201)	(0.208)
= 1 if preceding sib mig present	0.261**	0.140				
	(0.101)	(0.0994)				
= 1 if prec male sib mig present			0.187	0.145		
			(0.121)	(0.115)		
= 1 if prec female sib mig present			0.312**	0.179		
			(0.129)	(0.132)		
= 1 if prec int sib mig present					0.494***	0.410***
					(0.132)	(0.122)
= 1 if prec ext sib mig present					-0.176	-0.327**
					(0.123)	(0.135)
Regional dummies	Yes	Yes	Yes	Yes	Yes	Yes
Religion dummies	Yes	Yes	Yes	Yes	Yes	Yes
Ethnicity dummies	Yes	Yes	Yes	Yes	Yes	Yes
rho		0.201***		0.196***		0.197***
		(0.035)		(0.034)		(0.035)
σ_u		0.909***		0.891***		0.900***
		(0.100)		(0.100)		(0.098)
Spells at risk	12,150	12,150	12,150	12,150	12,150	12,150
Number of households	700	700	700	700	700	700

Notes to the table:

(i)   ***, ** and * denote statistical significance from zero at the 0.01, 0.05 and 0.10 level respectively using two-tailed tests.

(ii)   Standard errors are reported in parentheses for the random-effects logit model. Robust standard errors clustered at the household level are reported in parentheses for the logit model.

(iii)   The regression model also includes other explanatory variables that are not shown here in order to conserve space (see text for details).

This amounts to an increase in the probability of migrating by 2.23 percentage points on average and ceteris paribus and corresponds to a 37% increase in the probability of migrating, relative to the mean. Thus, when the preceding migrant is located within Kenya, it is more likely that other siblings will also migrate.

On the other hand, the presence of an external preceding sibling migrant decreases the probability of migrating. The effect exerted equates to a decrease in the probability of migrating by 1.4 percentage points on average and *ceteris paribus*. This is equivalent to a 23% contraction in the migration probability, relative to the mean. Hence, when the preceding migrant is located externally, this seems to deter the subsequent migration of other siblings. These findings are akin to those obtained in the earlier analysis in section 4.5.1 where the household income diversification strategy was found to be stronger in the case of external migration and evidence of preceding sibling migrants providing networks for internal migration was obtained.

It is quite interesting to note that the coefficient for the internal preceding sibling migrant variable is significant at the 1% level in both the pooled logit and random-effects model in the third specification. In addition, the magnitude of the coefficient is only slightly smaller in the random-effects model. On the other hand, the coefficient for the external preceding sibling migrant variable is larger but statistically insignificant in the pooled logit model while it is statistically significant at the 5% level in the random-effects logit model. Thus, the upward bias induced by neglected heterogeneity is more apparent in the case of an external preceding sibling migrant. Assuming that controlling for neglected heterogeneity captures common influences that determine the migration of siblings at the household level, the findings seem to suggest that these common influences are more prominent for households with external migrants. This is not an unreasonable assumption as external migration faces more barriers than internal migration and there may be more unobservable

common determinants among households with siblings that participate in external migration. These unobservable factors are likely captured when neglected heterogeneity is controlled for in the random-effects logit model.

In all the specifications for the pooled logit model, we see that the presence of a preceding non-sibling migrant has no statistically significant effect. In the random-effects models, we see that the presence of a non-sibling migrant reduces the probability of migrating. The probability of migrating is reduced by about 2.1 percentage points on average and *ceteris paribus*. The effect relative to the mean represents a 35% fall in the probability of migrating. This finding is akin to the findings obtained in the earlier analysis in section 4.5.1. There is also evidence of an upward bias in the coefficient for the preceding non-sibling migrant variable when neglected heterogeneity is not accounted for (though the coefficients are statistically insignificant in the pooled logit models). Thus, having accounted for unobservable common influences among households with sibling migrants, we find that non-sibling migrants decrease the probability of migration for siblings.

As a robustness check, we exclude the duration-specific dummy variables and re-estimate all the models presented in Table 4.9 for the random-effects logit model (see Table A4.12 of the Appendix). The results we obtain without the duration-specific dummy variables resemble those presented in Table 4.9 with the exception that the coefficients for the preceding sibling migrant variable and the male and female preceding sibling migrant variables are now significant. Therefore, the findings are somewhat sensitive to the exclusion of a fairly flexible baseline hazard.

We also undertake a robustness check to determine whether our findings are sensitive to the econometric methods employed. We re-estimate the three specifications presented in Table 4.9 using linear probability models (LPMs). Table A4.13 in the Appendix presents the estimates for the linear probability models. The first columns of each specification show the LPM estimates without allowing for neglected heterogeneity. The second and third columns under each specification provide estimates obtained for the random-effects and fixed-effects LPMs, respectively. The results obtained using the various LPMs are generally consistent with those obtained using the logit and random-effects logit models.

We now proceed to explore sibling and non-sibling network effects by type of migration in more detail. Table 4.10 provides the estimates for the discrete failure time logit models separately for internal and external migration.[42] These estimates are complemented by the LPM estimates reported in Table A4.14 in the Appendix.

Table 4.10: Migration type discrete failure time logit estimates (coefficients)

	Internal migration		External migration	
VARIABLES	**Logit**	**Random-effects logit**	**Logit**	**Random-effects logit**
= 1 if preceding non-sib mig present	-0.839***	-1.097***	-0.729**	-0.802***
	(0.286)	(0.292)	(0.372)	(0.300)
= 1 if preceding sib mig present	0.667***	0.553***	-0.0821	-0.214
	(0.162)	(0.149)	(0.168)	(0.174)
Other control variables	Yes	Yes	Yes	Yes
Duration-specific dummies	Yes	Yes	Yes	Yes
Regional dummies	Yes	Yes	Yes	Yes
Religion dummies	Yes	Yes	Yes	Yes
Ethnicity dummies	Yes	Yes	Yes	Yes
Rho		0.151***		0.143***
		(0.045)		(0.056)
σ_u		0.765***		0.740
		(0.133)		(0.169)
Spells at risk†	6,546	6,546	6,731	6,731
No. of households	433	433	436	436

Notes to the table:

(i)   ***, ** and * denote statistical significance from zero at the 0.01, 0.05 and 0.10 level respectively using two-tailed tests.

(ii)   Standard errors are reported in parentheses for the random-effects logit model. Robust standard errors clustered at the household level are reported in parentheses for the logit model.

(iii) The regression model also includes other explanatory variables that are not shown here in order to conserve space (see text for details).

(iv)   † The combined spells at risk are greater than 12,150 because the 'internal migration' sample consists of siblings from households with internal migrants only or no migrants. The 'external migration' sample consists of siblings from households with external migrants only or no migrants.

In the random effects logit models in Table 4.10 we see that the presence of a preceding sibling migrant increases the probability of migrating internally but has no statistically significant effect on the probability of migrating externally.[43] On the other hand, there is a strong negative effect of non-sibling migrants on the probability of migrating both internally and externally. The

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[42] These internal and external migration models are estimated as single risk models. Thus, the samples consist of siblings belonging to households with internal (external) sibling migrants only and those belonging to households with no sibling migrants. We exclude siblings belonging to households with both internal and external migrants as these are only a few observations and it is not feasible to estimate a model for this.

[43] However, for the LPM models in Table A4.14, the presence of an external preceding sibling migrant registers a negative and statistically significant effect on the probability of migrating.

findings relating to the effect of non-sibling migrants for the pooled logit models also reveal a strong negative effect on the exit from non-migration state. This corresponds with the results obtained in the earlier analysis using the binary logit model where we found that non-sibling migrants decrease the probability of migrating.

4.6   Summary and conclusions

In the initial analysis of this chapter, we employ a binary logit model to determine the effect of the presence of a preceding sibling migrant on the subsequent migration decisions of Kenyan siblings. We emphasise that the findings of this analysis are best interpreted as conditional on the presence of a preceding sibling (non-sibling) migrant. This interpretation is appropriate given difficulties in empirically testing the potential endogeneity of the preceding sibling variable. In addition, due to the absence of suitable instrumental variables, in the binary logit analysis we do not account for selection bias owing to any systematic differences between households with and without sibling migrants. Thus, the appropriate interpretation for the findings there is as conditional probabilities.

We find that both preceding sibling and non-sibling migrants induce a strong negative effect on the probability of migrating for siblings. This provides evidence for the migration of siblings being driven by a household income diversification strategy where some siblings migrate and others remain at home. Preceding non-sibling migrants are found to have the same deterrence effect for subsequent sibling migration as preceding sibling migrants. In addition, both male and female siblings are shown to participate in the household income diversification strategy. The empirical analysis also reveals that if a sibling who has a preceding sibling migrant migrates they are likely to move to the same internal or external destination as the preceding sibling migrant rather than to a different destination. Thus, the findings indicate that sibling networks have a positive effect on the subsequent migration decisions of siblings. The findings also reveal that households do not achieve income source diversification through sending siblings to diverse destinations. Rather, income source diversification is principally achieved through some siblings migrating and others remaining at home.

A limitation of the foregoing analysis is that it fails to take into account the potential variation in unobservables that influence sibling migration decisions across households. Therefore, we employed discrete failure time methods to control for this variation. The use of discrete failure time models thus enabled us to control for neglected heterogeneity at the household level by estimating a random-effects logit model. The empirical estimates obtained indicate that neglecting such heterogeneity yields an upward bias on the coefficient of the preceding sibling migrant variable. Controlling for neglected heterogeneity at the household level, we find that the overall effect of the presence of a preceding sibling migrant on the probability of migrating is statistically insignificant. On the other hand, the presence of preceding non-sibling migrants is found to decrease the probability of migrating. However, we are aware that the results obtained for the random-effects model could be sensitive to the parametric assumptions made regarding neglected heterogeneity. This is an issue that clearly requires further investigation.

Appendix

Table A4.1: Summary statistics for the per capita expenditure model

Variables	All	Non-migrant (0)	Migrant (1)	t-test/z-score †
Predicted log of expenditure per capita	10.42 (0.96)	10.4 (0.81)	10.43 (1.01)	-1.22
= 1 if head is male	0.7 (0.46)	0.82 (0.38)	0.65 (0.48)	16.9***
Age of head	48.9 (15.15)	42.67 (12.73)	51.41 (15.32)	26.65***
Household size	5.53 (2.52)	5.46 (2.55)	5.56 (2.51)	-1.75**
Education variables:				
= 1 if head has no education	0.18 (0.38)	0.15 (0.36)	0.19 (0.39)	-4.70***
= 1 if head has primary education	0.31 (0.46)	0.34 (0.47)	0.3 (0.46)	3.34***
= 1 if head has post-primary education	0.04 (0.19)	0.04 (0.19)	0.04 (0.19)	-0.36
= 1 if head has post-secondary education	0.14 (0.35)	0.13 (0.34)	0.15 (0.35)	-1.99**
= 1 if head has university education	0.09 (0.29)	0.08 (0.27)	0.1 (0.3)	-2.80***
= 1 if head has secondary education	0.23 (0.42)	0.26 (0.008)	0.22 (0.005)	4.77***
χ^2 test for education dummies				17.55***
Proportion of elderly people	0.08 (0.16)	0.04 (0.11)	0.09 (0.17)	-15.82***
Proportion of children	0.13 (0.16)	0.19 (0.17)	0.11 (0.15)	21.96***
Sample size	9700	2784	6916	

Notes to the table:
(i) Standard deviations are reported in parentheses.
(ii) The non-migrant category refers to individuals belonging to households with no migrants. The migrant category refers to individuals belonging to households with at least one migrant.
(iii) † The hypothesis under test is: $H_0: \mu_0 = \mu_1 / H_0: \pi_0 = \pi_1$. The column provides the t-ratios/z-scores for mean/proportion differences between non-migrants and migrants. *, **, *** represent the statistical significance of the differences for the 10%, 5% and 1% significance levels respectively.
(iv) The χ^2 test is testing for differences between non-migrants and migrants for the education categorical variable.

Table A4.2: OLS estimates for the per capita expenditure model

VARIABLES	I: OLS without interactions	II: OLS with interactions
= 1 if head is male	0.0329	0.127***
	(0.0440)	(0.0443)
Age of head	-0.00967	0.363***
	(0.00884)	(0.106)
Age of head squared	0.000108	-0.00486***
	(9.47e-05)	(0.00141)
Household size	-0.0636***	-0.0624***
	(0.00807)	(0.00884)
= 1 if head has no education	-0.329***	0.678**
	(0.0565)	(0.265)
= 1 if head has primary education	-0.147***	-0.604***
	(0.0419)	(0.209)
= 1 if head has post-primary education	0.0918	-0.284
	(0.0882)	(0.378)
= 1 if head has post-secondary education	0.484***	-0.0509
	(0.0536)	(0.232)
= 1 if head has university education	1.163***	0.255
	(0.0662)	(0.362)
= 1 if head has secondary education	Omitted category	
Proportion of elderly people	-0.300	0.0447
	(0.203)	(0.821)
Proportion of children	-2.100***	-4.778***
	(0.283)	(1.684)
Proportion of children squared	2.100***	5.125*
	(0.591)	(3.058)
= 1 if hh located in urban area	0.207***	0.496
	(0.0375)	(0.466)
Regional dummies	Yes	Yes
Interactions of regional dummies with all the variables	No	Yes
Interactions of urban/rural dummy with all the variables	No	Yes
Sample size	2,784	2,784
R-squared	0.449	0.545

Notes to the table:
(i)   The dependent variable is the log of actual expenditure per capita.
(ii) ***, ** and * denote statistical significance from zero at the 0.01, 0.05 and 0.10 level respectively using two-tailed tests.
(iii) Standard errors are reported in parenthesis.
(iv) The 2,784 observations used in the OLS regression relate to individuals belonging to non-migrant households. Several observations are dropped due to multicollinearity in the interacted terms.

Table A4.3: List of destinations for sibling migrants in the sample

External destination	N	Internal destination	N	Internal destination	N
United kingdom	37	Athi river	2	Mandera	3
Tanzania	18	Bam	1	Mangu	1
United states	132	Banana	1	Mbeere	1
Uganda	42	Bungoma	4	Meru	3
Canada	9	Bunyala	1	Migori	2
Germany	21	Busia	1	Mombasa	28
Australia	6	Changamwe	1	Muhoroni	1
India	3	Dadaab	1	Muranga	2
Netherlands	6	Eldamaravin	2	Mwea	1
Italy	5	Eldoret	22	Mwingi	1
Rwanda	2	Embu	4	Nairobi	207
South Africa	14	Garissa	2	Naivasha	3
Sudan	8	Gathiga	2	Nakuru	18
Norway	2	Gatundu	1	Narok	1
United Arab Emirates	22	Gilgil	1	Ndenderu	1
Congo	3	Homabay	5	Nduberi	1
Sweden	1	Kabungi	1	Njoro	4
Belgium	2	Kakamega	4	Nyahururu	1
Switzerland	1	Kenyeya	1	Nyamira	1
China	1	Kericho	9	Nyathuna	1
Saudi Arabia	6	Kiambu	3	Nyeri	3
Libya	1	Kisii	1	Oyugis	1
Zimbabwe	1	Kisumu	12	Riandu	1
France	1	Kitale	3	Rongo	1
Ethiopia	1	Kitengela	1	Ruiru	1
Russia	1	Likaya	1	Siaya	1
		Likoni	2	Soi	1
		Limuru	3	Teso	1
		Loi	1	Thika	7
		Lungale	2	Ufanisi	1
		Maasai mara	1	Wajir	1
		Machakos	2	Wangige	1
		Makueni	1	Webuye	1
		Malaba	1	Westland	1
		Malindi	3		

Table A4.4: Binary logit model estimates with varying migration lengths of preceding sibling migrant (marginal/impact effects)

Variables	I	II	III
= 1 if preceding sib mig present	-0.229***	-0.176***	-0.125***
	(0.0253)	(0.0268)	(0.0284)
Other variables†	Yes	Yes	Yes
Pseudo R-squared	0.233	0.212	0.197
N	1,731	1,731	1,731

Notes to the table:
(i) In specifications I, II, and III, the preceding sibling migrant dummy variable is equal to one if the preceding sibling migrated (i) more than a year ago, (ii) more than two years ago, and (iii) more than three years ago, respectively.
(ii) ***, ** and * denote statistical significance from zero at the 0.01, 0.05 and 0.10 level respectively using two-tailed tests.
(iii) Robust standard errors clustered at the household level are reported in parentheses.
(iv) † The regression model also includes other explanatory variables that are not shown here in order to conserve space (see text for details).

Table A4.5: Binary logit model estimates excluding siblings with age gap of two or less (marginal/impact effects)

Variables	
=1 if preceding sib mig present	-0.243***
	(0.0267)
Other variables†	Yes
Pseudo R-squared	0.240
N	1455

Notes to the table:
(i) The sample size is smaller as siblings with an age gap of two or less years are excluded.
(ii) ***, ** and * denote statistical significance from zero at the 0.01, 0.05 and 0.10 level respectively using two-tailed tests.
(iii) Robust standard errors clustered at the household level are reported in parentheses.
(iv) † The regression model also includes other explanatory variables that are not shown here in order to conserve space (see text for details).

Table A4.6: Binary logit model estimates with age threshold of 18 and 21 (marginal/impact effects)

VARIABLES	I	II
=1 if preceding sib mig present	-0.267***	-0.283***
	(0.0276)	(0.0310)
	(0.154)	(0.159)
Other variables †	Yes	Yes
Pseudo R-squared	0.214	0.234
N	1,384	1,002

Notes to the table:
  (i)   The sample size is smaller as the age threshold is 18 in specification (I) and 21 in specification (II).
  (ii) ***, ** and * denote statistical significance from zero at the 0.01, 0.05 and 0.10 level respectively using two-tailed tests.
  (iii) Robust standard errors clustered at the household level are reported in parentheses.
  (iv) † The regression model also includes other explanatory variables that are not shown here in order to conserve space (see text for details).

Table A4.7: Binary logit model estimates excluding all full-time students (marginal/impact effects)

VARIABLES	
=1 if preceding sib mig present	-0.260***
	(0.0328)
Other variables†	Yes
Pseudo R-squared	0.23
N	1,006

Notes to the table:
  (i)   The sample size is smaller as siblings who are full-time students are excluded.
  (ii) ***, ** and * denote statistical significance from zero at the 0.01, 0.05 and 0.10 level respectively using two-tailed tests.
  (iii) Robust standard errors clustered at the household level are reported in parentheses.
  (iv) † The regression model also includes other explanatory variables that are not shown here in order to conserve space (see text for details).

Table A4.8: Binary logit model estimates with first born dummy interaction (marginal/impact effects)

VARIABLES	
= 1 if preceding sibling migrant present	-0.167***
	(0.0343)
= 1 if first born	0.0898***
	(0.0254)
= 1 if first born interacted with preceding sibling migrant dummy	-0.0819
	(0.0524)
Other variables included	Yes
Regional dummy variables	Yes
Religion dummy variables	Yes
Ethnicity dummy variables	Yes
Pseudo R-squared	0.230
N	1,731

Notes to the table:
(i) ***, ** and * denote statistical significance from zero at the 0.01, 0.05 and 0.10 level respectively using two-tailed tests.
(ii) Robust standard errors clustered at the household level are reported in parentheses.
(iii) The regression model also includes other explanatory variables that are not shown here in order to conserve space (see text for details).

Table A4.9: Binary logit model estimates excluding parents in preceding non-sibling migrant variable (marginal/impact effects)

VARIABLES	
=1 if preceding sib mig present	-0.232***
	(0.0252)
=1 if preceding non-sib mig present	-0.292***
	(0.0444)
Other variables†	Yes
Pseudo R-squared	0.232
N	1,731

Notes to the table:
(i)   ***, ** and * denote statistical significance from zero at the 0.01, 0.05 and 0.10 level respectively using two-tailed tests.
(ii)   Robust standard errors clustered at the household level are reported in parentheses.
(iii)   † The regression model also includes other explanatory variables that are not shown here in order to conserve space (see text for details).

Table A4.10: Binary logit model estimates with sample restricted definition of migrant (marginal/impact effects)

VARIABLES	
= 1 if preceding sibling migrant present	-0.247***
	(0.0246)
= 1 if preceding non-sibling migrant present	-0.344***
	(0.0471)
Other variables included	Yes
Regional dummy variables	Yes
Religion dummy variables	Yes
Ethnicity dummy variables	Yes
Pseudo R-squared	0.2339
N	1,656

Notes to the table:
(i) ***, ** and * denote statistical significance from zero at the 0.01, 0.05 and 0.10 level respectively using two-tailed tests.
(ii) Robust standard errors clustered at the household level are reported in parentheses.
(iii) The regression model also includes other explanatory variables that are not shown here in order to conserve space (see text for details).

Table A4.11: Binary logit model estimates: alternative specifications (marginal/impact effects)

VARIABLES	Specification I	Specification II
Household characteristic variables:		
= 1 if household head is male	0.0453***	0.0271
	(0.0175)	(0.0215)
Age of household head	0.00230*	-0.00321**
	(0.00131)	(0.00139)
Household size	0.0549***	0.0920***
	(0.00890)	(0.00974)
= 1 if head has secondary education	0.0205	-0.00328
	(0.0196)	(0.0237)
= 1 if head has university education	0.0268	0.0216
	(0.0264)	(0.0335)
Number of elderly people in household	-0.118***	-0.0333
	(0.0216)	(0.0237)
Number of children in household	-0.0238*	-0.0623***
	(0.0141)	(0.0146)
Number of adults in household	-0.126***	-0.179***
	(0.0103)	(0.00832)
Number of siblings in household	-0.107***	-0.0569***
	(0.00821)	(0.0103)
= 1 if household located in urban area	-0.0389**	-0.0248
	(0.0169)	(0.0202)
Individual characteristic variables:		
Aged 15 to 25	-0.0949***	0.0110
	(0.0205)	(0.0246)
Aged 36 to 45	0.0560*	0.0277
	(0.0300)	(0.0402)
Aged 46+	0.114	0.0944
	(0.0696)	(0.0816)
Birth rank	0.109***	0.104***
	(0.00765)	(0.00891)
= 1 if male	0.0630***	0.0599**
	(0.0221)	(0.0275)
= 1 if female in early adulthood	0.106***	0.0940***
	(0.0239)	(0.0297)
= 1 if just completed high school	-0.125***	-0.102***
	(0.0411)	(0.0382)
= 1 if university	0.0225	0.0746**
	(0.0232)	(0.0305)
= 1 if primary	-0.0938***	-0.161***
	(0.0194)	(0.0219)
= 1 if employed	-0.0327	-0.0212
	(0.0256)	(0.0273)
= 1 if self-employed	-0.158***	-0.125***
	(0.0346)	(0.0361)
= 1 if student	-0.0208	-0.0812***
	(0.0208)	(0.0229)
Network variables:		
= 1 if preceding sibling migrant present	-0.171***	-0.155***
	(0.0176)	(0.0201)
=1 if preceding non-sibling migrant present	-0.163***	-0.198***
	(0.0222)	(0.0272)
Regional dummy variables	Yes	Yes
Religion dummy variables	Yes	Yes
Ethnicity dummy variables	Yes	Yes

Pseudo R-squared	0.5472	0.4634
N	1,731	1,731

Notes to the table:
(i) ***, ** and * denote statistical significance from zero at the 0.01, 0.05 and 0.10 level respectively using two-tailed tests.
(ii) Robust standard errors clustered at the household level are reported in parentheses.
(iii) The regression model also includes other explanatory variables that are not shown here in order to conserve space (see text for details).

Table A4.12: Discrete failure time random-effects logit estimates (coefficients)

Variables	I	II	III
= 1 if preceding non-sib mig present	-0.493**	-0.499**	-0.481**
	(0.197)	(0.197)	(0.198)
= 1 if preceding sib mig present			0.192**
			(0.0957)
= 1 if preceding male sib mig present		0.186*	
		(0.111)	
= 1 if preceding female sib mig present		0.218*	
		(0.128)	
= 1 if preceding int sib mig present	0.456***		
	(0.118)		
= 1 if preceding ext sib mig present	-0.271**		
	(0.130)		
Other variables	Yes	Yes	Yes
Regional dummies	Yes	Yes	Yes
Religion dummies	Yes	Yes	Yes
Ethnicity dummies	Yes	Yes	Yes
Duration-specific dummies	No	No	No
	0.150***	0.151***	0.155***
	(0.030)	(0.030)	(0.030)
	0.761***	0.765***	0.776***
	(0.088)	(0.088)	(0.088)
Spells at risk	12,150	12,150	12,150
Number of households	700	700	700

Notes to the table:
(i) ***, ** and * denote statistical significance from zero at the 0.01, 0.05 and 0.10 level respectively using two-tailed tests.
(ii) Robust standard errors are reported in parentheses.
(iii) The regression model also includes other explanatory variables that are not shown here in order to conserve space (see text for details).

Table A4.13: Discrete failure time LPM estimates (coefficients)

Variables	Specification I			Specification II			Specification III		
	Pooled LPM	Random-effects LPM	Fixed-effects LPM	Pooled LPM	Random-effects LPM	Fixed-effects LPM	Pooled LPM	Random-effects LPM	Fixed-effects LPM
= 1 if prec non-sib	-0.0130	-0.0305***	-0.0427***	-0.0142	-0.0307***	-0.0426***	-0.0143	-0.0302***	-0.0416***
	(0.00878)	(0.00871)	(0.0103)	(0.0088)	(0.00867)	(0.0102)	(0.0088)	(0.00851)	(0.00986)
= 1 if prec sib mig	0.0163**	-0.00140	-0.0120						
	(0.00648)	(0.00707)	(0.00766)						
= 1 if prec male sib mig				0.0136*	0.00240	-0.00570			
				(0.00809)	(0.00846)	(0.00905)			
= 1 if prec female sib mig				0.0189**	0.00126	-0.00767			
				(0.00902)	(0.0105)	(0.0113)			
= 1 if prec int sib mig							0.0331***	0.0166	0.00405
							(0.0010)	(0.0110)	(0.0119)
= 1 if prec ext sib mig							-0.00903	-0.0249***	-0.0309***
							(0.00659)	(0.00742)	(0.00812)
Other control variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Duration-specific dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Regional dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Religion dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Ethnicity dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R-squared	0.022	0.017	0.010	0.022	0.017	0.010	0.023	0.018	0.010
R-squared within		0.041	0.041		0.040	0.041		0.041	0.042
R-squared between		0.005	0.053		0.005	0.052		0.004	0.051
Spells at risk	12,150	12,150	12,150	12,150	12,150	12,150	12,150	12,150	12,150
No. of households	700	700	700	700	700	700	700	700	700

Notes to the table:

(i) ***, ** and * denote statistical significance from zero at the 0.01, 0.05 and 0.10 level respectively using two-tailed tests.

(ii) Robust standard errors clustered at the household level are reported in parentheses for the pooled LPM.

(iii) The regression model also includes other explanatory variables that are not shown here in order to conserve space (see text for details).

Table A4.14: Migration type discrete failure time LPM estimates (coefficients)

	Internal migration		External migration	
VARIABLES	**Pooled LPM**	**Random-effects LPM**	**Pooled LPM**	**Random-effects LPM**
= 1 if preceding non-sib mig present	-0.0254***	-0.0344***	-0.0208**	-0.0281**
	(0.00746)	(0.0105)	(0.00828)	(0.0115)
= 1 if preceding sib mig present	0.0374***	0.0234***	-0.00166	-0.0245***
	(0.01065)	(0.00789)	(0.00714)	(0.00738)
Other control variables	Yes	Yes	Yes	Yes
Duration-specific dummies	Yes	Yes	Yes	Yes
Regional dummies	Yes	Yes	Yes	Yes
Religion dummies	Yes	Yes	Yes	Yes
Ethnicity dummies	Yes	Yes	Yes	Yes
R-squared	0.029	0.0253	0.025	0.019
R-squared within		0.021		0.031
R-squared between		0.10		0.017
Spells at risk	6,546	6,546	6,731	6,731
No. of households	433	433	436	436

Notes to the table:

(i) ***, ** and * denote statistical significance from zero at the 0.01, 0.05 and 0.10 level respectively using two-tailed tests.

(ii) Robust standard errors clustered at the household level are reported in parentheses for the pooled LPM.

(iii) The regression model also includes other explanatory variables that are not shown here in order to conserve space (see text for details).

5 The Remittance Behaviour of Kenyan Sibling Migrants

5.1 Introduction

Adult children play a central role in providing financial and other assistance to their parents in most developing countries. In the Kenyan context, care for parents by adult children is often considered a filial responsibility with family welfare being valued over individual welfare (Armer and Gewirtz 1986). This assistance can directly cater for parental needs (Dow and Werner 1983), for example, or be channelled towards specific purposes such as educating younger siblings (Gomes 1984). The reliance of parents on the support of adult children assumes particular significance in Kenya given the lack of government assistance for the elderly (Buchmann 2000). Elderly people are considered to be among the most vulnerable members of society in Kenya, registering the highest poverty levels and often not in receipt of pension income (Kakwani *et al.* 2006). The inability to save for retirement due, among other things, to unemployment, low wages, and a lack of access to finance exacerbates poverty levels among the elderly (Kenya Retirement Benefits Authority 2007). Thus, the support offered by adult children is often central to the livelihoods of elderly persons. Kenyan migrant children often compensate for their inability to provide physical care due to their absence from the parental home by providing financial support.

Remittances by migrants are an important component of household income in Kenya, with migration being mainly driven by economic objectives. Remittances sent between members of the nuclear family maintain the income levels of family members and serve to maximize the utility of the nuclear family as a group (Mukras *et al.* 1985). Knowles and Anker (1981) report that remittances in Kenya are usually sent between close relatives, mainly husbands and wives, and parents and children. The latter comprises the greater proportion thus supporting the notion that children in Kenya are an important source of financial support for their parents. The remittances sent by adult children seem to be motivated by a variety of factors. These factors include, for instance, the need to assist parents in old age (especially as alternative forms of support are limited), financing the education of younger siblings, inheritance motives, and cultural norms and

expectations. The increasingly prominent role of remittances in Kenya, as articulated in chapter 2, merits empirical research that enhances understanding of how migrants behave when remitting to their households of origin. In the current chapter, we investigate the remittance behaviour of Kenyan sibling migrants, which provides a more novel focus on this particular research theme.

5.1.1   Research questions

As already noted, the aim of the current chapter is to investigate the motivations for sending remittances by sibling migrants through examining the remittance behaviour of a sample of sibling migrants in Kenya. The data used for the analysis are again obtained from the World Bank Africa Migration Project household survey conducted for Kenya in 2009, the details of which were discussed earlier in chapter 3.

We undertake empirical analysis to examine how Kenyan multiple sibling migrants interact when remitting to the household of origin in order to determine the dominant drivers of their remittance behaviour. Firstly, we investigate whether remitting behaviour differs according to whether the migrant is a sole[1] or multiple[2] sibling migrant. Secondly, we investigate how, if at all, the amount of remittances sent by one sibling migrant is related to the volume of remittances sent by another sibling.

A key motivation of the research is to ascertain whether the remitting behaviour of Kenyan multiple sibling migrants conforms to the main remittance motives identified in the existing remittance literature. The three main extant remittance motives examined are competitive inheritance-driven motives (Bernheim *et al.* 1985, Hoddinott 1992), independent self-insurance motives (Lucas and Stark 1985, Rosenzweig 1988), and altruistic motives (Lucas and Stark 1985, Funkhouser 1995). We also propose that there may be other possible motives for remitting that may help to explain the remittance behaviour of migrants. In particular, we suggest that in the case

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[1] A sole sibling migrant is an individual who is the only sibling migrant in the household, but who belongs to a household that has at least two siblings.

[2] A multiple sibling migrant refers to an individual from a household where at least two children of the household head are migrants.

of multiple migrants, there may be a sharing of responsibilities that influence remittance allocation arrangements when siblings remit to the household of origin.

5.1.2   Research contribution

The remittance behaviour of sibling migrants is a relatively under-researched topic in the literature, especially in the Kenyan context. The current chapter contributes to the literature by employing a relatively recent dataset that was specifically designed to capture migration and remittance flows. To the author's knowledge, the empirical studies that have analysed the behaviour of multiple sibling migrants in the existing literature have done so for different contexts from the current one and employed different econometric methods. Moreover, the few studies in the literature that have analysed remittance motives for the case of Kenya have used relatively older datasets than the current one (e.g., Hoddinott 1992 and 1994, Knowles and Anker 1981). The cited studies respectively use a 1982 survey of smallholders and a 1974 household survey. Thus, the current analysis potentially contributes more contemporary insights for the understanding of Kenyan migrant remitting behaviour.

In addition, the emphasis on siblings in the current chapter generates a more homogeneous sample for the purposes of analysis. This will hopefully provide deeper insights into the remittance motives of migrants since we do not expect sibling and non-sibling migrants to have similar motivations when remitting. For example, while spouses naturally share the responsibility of providing for the household, this responsibility is less evident for siblings (Naufal 2007). Restricting our sample to siblings alone enables us to distil the motivations for remitting for this particular sub-set of migrants.

In the current study we acknowledge that the existing remittance literature contains theories that are useful for explaining the remittance behaviour of migrants. Nonetheless, the changing natures of migration and remittance patterns require the consideration of alternative motives and drivers of remittances. This research proposes that the current remittance literature needs to be expanded in order to incorporate more contemporary remittance motives.

The chapter proceeds as follows: section 5.2 provides a review of the relevant literature and also discusses key theories in the literature germane to the current study. Section 5.3 discusses the data and provides summary statistics for the main variables used in the empirical analysis. The empirical methodology is articulated in section 5.4. Section 5.5 presents and discusses the empirical findings, including various checks that are undertaken to determine whether the main results are robust to different specifications of the empirical model. Finally, section 5.6 provides a summary of the main findings, as well as some concluding remarks.

5.2 Literature review

In this section we review the main theories of remittance behaviour that feature in the remittance literature. The findings of the set of empirical studies in the literature that are specific to multiple migrant and sibling remittance behaviour are also reviewed.

5.2.1 Review of theory

5.2.1.1 Remittance theories

The economic literature on migration has been heavily influenced by Lucas and Stark (1985) and their new economics of labour migration (NELM). This theory views migration as a decision made at the household level. Migrant remittances are seen as part of a strategy aimed at diversifying the resources of the household amid risks related to the absence of efficient insurance markets in the home country. In the NELM model, remittances are motivated by pure altruism, pure self-interest or tempered altruism/enlightened self-interest.

In the altruistic model, the migrant is assumed to derive utility from the utility of those left at home (Becker 1981). This utility depends on the consumption levels of both the family and migrant. Hence, a fall in recipient household income or an increase in migrant income have positive effects on migrant remittances (Funkhouser 1995). Lucas and Stark (1985) present the following altruistic model where the migrant derives utility (u_m) from the utility of those remaining at home, and the utility of the latter depends on per capita consumption (c_h):

$$u_m = u[c_m(w - r), \textstyle\sum_{h=1}^{j} a_h \, u(c_h)] \tag{5.1}$$

where w is the wage of the migrant, r is the amount they remit, c_m is the consumption of the migrant, a_h are altruistic weights attached to various household of origin members, and j is the size of the household of origin. For the household, consumption per capita may be assumed to increase with income per capita at home and vary with household size if economies or diseconomies of scale in consumption exist. Hence,

$$c_h = c(y + \tfrac{r}{j}, j) \tag{5.2}$$

where y is the income per capita at home before receipt of any remittances. Choosing a level of r that maximizes (5.1) subject to (5.2) provides a remittance equation:

$$r = r(w, y, j) \tag{5.3}$$

Because the migrant is altruistic, if both his utility function and the household of origin utility functions are well behaved, $\frac{\partial r}{\partial w}$ is predicted to be positive and $\frac{\partial r}{\partial y}$ negative. The sign of $\frac{\partial r}{\partial j}$ is unrestricted because if there are economies of scale in consumption, an increase in household size given $y > c_h$ could exert a negative effect on the amount of remittances sent, whereas if there are diseconomies of scale in consumption, the effect would be positive. For example, if there is a large proportion of school age children in the household, the demand for remittances could be high given the need to meet expenses such as school fees. On the contrary, if there is a large proportion of working adults, the demand for remittances could decrease if they all contribute towards the welfare needs of the household. In the empirical literature, studies that have obtained an inverse relationship between the amount of remittances sent and the number of migrants from the same origin household provide support for altruistic motives driving the remittances behaviour of multiple migrants (e.g., Agarwal and Horowitz 2002, Funkhouser 1995).

In the pure self-interest model, the motivation to remit relies purely on individual incentives and the absence of altruism by the migrant toward the family (Lucas and Stark 1985). Thus, remittances will increase with household of origin assets and income, migrant income, and the

probability of inheritance which is dependent on, among other things, the age of parents and the number of siblings. However, only in the case of an aspiration to inherit, can self-interest be distinguished from altruism in the behaviour of the migrant. Here, a larger income and/or wealth of the household should lead to more remittances (see Hagen-Zanker and Siegel 2007). The presence of other migrants is predicted to have a positive effect on the probability of remitting and the amount of remittances sent under competitive self-interest motives. The following are some studies in the literature that have found evidence in support of inheritance motives driving migrant remittances: Pleitez-Chavez (2004), De la Brière *et al.* (2002), Hoddinott (1992 1994), Lucas and Stark (1985) and Bernheim *et al.* (1985). Cox (1987), Cox and Rank (1992), Cox *et al.* (1998) have also found positive relationships between transfer amounts and recipient incomes supporting an inheritance motive.

In general, while remittance sending may be driven by self-interest motives, the self-enforcing mechanism on which it depends may actually be altruism (Chami *et al.* 2003). This gave rise to tempered altruism/enlightened self-interest motives which are seen as intermediate forms of motivation. Thus, remittances are interpreted as part of an inter-temporal, mutually beneficial contractual arrangement between the migrant and the origin household, with altruism and self-interest facilitating the enforcement of the contract (see, e.g., Lucas and Stark 1985, Hagen-Zanker and Siegel 2007). For example, due to market failures in the place of origin, some members migrate to labour markets that are not perfectly correlated with the home market and enter into a co-insurance agreement with the remaining household members (Stark and Bloom 1985). Therefore, migrants remit in response to shocks to household income and also to reduce income uncertainty in the destination, and thus ensure the household's support during adverse times (Roberts and Morris 2003). Migration thus acts as a reciprocal risk-reducing co-insurance strategy. Studies that report evidence for the co-insurance motive include Lucas and Stark (1985) who find that during times of hardships (such as drought), urban-to-rural remittances in Botswana increase for rural households possessing drought-prone assets. Cox *et al.* (1998) find that remittances received by households in Colombia are a function of their income risk. Rosenzweig (1989) finds that remittances to rural households in India respond to shocks on parental income.

However, it can be difficult to distinguish between altruistic and insurance motives. This is particularly so when measures of risk in the household of origin are used, as opposed to measures of risk at the destination. The use of the latter appears more persuasive because an increase in income uncertainty in the host country is unlikely to directly impact remittances motivated by altruism since no additional need on the part of the household is induced (Ruiz and Vargas-Silva 2009). A study by Amuedo-Dorantes and Pozo (2006) uses measures of income uncertainty in the host country such as the legal status of migrants, the receipt of benefits, the availability of social networks, work experience, and the length of stay. The study finds that a rise in income uncertainty in the host country increases remittances because migrants are risk-averse and insure themselves by remitting more to the household. If multiple migrants are driven by co-insurance motives, each migrant is expected to independently self-insure with the origin household. Hence, any contract the migrant enters into with the household does not depend on the remittance activities of other household members (see, e.g., Agarwal and Horowitz 2002). Thus, the leading prediction under this independent strategy is that the presence of other migrants will exert no effect on the remittances sent by a migrant.

5.2.2   Review of empirical evidence

The few empirical studies that have analysed the behaviour of multiple migrants in the literature, to the author's knowledge, have done so within different settings from the current one and employed different econometric methods. Similar to our focus in the current research, Piotrowski (2008) examines the remittance behaviour of siblings, albeit for a context dissimilar to ours and using different empirical methods. Using data from rural households in Nang Rong, Thailand, and migrant-sibling pairs as the unit of analysis, Piotrowski investigates sibling differences in remittance behaviour. The study employs a multinomial probit model with dependent variables measuring whether both, neither, or only one of the siblings in the pair remitted, as well as whether a sibling sent the same or different amounts than the reference sibling. Various relative attributes of siblings are used as explanatory variables. The results of the study reveal that differences in occupation, gender, and marital status across sibling pairs all have a net effect on remittance behaviour. Though the study is on sibling remittance behaviour, the research question it addresses,

as well as the data and econometric methods it employs, are very distinct from the current study. In addition, the study does not provide any justification for the use of a multinomial probit model, and in its empirical application does not appear to relax the independence of irrelevant alternatives (IIA) assumption. Therefore, the author permits no correlation in the unobservables that influence the different remittance outcomes examined.

Naufal (2008) uses an heteroskedastic tobit model for a sample of Nicaraguan migrants belonging to the same household and finds the decisions to remit are positively correlated across migrant unobservables. However, the study is unable to differentiate between whether the positive correlation in these unobservables is an attribute of competition among migrants belonging to the same household, similarities in behaviour due to a shared background or an *ex-ante* agreement. A shortcoming of the study by Naufal is that the dataset does not contain a breakdown of the amount of remittances sent by each migrant. The author approximates per-migrant remittances based on the total amount of remittances received by the household and the number of remitting migrants. In the case where there is more than one remitting migrant, total remittances are averaged over the number of remitters. As such, the study is unable to differentiate between individual sibling remittance behaviour. The data used for the current thesis chapter has the advantage that we observe exactly how much an individual migrant remitted to the household. Thus, in contrast to the existing literature, the data contain the actual remittances of sibling migrants who belong to the same household of origin. These data represent an advance on what is currently available in the literature.

In a study that more closely resembles the current one, Antman (2012) examines the financial[3] and physical[4] contributions of siblings to their families of origin. The study assumes sibling contributions to be the outcome of a non-cooperative game as the relationship between older parents and their adult children is assumed to be largely independent and to incorporate conflicting interests. This assumption of a non-cooperative bargaining model is central to the identification

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[3] In the study, financial contributions are monetary transfers by both migrant and non-migrant siblings to their parents.

[4] Physical contributions refer to the amount of time (i.e., number of hours) non-migrant children spend helping their parents, conditional on parents reporting difficulties with activities of daily living.

strategy used in the paper, and thus the reported results are uninformative of a cooperative

bargaining approach. The data used are obtained from the Mexican Health and Aging Study

(MHAS) for the years 2001 and 2003. The unit of analysis are siblings whose parents were born

before 1950. The paper considers sibling contributions to be endogenous and uses other sibling

characteristics as instrumental variables. These are comprised of the number of sisters, the number

of siblings in each of four education categories, the sum of ages, the sum of children of other

siblings, the number of married siblings, the total number of siblings, and the total birth orders of

other siblings. IV linear regression and tobit models are employed and estimated separately for

migrants and non-migrants, and for financial and physical contributions. The main results reveal

that a 100 peso increase in sibling financial contributions to their parents leads to a six-peso

increase in the financial contribution of the individual sibling migrant and an increase of about 12

pesos for the non-migrant child. This positive relationship indicates strategic complementarity in

migrant and non-migrant financial contributions. The cross-effects between financial and time

contributions across siblings are found to be negative thus suggesting substitution across siblings.

The time contributions of siblings are found to be strategic substitutes. The author suggests that the

distinction between the complementarity of financial contributions and the substitutability of time

contributions across siblings suggests that children expect their parents to mainly consider financial

contributions when allocating bequests. The author also suggests that the magnitude of

complementarity is higher for non-migrants as some migrants do not plan to return home, and thus

have weaker bequest motives. Unlike Antman, our dataset does not contain information on the

time contributions of siblings and therefore we cannot consider non-financial contributions. In

addition, our focus is exclusively on migrants. Furthermore, the non-cooperative assumption that is

central to the identification strategy in the study seems implausible for the current context. As

highlighted in section 5.1, in the Kenyan context, adult children play a crucial role in supporting

elderly parents even after they have established their own independent households.

Agarwal and Horowitz (2002) examine the effect of multiple migrants on the level of

remittances anticipating the presence of other remitting migrants to reduce the average size of

remittances if motivated by altruism. Using data from the Guyana Living Standards and

Measurement Survey, they estimate the decision to remit and the amount of remittances sent by multiple versus sole migrants. They employ a Heckman selection model. In order to identify the remittance model parameters, they use a variable measuring whether a migrant had been settled in the host country for more than one year to shift the probability of remitting but not the amount. They find that the presence of other migrants decreases remittance levels per migrant, thus supporting altruistic motives. In addition, the authors use the unemployment rate in the destination as a risk variable assuming it to have a positive effect if remittances are motivated by co-insurance and an indeterminate effect if through altruism. They find weak explanatory power for the insurance model and a statistically insignificant effect for the unemployment variable. The study undertaken by Agarwal and Horowitz (*op. cit.*) is similar in spirit to the current study and employs broadly comparable empirical methods, though the contexts are somewhat different. However, unlike in the current study, their data do not contain information on the amount of remittances sent by each migrant and so the total remittances received by a household are averaged across the number of remitting migrants to approximate per-migrant remittances. This could provide misleading outcomes in the case where migrants within the same household remit differing amounts. The research in this chapter also differs from that contained in the study by Agarwal and Horowitz in its focus on siblings.

Using U.S. data from the Longitudinal Retirement History Survey (LRHS) collected in 1969, 1971, 1973, and 1975, Bernheim *et al.* (1985) examine whether bequests are used to influence the behaviour of potential beneficiaries. Their data consist of elderly parents with two or more living children. The dependent variable is a measure of the contact between parents and a child (referred to as the supply of attention per child).[5] The main explanatory variable of interest is the value of bequeathable wealth per child. The definition of bequethable wealth includes financial investments, physical property, and other equity. OLS estimates of the model yield an insignificant effect for bequeathable wealth holdings on the supply of attention per child. To solve for the potential endogeneity of this wealth measure, the lifetime earnings of parents are used as instrumental

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[5] The supply of attention per child is constructed as a function of the number of children who visit or telephone their parents weekly and the number of children who visit or telephone their parents monthly. This is weighted by the total number of children and is normalized such that the maximum contact equals unity.

variables. The justification is that lifetime earnings are positively correlated with bequeathable wealth but unlikely to have a strong correlation with the amount of attention given by children. Using a two-stage least squares (2SLS) approach, the authors find that such wealth is strongly correlated with the attention provided to parents by their children. The coefficient on bequeathable wealth in the 2SLS model is found to be about eight times as large as that of the OLS estimate. The difference in the magnitude of the OLS and 2SLS coefficients is quite large and raises questions about the validity of the instruments used. Although the study provides a theoretical justification for the instruments, it does not report any tests to determine their validity (i.e., relevance and orthogonality).

Hoddinott (1992) uses a survey conducted in Karateng (western Kenya) to investigate the nature and level of assistance that children provide their elderly parents. The study examines whether parents can influence the level of assistance their offspring provide by adapting the non-cooperative bargaining model of intergenerational transfers developed by Bernheim *et al.* (1985). The study excludes daughters of the head from the sample because land in Karateng is passed on from father to son, so the disinheritance threat does not apply to daughters. Thus, the dependent variables are restricted to the assistance provided by sons, their wives, and their children. Time and money transfers are jointly estimated using a 2SLS estimation procedure. This study provided support for the hypothesis that parents can use inheritable assets to influence the level of assistance that they receive from their sons. In addition, the number of sons was found to have a significant effect on monetary transfers. However, due to a small sample size (74 households) the results obtained cannot be generalized in any meaningful way. Using the same data as above, Hoddinott (1994) finds evidence that the level of remittances is influenced by parental ability to reward good behaviour through the promise of bequests. Hoddinott assumes that there is a benchmark, minimal amount of money that each migrant is expected to remit and that parents can encourage transfers above this level by offering a "reward" in the form of land or any other inheritable asset.

For the Dominican Sierra, De la Brière *et al.* (2002) test whether remittances to parents are motivated by an insurance contract between parents and their migrant children, or an investment in

potential bequests. The data used consist of 400 farm households surveyed by the authors in 1994. The analysis restricts attention to migrant children of the household head as they are the main source of remittances. The main explanatory variables used in this model are a variable measuring shock to the income of a parent (proxied by the number of days of work in the year lost due to illness) expected to have a positive effect on the amount of remittances, the level of risk-aversion of a parent (proxied by the household income level) assumed to have a negative effect, and a migrant's risk aversion (proxied by the income level) expected to have a positive effect. The inheritance model is specified as the decision to remit by a migrant as a contribution to investment in household assets that are later to be inherited. The overall finding of the analysis is that both insurance and inheritance motives induce remittances, but the latter more strongly than the former.

Table 5.1: Summary of studies with multiple migrant variables

Paper	Data source & time period	Data type	Main estimation methods	Identification variables	Multiple migrant variables & effects
Hoddinott (1994)	1982 survey of smallholders in Central Province, Kenya	Cross-sectional	Heckman selection model	District dummy variables and a dummy variable equalling one if the migrant has been absent for more than one year	Presence of other male sibling migrants (+ve effect on amount of remittances but with a caveat as difference in means insignificant)
Funkhouser (1995)	1987 El Salvador household survey 1989 Nicaraguan Institute of Statistics & Censuses	Cross-sectional	Tobit model Two-stage self-selection model	Not Applicable	Number of migrants: -0.033 (probability of remitting for El Salvador), -ve effect on amount; insignificant for both the probability & the amount for Nicaragua
Gubert (2002)	1997 survey of 8 villages in Kayes, western Mali	Cross-sectional	Powell's censored least absolute deviation	Not Applicable	Number of migrants: -ve effect on probability and amount; +ve effect on amount at household level
Agarwal and Horowitz (2002)	1992/3 Guyana household and income survey 1992/3 Guyana World Bank living standard measurement survey	Cross-sectional	Heckman selection model	Whether a migrant had been settled in the host country for more than a year	Number of migrants: -0.11 (probability of remitting), -0.26 (log of remittances) Unemployment (risk variable): insignificant
Piotrowski (2008)	Rural household survey in Nang Rong, Thailand	Cross-sectional	Multinomial probit model	Not Applicable	Not Applicable
Antman (2012)	2001 and 2003 Mexican Health and Aging Study (MHAS)	Cross-sectional	IV regression; IV tobit	Characteristics of other migrants	Amount remitted by other siblings (+ve effect on remittances) Other siblings' time contributions to the household (-ve effect on time contribution)
Naufal (2008)	2001 Nicaraguan Encuesta Nacional de Hogares sobre Medición de Niveles de Vida (EMNV)	Cross-sectional	Heteroskedastic tobit model	Not Applicable	+ve correlation of remittance decisions across multiple siblings

Table 5.1 provides a summary of the main studies reviewed here relevant to our empirical analysis. These studies offer a basis of comparison for the empirical estimates subsequently reported in section 5.5.

5.3   Data and summary statistics

In this section, we discuss the main explanatory variables for the empirical analysis and present summary statistics for these variables. The dataset used was discussed in detail in chapter 3. Due to the emphasis on multiple sibling migration we conduct the analysis on sibling migrants belonging to households with more than one child of the household head. We also restrict the sample to migrants who are more than 15 years old. This is because from this age onwards, we expect most migrants to be in a position to send remittances home independently, if they wish. The final sample of usable observations consists of 1,092 sibling migrants who are children of the household head in the 647 households in the sample containing at least two siblings. Table 5.2 presents a breakdown of multiple sibling migrant households by number of sibling migrants and indicates that the majority of households in the sample have two sibling migrants.

Table 5.2: No. of sibling migrants in households with multiple sibling migrants

No. of sibling migrants	No. of households
2	207
3	76
> 3	80
Total	**363**

Source: Author's own estimates from World Bank Africa Migration Project dataset.

Two dependent variables are used in the preliminary analysis - a dummy dependent variable measuring whether or not a migrant remitted to the household of origin and the total amount of remittances sent. Remittances refer to the value of both cash and in-kind remittances sent to the household in the 12 months prior to November/December 2009, valued in Kenyan shillings. The following goods are reported as in-kind remittances in the survey: washing machine, furniture, stove/cooker, microwave, air conditioner, computers and accessories, DVCD/DVD/video, motorbike, cars, buses, trucks, posh mill, hair dressing equipment, sewing machine, tractor, agricultural equipment, mobile phone, other goods. In the dataset, the conditional mean value of

non-zero remittances is 100,925 shillings while the median is 16,000 shillings. This wide deviation

between the mean and median is due to the presence of four very large values. The largest of these

four is respectively 188 and 1,225 times larger than the mean and median. The presence of

extremely large and small remittance values is common in household datasets (De la Briere 2002).

However, these four values appear to be overly extreme.[6] Eliminating the four values from our

analysis results in a conditional mean of 59,576 shillings and a median of 15,500 shillings. In our

econometric analysis, we thus exclude these four outliers.

The explanatory variables used in the empirical analysis are motivated by the literature on

migrant remittances discussed earlier, but are also constrained by the nature of the information

available in our dataset. The education level of the sibling is classified into university, secondary, or

primary education or less. A shortcoming of the data is that we do not have information on current

education. Hence, we only know what education the migrant had at the time of migration but not if

and how much education they acquired after migrating. The age of the sibling is captured using

dummy variables grouped into ten year age intervals. The employment status of the migrant is

defined using the following dummy variables: employed, student, self-employed, unemployed. The

living situation of the migrant is captured by including dummy variables defined as follows: lives

alone, lives with spouse and/or children and lives with other. The "other" category refers to

relations such as cousins, brother, sister, or even friends. Dummy variables measuring how long the

migrant has been in the destination are also included. These are defined for one to three years, four

to five years, and six or more years. The other migrant-specific explanatory variables include the

gender, marital status, and location (i.e., internal or external) of the sibling. In addition, a variable

measuring the receipt of any monetary transfers from the household of origin in the previous 12

months is also included in the analysis.

Variables that are specific to the household of origin include the gender of the household head

and four mutually exclusive dummy variables for the age of the household head. These are defined

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[6] The details of the extreme values are as follows: (i) Male sibling aged 35 years in Congo remitted 19 million shillings (about USD 220,000), (ii) Female sibling aged 32 located in the US remitted 3,030,000 shillings (about USD 35,000), (iii) Male sibling aged 40 located in Dubai remitted 2,010,000 shillings (about USD 23,000), and (iv) Female sibling aged 28 located in Denmark remitted 6,000,000 shillings (about USD 70,000).

for less than 44, 45 to 54, and greater than 55. The education level of the household head is defined for the categories of university, secondary, or primary or less. A set of employment status dummy variables for the household head are defined for employed, self-employed, unemployed and retired. The following household demographic variables are constructed: the proportion of elderly people (defined as members who are more than 59 years old), the proportion of children (defined as members who are less than seven years old), and the total number of members currently living in the household. A dummy variable for whether or not the household owns land and/or a house is also constructed. In addition, a variable measuring whether or not a non-sibling migrant is present in the household is also included in the analysis.

Lastly, a set of regional dummy variables are also constructed and these are for the regions of Nairobi, Central, Eastern, North-eastern, Coast, Rift valley, Nyanza and Western. Geographical differences can account for some of the variation in the probability of receiving remittances and the amount received. For example, as discussed in chapter 2, Nairobi, Coast and the Rift Valley tend to be provinces of net inward migration with the others being provinces of net outward migration. Thus we expect the latter provinces to be more likely to receive internal remittances. However, since the former provinces are wealthier, we expect them to have higher incidents of external migration and thus to be more likely to receive remittances from abroad.

Table 5.3 provides a summary of the predicted signs of the effects of some of the key variables introduced above under the different motives for remittances found in the existing literature.

Table 5.3: Predicted signs for the effects of key variables

Effect on level of remittances	Pure altruism	Pure self-interest	Co-insurance	Loan repayment	Exchange motives
Presence of other sibling migrants	-	+	zero	?	?
Migrant education level	?	?	?	+	+
Migrant income	+	+	?	+	+
Length of migration	-	?	?	+, later -	?
Migrant receipt of transfers from the household	?	?	-	?	?
Location of migrant (external = 1)	+	?	?	?	?
Household of origin head age	+	+	?	?	?
Household of origin income	-	+	-	+/-	+/-
Proportion of elderly people in origin household	-	-	?	?	?

Table 5.4 provides summary statistics for the variables discussed in this section. The first column reports combined summary statistics, the second and third columns report summary statistics for sole and multiple sibling migrants respectively, and the fourth column reports the t-test/z-scores for tests for mean/proportion differences between sole and multiple sibling migrants. The table reveals that the average amount of cash and/or in-kind remittances sent is about 30,000 shillings (approximately USD 340). There is no statistically significant difference in the mean value of remittances sent by sole versus multiple sibling migrants.

The table also reveals that 50% of migrants sent cash and/or in-kind remittances to the household in the 12 months prior to November/December 2009. The majority of remittances were sent in the form of cash, compared to in-kind remittances. Hoddinott (1992) reports that 68% of migrants sent remittances in the previous 12 months. This is higher than the proportion of migrants sending remittances in our sample and may have arisen from differences in the sample surveyed. The sample in Hoddinott (*op. cit.*) consists of spouses, sons and daughters of rural households in the Central province of Kenya who are living in the urban areas of Kenya. When we restrict our sample to migrants whose households of origin are located in the Central province, we find that 49% of siblings remitted. However, in order to have a more comparable sample to that of Hoddinott (*op. cit.*) we also incorporate both sibling and non-sibling migrants into the subset of migrants from the Central province. We find that 68% of migrants in this sub-sample remitted. This is equivalent to the proportion obtained in the Hoddinott study.

The table also shows that 76% of siblings are multiple sibling migrants. Sole sibling migrants are shown to be more likely to remit than multiple sibling migrants. Sole sibling migrants are more likely to be younger and male. The proportion of sole migrants who are students and/or unemployed is also higher than that of multiple migrants. On the other hand, multiple sibling migrants are more likely to be employed and be married, compared to sole migrants. Multiple migrants are also more likely to reside with a spouse and/or children, while sole migrants are more likely to live alone.

Table 5.4: Summary statistics for sole and multiple sibling migrants

Variables	All	Sole migrants (0)	Multiple migrants (1)	t-test/z-score†
Dependent variables:				
Value of cash & in-kind rems (Ksh)	29751 (93906)	35876 (101257)	27866 (91507)	1.2
Value of cash only rems (Ksh)	26798 (90024)	32477 (98213)	25050 (87338)	1.16
Value of in-kind only rems (Ksh)	2953 (20595)	3399 (15101)	2816 (22017)	0.4
= 1 if remitted cash & in-kind; = 0 otherwise	0.5 (0.5)	0.54 (0.5)	0.48 (0.5)	1.78*
= 1 if remitted cash only; = 0 otherwise	0.34 (0.47)	0.33 (0.47)	0.34 (0.47)	-0.02
= 1 if remitted in-kind only; = 0 otherwise	0.05 (0.22)	0.05 (0.23)	0.05 (0.22)	0.19
Individual characteristic variables:				
= 1 if multiple sibling migrant	0.76 (0.42)			
Age dummy variables:				
= 1 if aged 15 to 25; = 0 otherwise	0.3 (0.46)	0.37 (0.48)	0.27 (0.45)	3.05***
= 1 if aged 26 to 35; = 0 otherwise	0.45 (0.5)	0.42 (0.49)	0.46 (0.5)	-1.13
= 1 if aged 26 to 45; = 0 otherwise	0.17 (0.38)	0.12 (0.33)	0.19 (0.39)	-2.32**
= 1 if aged 46+; = 0 otherwise	0.08 (0.28)	0.09 (0.28)	0.08 (0.28)	0.15
χ^2 test for age dummies				11.66***
= 1 if male; = 0 otherwise	0.57 (0.5)	0.61 (0.49)	0.55 (0.5)	1.49*
Education dummy variables:				
= 1 if university education; = 0 otherwise	0.18 (0.38)	0.15 (0.36)	0.18 (0.39)	-1.20
= 1 if secondary education; = 0 otherwise	0.63 (0.48)	0.61 (0.49)	0.64 (0.48)	-0.61
= 1 if primary education; = 0 otherwise	0.19 (0.39)	0.23 (0.42)	0.18 (0.38)	1.92**
χ^2 test for education dummies				4.27
Employment status dummy variables:				
= 1 if employed; = 0 otherwise	0.6 (0.49)	0.54 (0.5)	0.62 (0.49)	-2.24**
= 1 if self-employed; = 0 otherwise	0.1 (0.3)	0.09 (0.28)	0.1 (0.3)	-0.76
= 1 if unemployed/student; = 0 otherwise	0.30 (0.46)	0.37 (0.48)	0.28 (0.45)	2.90***
χ^2 test for employment dummies				15.73***
= 1 if married; = 0 otherwise	0.46 (0.5)	0.39 (0.49)	0.48 (0.5)	-2.50**
Living situation dummy variables:				
= 1 if lives with spouse and/or children; = 0 otherwise	0.39 (0.49)	0.3 (0.46)	0.42 (0.49)	-3.35***
= 1 if lives with relatives and/or friends; = 0 otherwise	0.2 (0.4)	0.17 (0.37)	0.21 (0.41)	-1.44*
= 1 if lives alone; = 0 otherwise	0.41 (0.49)	0.53 (0.5)	0.38 (0.48)	4.51***
χ^2 test for living situation dummies				20.21***
Migration length spline 1	3.63 (1.54)	3.13 (1.58)	3.78 (1.5)	-6.02***
Migration length spline 2	2.76 (5.88)	1.25 (3.35)	3.22 (6.39)	-4.74***
= 1 Receives transfers from hh of origin; = 0 otherwise	0.17 (038)	0.28 (0.45)	0.14 (0.34)	5.42***
= 1 if located in external destination; = 0 otherwise	0.39 (0.49)	0.49 (0.5)	0.35 (0.48)	4.08***
Household characteristic variables:				
Household age:				
= 1 if head aged 25 to 44; = 0 otherwise	0.08 (0.27)	0.15 (0.36)	0.06 (0.23)	5.02***
= 1 if head aged 45 to 54; = 0 otherwise	0.25 (0.44)	0.36 (0.48)	0.22 (0.41)	4.60***
= 1 if head aged 55 to 65; = 0 otherwise	0.29 (0.46)	0.25 (0.44)	0.31 (0.46)	-1.62*
= 1 if head aged 66 or more; = 0 otherwise	0.37 (0.48)	0.23 (0.42)	0.42 (0.49)	-5.41***
χ^2 test for head age dummies				57.96***
Head education dummy variables:				
= 1 if head has university education; = 0 otherwise	0.1 (0.29)	0.1 (0.3)	0.09 (0.29)	0.127
= 1 if head has secondary education; = 0 otherwise	0.39 (0.49)	0.34 (0.47)	0.4 (0.49)	-1.87**
= 1 if head has primary education; = 0 otherwise	0.52 (0.5)	0.56 (0.5)	0.5 (0.5)	1.75**
χ^2 test for education dummies				3.64

Head employment dummy variables:			
= 1 if head is employed; = 0 otherwise	0.18 (0.38)	0.28 (0.45)	0.15 (0.36)	4.99***
= 1 if head is self-employed; = 0 otherwise	0.38 (0.49)	0.42 (0.49)	0.37 (0.48)	1.2
= 1 if head is unemployed; = 0 otherwise	0.15 (0.35)	0.14 (0.35)	0.15 (0.35)	-0.08
= 1 if head is retired; = 0 otherwise	0.29 (0.45)	0.16 (0.36)	0.33 (0.47)	-5.48***
χ² test for employment dummies				41.67***
Proportion of elderly people	0.21 (0.27)	0.09 (0.14)	0.25 (0.29)	-8.35***
=1 if hh owns land/house; = 0 otherwise	0.88 (0.32)	0.86 (0.34)	0.89 (0.31)	-1.19
= 1 if head is male; = 0 otherwise	0.69 (0.46)	0.65 (0.48)	0.7 (0.46)	-1.61*
Proportion of children	0.06 (0.12)	0.08 (0.13)	0.06 (0.11)	2.15**
Household size	4.48 (2.24)	5.22 (2.11)	4.25 (2.23)	6.18***
= 1 if non-sibling migrant present; = 0 otherwise	0.13 (0.33)	0.08 (0.27)	0.14 (0.35)	-2.47**
= 1 if household in urban location; = 0 otherwise	0.42 (0.49)	0.47 (0.5)	0.4 (0.49)	1.80**
N	1092	257	835	

Notes to the table:

(i) The remittance values reported are based on the non-censored observations therefore average over 542, 140, and 402 observations for the combined, sole, and multiple sibling migrant samples, respectively.
(ii) Standard deviations are reported in parentheses.
(iii) † The hypothesis under test here is: $H_0: \mu_0 = \mu_1 / H_0: \pi_0 = \pi_1$. The column provides the t-ratios/z-scores for mean/proportion differences between non-migrants and migrants. *, **, *** represent the statistical significance of the differences for the 10%, 5% and 1% significance levels respectively.
(iv) The χ² tests are testing for differences between sole and multiple migrants for categorical variables.

The summary statistics also reveal that more sole migrants received transfers from the household of origin compared to multiple migrants, and that more sole migrants are located in an external destination. In regard to the household characteristics, we see that sole migrants have younger household of origin heads than multiple migrants. Multiple migrant household heads are less likely to be employed, more likely to be retired and more likely to be male compared to sole migrant heads. The proportion of elderly people is higher in multiple sibling migrant households, while the proportion of children is lower. The household size is larger for sole migrants. Multiple sibling migrants are more likely to have non-sibling migrants. Finally, we see that the households of sole sibling migrants are more likely to be located in urban than in rural areas compared to those of multiple sibling migrants.

Table 5.5 provides summary statistics for the variables used in the analysis focusing on multiple sibling migrants only. The first column reports statistics for the pooled sample of multiple sibling migrants. The second and third columns report statistics for remitters and non-remitters, respectively, and the fourth contains t-tests/z-scores for the difference in means/proportions between non-remitters and remitters.

Table 5.5: Summary statistics for multiple sibling migrants

Variables	All	Remitters (1)	Non-remitters (0)	t-test/z-score†
Dependent variable:				
Value of cash & in-kind rems (Ksh)	35950 (165265)	72522 (229167)		
Individual characteristic variables:				
Value of cash & in-kind rems by others (Ksh)	67493 (216422)	85665 (250065)	49630 (175782)	-2.209**
= 1 if male; = 0 otherwise	0.55 (0.50)	0.59 (0.49)	0.5 (0.5)	-2.383***
Age	30.57 (8.40)	32.03 (7.63)	29.13 (8.87)	-4.639***
Birth rank	2.10 (1.20)	2.27 (1.24)	1.92 (1.13)	-3.90***
= 1 if married; = 0 otherwise	0.50 (0.50)	0.59 (0.49)	0.41 (0.49)	-4.756**
Education dummy variables:				
= 1 if secondary education; = 0 otherwise	0.65 (0.48)	0.63 (0.48)	0.67 (0.47)	1.037
= 1 if university education; = 0 otherwise	0.18 (0.38)	0.23 (0.42)	0.13 (0.34)	-3.385***
= 1 if primary education; = 0 otherwise	0.17 (0.38)	0.14 (0.35)	0.20 (0.40)	2.09**
χ^2 test for education dummies				13.27***
Living situation dummy variables:				
= 1 if lives alone; = 0 otherwise	0.39 (0.49)	0.43 (0.5)	0.35 (0.48)	-2.358***
= 1 if lives with spouse and/or children; = 0 otherwise	0.41 (0.49)	0.46 (0.5)	0.35 (0.48)	-2.816***
= 1 if lives with other relations; = 0 otherwise	0.21 (0.40)	0.11 (0.31)	0.30 (0.46)	6.42***
χ^2 test for living situation dummies				39.02***
Length of migration (years)	6.75 (6.81)	6.94 (5.98)	6.57 (7.55)	-0.713
= 1 if located in external destination; = 0 otherwise	0.37 (0.48)	0.4 (0.49)	0.35 (0.48)	-1.504*
Household characteristic variables:				
Head education dummy variables: = 1 if head has secondary education; = 0 otherwise	0.43 (0.49)	0.41 (0.49)	0.44 (0.5)	0.5685
= 1 if head has university education; = 0 otherwise	0.10 (0.30)	0.09 (0.28)	0.12 (0.32)	1.416***
= 1 if head has primary education; = 0 otherwise	0.47 (0.50)	0.50(0.50)	0.44 (0.50)	-1.43*
χ^2 test for head education dummies				3.06
Number of children in household	0.37 (0.78)	0.36 (0.76)	0.38 (0.8)	0.232
Number of elderly people in household	0.81 (0.75)	0.9 (0.72)	0.71 (0.77)	-3.372***
Household size	4.28 (2.23)	4.49 (2.1)	4.07 (2.33)	-2.477***
= 1 if non-sibling migrant present; = 0 otherwise	0.14 (0.35)	0.09 (0.29)	0.19 (0.39)	3.830***
= 1 if household owns land and/or house; = 0 otherwise	0.90 (0.29)	0.92 (0.27)	0.89 (0.32)	-1.597*
N	700	347	353	

Notes to the table:
(i)   Standard deviations are reported in parentheses.
(ii)   † The hypothesis under test here is: H_0: $\mu_0 = \mu_1$/ H_0: $\pi_0 = \pi_1$. The column provides the t-ratios/z-scores for mean/proportion differences between non-migrants and migrants. *, **, *** represent the statistical significance of the differences for the 10%, 5% and 1% significance levels respectively.
(iii)   The χ^2 tests are testing for differences between non-remitters and remitters for categorical variables.

The sample size is smaller due to the restriction to multiple migrants and has only 700 siblings. Moreover, not all the variables featured in the preliminary analysis are included in this analysis. We only employ those variables found to have a significant effect on either the probability of remitting or the amount of remittances sent by multiple migrants. We also conflate some of the variables that are otherwise disaggregated in the initial analysis (e.g., age variables). This is done to avoid over-parameterizing the econometric models given the small sample size.

The table reveals that the average amount of remittances sent by multiple sibling migrants is about 36,000 shillings (approximately USD 400). Males are more likely to remit and remitters also tend to be older than non-remitters. Having a university education, living alone, living with a spouse and/or children, and being located in an external destination all increase the chances of remitting. Remittances are more likely to be sent if the household has a higher number of elderly people and if the household size is bigger. Siblings are more likely to remit if the household owns land and/or a house and less likely if there are non-sibling migrants belonging to the same household of origin. We also introduce a variable capturing the birth rank of the sibling here as a measure of bargaining power. Higher values represent older siblings. We see that older siblings are more likely to remit.

5.4   Empirical methodology

Three econometric methodologies are dominant in the literature when it comes to modelling the determinants of the amount of migrant remittances: Ordinary Least Squares (OLS), Heckman two-step procedures, and censored tobit models. Studies that have used OLS include Johnson and Whitelaw (1974) and Knowles and Anker (1981). A shortcoming associated with the OLS model is that it does not account for zero remittance observations, which truncate the equation error term, leading to biased and inconsistent estimates if the scale of censorship is sizeable. The popular tobit models address this censorship by assuming that there is only one remittance decision in which the decisions of whether and how much to remit occur simultaneously (Tobin 1958).

Remittance studies that have used the tobit model include Brown (1997) and Markova and Reilly (2007). However, the imposition of a sign constraint on the probability and levels effect is a

strong empirical assumption. In order to determine the suitability of the censored tobit model for our empirical analysis, we conducted a well-known specification test. This revealed a decisive rejection of the censored tobit model.[7] The tobit model is therefore deemed unsuitable for the current application as the inherent misspecification yields inconsistent estimates (see Wooldridge 2010 p. 685).

The Heckman two-step procedure addresses this shortcoming by treating the transfer of remittances as a sequential 'two-step' decision and allowing the effect of a given variable on the decision to remit to be different from its effect on the level of remittances (Heckman 1979). Hoddinott (1994), Brown and Connell (2006) and Liu and Reilly (2004) provide examples of remittance studies that have used the Heckman procedure, which is also interpreted as a generalized tobit model. The identification of the selection effect is one of the key challenges in using the Heckman procedure. This is only achieved if there is (at least) one variable in the selection equation that is not included in the remittance equation. The identifying variables we use in the current analysis are discussed in section 5.5 below but we now briefly outline the structure of the Heckman procedure for the current application. The selection mechanism that governs the decision to remit can be defined in terms of a latent variable as follows:

$$y_i^* = w_i'\gamma + u_i \tag{5.4}$$

where $i = 1, \ldots, 1092$. w_i is a vector of characteristics that determines whether the ith sibling remits or not (see Table 5.4) and $u_i \sim N(0, \sigma_u^2)$. If $y_i^* > 0$ then the event of remitting occurs and if $y_i^* \leq 0$ it does not. The regression model is only observed if $y_i^* > 0$. The remittance regression equation may then be expressed as:

$$r_i = x_i'\beta + \varepsilon_i \tag{5.5}$$

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[7] The likelihood ratio test, based on Lin and Schmidt (1984) yields a test statistic of 372 for this application.

where $\varepsilon_i \sim N(0, \sigma_\varepsilon^2)$ and x_i is a vector of characteristics for individual i that determines how much they remit and represents the set of explanatory variables. This model is only observed for $i = 1, \dots, 542$ siblings in our case.

The error terms of equations (5.4) and (5.5) follow a bivariate normal distribution as follows:

$$u_i, \varepsilon_i \sim BVN[0, 0, \sigma_u^2, \sigma_\varepsilon^2, \sigma_{u\varepsilon}]$$

where $\sigma_{u\varepsilon}$ represents the covariance between the two unobservable error terms. The correlation coefficient between the errors in the two equations is expressed as $\rho = \dfrac{\sigma_{u\varepsilon}}{\sigma_u \sigma_\varepsilon}$.

The Heckman two-step procedure is implemented as follows. In the first step, the reduced form selection equation (i.e., the decision to remit or not) is estimated using a probit model and maximum likelihood estimates for the y vector are obtained. This reduced form should contain all relevant exogenous variables and should also contain identifying variables which are not included in the x vector determining the remittance amount equation. The estimates from the reduced form equation are used to construct empirical measures for the inverse-Mills ratio (λ_i) defined as follows:

$$\lambda_i = \frac{\phi[w_i'\, y]}{\Phi[w_i'\, y]} \tag{5.6}$$

The inverse-Mills ratio represents the pseudo-residuals from the probit model for the case where the event actually occurs. The two terms $\Phi[\,\cdot\,]$ and $\phi[\,\cdot\,]$ denote the cumulative distribution function and probability density function operators respectively.

In the second step of the procedure, the following equation is estimated by OLS:

$$r_i = x_i'\beta + \theta\lambda_i + \varsigma_i \tag{5.7}$$

where θ is the selection coefficient, $E[\varsigma_i] = 0$ and $i = 1, \dots, 542$. OLS yields estimates for the elements in the β vector and the selection parameter θ which are consistent and asymptotically normal. The expected value of the equation for the second stage of the Heckman two-step procedure is thus represented as follows:

$$E[r_i|y_i^* > 0] = x_i'\beta + \Theta\lambda_i \qquad (5.8)$$

The Heckman procedure provides a test for sample selectivity (or non-random) bias. If $\rho = 0$, then there is no correlation between the unobservables in the selection and the remittance equations and $\Theta = 0$. Thus, the test for the statistical significance of Θ is a formal test for sample selection. Equation (5.5) can be estimated by OLS and yields consistent estimates if there is no sample selectivity bias.

Finally, in order to determine whether to use a logged or non-logged dependent variable in expression (5.5) or (5.7) above, we compare the R-squared values for both models using a heuristic approach suggested by Ramanathan (1998). The procedure entails estimating the log-linear model and obtaining its fitted values. The antilogs of the fitted values are computed. The square of the correlation coefficient between the antilogs of the fitted values and the actual variable is then computed. This is then compared to the unadjusted R-squared from the linear regression model with the non-logged dependent variable. The model with the larger unadjusted R-squared is the preferred model. In our empirical analysis, the data favour the non-logged model and thus we use an unlogged dependent variable. This then allows for a more straightforward interpretation of the estimates and a cleaner insight as to the magnitude of the estimated effects obtained.

5.5   Empirical results

We first estimate the Heckman selection model for the sample of sole and multiple sibling migrants. The identification restrictions in the Heckman model are provided by the following variables: (i) the current size of the household of origin, (ii) a dummy variable capturing whether there is a non-sibling migrant from the same household of origin,[8] (iii) a dummy variable for whether the household of origin is located in an urban or a rural area,[9] and (iv) a dummy variable for the gender of the household of origin head.[10] All these variables exert an insignificant effect on the level of remittances (p-value = 0.333) but are jointly significant in determining the probability of

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[8] In the sample, 12% of siblings belong to a household of origin with a non-sibling migrant.

[9] About 57% of households are based in rural areas.

[10] In the sample, 70% of siblings belong to a household of origin headed by a male.

remitting (p-value = 0.001) thus statistically justifying their use as identifying variables. The rationale for using these variables as identifiers in the current application is briefly discussed.

Firstly, it could be argued that households headed by women are more likely to receive remittances compared to those headed by men (Carling 2008). This is because migrants tend to be more altruistic towards female heads. The act of remitting could be influenced by social pressure if children who send remittances to their mothers are perceived as more caring towards them. However, the amount of remittances sent is more private and thus likely to be dictated by the need of the recipient and not their gender *per se*. The presence of non-sibling migrants in the household potentially decreases the probability of remitting as the remitting responsibility is distributed across more individuals. However, the amount of remittances sent is more likely to be determined by how much the migrant is capable of remitting and the needs of the receiving household, not the presence of non-sibling migrants *per se*. An increase in the size of the household is likely to increase the demand for remittances as migrants may feel obliged to remit to larger households. However, it does not necessarily affect how much is actually remitted as an increase in household size may not directly translate to an increase in the amount of remittances needed.[11] In addition, the capacity of the migrant to remit should affect the level of remittances sent and not the size of the receiving household in itself. Households located in urban areas generally have higher income levels, can diversify their income sources more easily compared to rural households, and so are less likely to demand or require remittances. However, the amount of remittances a migrant sends, if they decide to remit, should not be affected by urban/rural location itself. Overall, and given their statistical relevance, it does not appear implausible to treat these four identifying variables as exogenous with respect to the decision of how much to remit and as independent of the level of remittances.

In the Heckman two-step model, the inverse Mills ratio is found to be statistically insignificant. Thus, the null hypothesis of no selectivity bias is upheld by the data in this application. This suggests that the selectivity in sibling decisions to remit and the amount of remittances to send has been captured entirely through the inclusion of the observable covariates. Because there is no

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[11] For example, if additional household members contribute towards household income, their presence may not affect the level of remittances demanded by the household.

sample selection problem in terms of unobservables, the remittance levels model can be estimated by uncorrected OLS using the sample of positive remitters (see Wooldridge 2010 pp. 805-6). We thus employ OLS for the level of remittances and a probit model for the probability of remitting as the preferred models. The results from the Heckman two-step selection model are provided in the Appendix (see Table A5.1) for completeness.

5.5.1 OLS and probit model estimates

The first column of Table 5.6 reports marginal/impact effects for the probability of remitting using a probit model based on the full sample of remitting and non-remitting siblings. The dependent variable is equal to 1 if a migrant remitted and 0 otherwise. The second column presents estimates for the remittance volume model based on OLS using the sample of non-zero remitters given the absence of selection effects. Here, the dependent variable is the total amount of cash and in-kind remittances sent to the household measured in Kenyan shillings. In the OLS and probit model, robust standard errors clustered by household are reported in order to take into account the clustering effect of the presence of siblings from the same households.

The empirical estimates show that multiple sibling migrants are 10 percentage points less likely to remit, on average and *ceteris paribus*, relative to sole sibling migrants. This corresponds to a 20% decrease in the probability of remitting relative to the mean. To check if the negative effect holds for the different types of remittances sent, we estimate a multinomial logit model for the following categories of remittances: no remittances, cash only, in-kind only, and both cash and in-kind remittances. We also find a statistically significant negative effect of being a multiple sibling migrant on the probability of remitting for the cash and in-kind remittance category, and an insignificant effect for the cash only and in-kind only categories (see Table A5.2 in the Appendix). This seems to indicate that migrants respond to the joint remittances sent to the household and not to the individual remittance components.

Table 5.6 also reveals that, conditional on a sibling remitting, the amount of remittances sent by a multiple sibling migrant is not statistically different from that sent by a sole sibling migrant. This finding is invariant to whether the model is estimated using different definitions for the remittance

metric. For instance, we also estimate the OLS model under three specifications with the following dependent variables: (i) the value of cash remittances sent, (ii) the value of in-kind remittances sent, and (iii) the value of both cash and in-kind remittances sent. In all three specifications we obtain an insignificant effect for the multiple sibling migrant dummy variable (see Table A5.3 in the Appendix).

Table 5.6: Probit model (marginal/impact effects) and OLS regression (coefficients)

VARIABLES	Probit model marginal/impact effects (remit = 1)	OLS model coefficients (remit value)
Individual characteristic variables:		
= 1 if multiple sibling migrant	-0.0974***	-8,746
	(0.0334)	(13,517)
= 1 if aged 26 to 35	0.0349	16,902
	(0.0364)	(10,660)
= 1 if aged 26 to 45	0.0331	22,327
	(0.0489)	(14,980)
= 1 if aged 46+	0.0183	-12,886
	(0.0565)	(19,210)
= 1 if male	-0.0388	-5,081
	(0.0262)	(10,590)
= 1 if university education	0.0455	31,006
	(0.0489)	(19,749)
= 1 if secondary education	0.000893	4,399
	(0.0350)	(11,545)
= 1 if employed	0.429***	49,818***
	(0.0302)	(12,581)
= 1 if self-employed	0.272***	24,578*
	(0.0572)	(14,548)
= 1 if married	0.0766*	-8,412
	(0.0396)	(12,859)
= 1 if lives with spouse and/or children	-0.0620	8,211
	(0.0421)	(11,611)
= 1 if lives with relatives and/or friends	-0.0919**	21,440
	(0.0380)	(21,714)
= 1 if migration length: 1 to 3 years	0.0226**	9,542***
	(0.00988)	(3,324)
= 1 if migration length: 4 to 5 years	-0.00358	730.2
	(0.00255)	(974.3)
= 1 if receives transfers from hh of origin	-0.175***	-8,985
	(0.0436)	(15,910)
= 1 if located in external destination	0.0335	79,127***
	(0.0324)	(13,894)
Household characteristic variables:		
=1 if head aged 25 to 44	-0.00493	-4,427
	(0.0683)	(24,167)
=1 if head aged 45 to 54	0.0154	7,122
	(0.0512)	(21,799)
=1 if head aged 55 to 65	-0.00270	-6,352
	(0.0394)	(19,511)
=1 if head has university	-0.0459	42,163
	(0.0627)	(36,241)

=1 if head has secondary	0.0337	-9,521
	(0.0337)	(14,554)
=1 if head is self-employed	0.00818	-25,745
	(0.0417)	(25,964)
=1 if head is unemployed	-0.105*	-13,023
	(0.0550)	(34,379)
=1 if head is retired	-0.0645	-51,360
	(0.0478)	(34,311)
Proportion of children in origin hh	-0.362***	-63,378
	(0.133)	(38,694)
Proportion of elderly people in origin hh	0.0238	40,562
	(0.0884)	(40,224)
=1 if hh owns land/house	0.00873	3,834
	(0.0566)	(20,666)
=1 if head is male†	-0.0671*	
	(0.0354)	
Size of hh of origin†	0.0313***	
	(0.00892)	
= 1 if non-sibling migrant present†	-0.0900*	
	(0.0481)	
=1 if hh of origin in urban location†	-0.0616*	
	(0.0323)	
Regions	Yes	Yes
N	1,092	542
R-squared		0.234
Pseudo R-squared	0.312	

Notes to the table:
(i) ***, ** and * denote statistical significance from zero at the 0.01, 0.05 and 0.10 level respectively using two-tailed tests.
(ii) In columns (I) and (II), robust standard errors clustered by household are reported in parentheses.
(iii) † These variables are not included in the OLS regression model to prevent over parameterizing the model. The variables were originally used as identification variables in the Heckman selection model and were found to have statistically insignificant effects on the level of remittances sent.
(iv) Other variables are included in these models but not shown here in order to conserve space (see text for details).
(v) The t-ratio for the selection effect is -0.13 (p-value = 0.895).

In contrast to Hoddinott (1992 and 1994), who reports inheritable assets to have a positive effect on the amount of remittances sent for the case of Kenya, our results appear to be inconsistent with self-interest competitive motives as drivers of the remittance behaviour of Kenyan sibling migrants. If siblings are driven by competition, the presence of other sibling migrants should have a positive effect on both the probability and the amount of remittances sent to the household of origin. This evidence against inheritance motives is also supported by the insignificance of the dummy variable capturing whether or not the household of origin owns land and/or a house (in both the OLS and probit models). To further investigate this motive, we include a variable interacting land and/or house ownership with the multiple sibling migrant dummy variable. The coefficients on the interacted term, as well as on the non-interacted variables, are all

statistically insignificant. As an additional test, we run the regression models separately for multiple sibling migrants as we expect the parental threat of disinheritance to be more credible for this subset of migrants. We anticipate the presence of an additional migrant will increase competition and parents can more credibly threaten disinheritance as inheritable assets can be passed on to another migrant. The estimated coefficients on the dummy variable for land and/or house ownership retain their statistical insignificance.

Our findings also seem to conflict with pure altruism as the sole driver of sibling remittance behaviour. Under altruism, we expect the presence of other sibling migrants to have a negative effect on both the probability and the amount of remittances sent. Such evidence has been reported in the literature in the studies of Funkhouser (1995) and Gubert (2002). Further evidence against altruistic motives is contained in Table 5.6, which reports that if the head is unemployed, relative to being employed, this decreases the probability of remitting. However, it has no effect on the amount of remittances sent. The estimates for the remaining head employment status variables are all found to be statistically insignificant. These findings do not provide support for altruism since we expect unemployed and retired heads to be more in need of remittances. In addition, under altruism we expect variables that indicate a higher level of need in the household to exert a positive effect on the remittances of migrants. The proportion of elderly people in the household potentially provides an indicator of the level of household need. We find this variable to have an insignificant effect on the amount of remittances sent to the household thus contradicting pure altruistic motives.

We conduct robustness checks to determine if the results we obtained are sensitive to the exclusion of students in the sample of sibling migrants. The key results remain the same using a sample excluding students (see Table A5.4 of the Appendix). This provides support that the inclusion of students has no detrimental effects on the core findings of the analysis conducted in this chapter.

The insignificance of the presence of other sibling migrants on the amount of remittances sent to the household of origin may be suggestive of an independent self-insurance contract between

each sibling migrant and the household of origin (Stark and Lucas 1988). However, the negative effect on the probability of remitting is not compatible with siblings being motivated to remit by an independent self-insurance contract, as the effect should be statistically insignificant if this is the case. Unfortunately, the absence of variables in the dataset that offer a measure of risk constrains testing co-insurance motives more explicitly. In the literature, the findings of Agarwal and Horowitz (2002) for Guyanese migrants are at variance with the self-insurance motive. They use a variable measuring the unemployment rate[12] at the destination as a risk variable assuming it to be positive if the motive is insurance and indeterminate if the motive is altruism. They obtain an insignificant effect on this particular risk variable. Agarwal and Horowitz (*op. cit.*) instead find that per-migrant remittances are negatively and significantly related to the number of migrants thus lending support to an altruistic motive. We introduced a variable for the unemployment rate in the destination country as a measure of risk. We obtained a statistically insignificant effect for this variable in the OLS model and a negative and significant effect in the probability model. Although this finding is in conflict with the predictions of the co-insurance motive, caution is justified here as the unemployment rate variable is likely to provide a very crude proxy for risk in the current case.

Overall the foregoing evidence provides no empirical support for competition, pure altruism and self-insurance motives. Rather, it seems that other motives besides those that are to be found in the traditional remittance literature may better explain the remittance motives of Kenyan siblings. The findings in Table 5.6 reveal that the employment status of the sibling influences both the probability of remitting and the amount of remittances sent (see discussion below). Since employment variables are likely to be proxies of the earnings capacity of a migrant, it seems that it is the capacity of siblings to remit that influences their remittance behaviour. Unfortunately, we do not have information about the incomes of migrants and therefore are not able to test this proposition directly. In addition, the negative effect of the presence of other sibling migrants on the probability of remitting seems to reveal that there is some form of sharing of remitting

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[12] Their dataset contains information on the destination continent of the migrant. Since they do not know the destination country, the authors generate the risk variable by taking a weighted average of the unemployment figures of the commonwealth countries in that continent under the assumption that the destination of a Guyanese migrant would also be an English speaking country as Guyana is a commonwealth country. The weights used are the population levels of the countries.

responsibilities among multiple migrants. That is, the presence of other siblings decreases the remittance burden on any one sibling migrant. This may manifest itself in terms of a negative effect in the probability model for the variable capturing the presence of other siblings. However, if this is the case the nature of the sharing of remittance responsibilities is indeterminate given the insignificant effect of the presence of other migrants on the amount of remittances sent. In addition, it is not clear what sign to expect if it is the case that there are shared responsibilities. For example, a negative effect of the presence of other migrants on the amount of remittances sent could imply that multiple siblings each contribute towards meeting the remittance needs of the household such that each migrant assumes a smaller share of the remittances. This would be analogous to the altruistic model which predicts a negative sign for both the probability and the amount of remittances sent. On the other hand, the insignificant sign we obtain here may imply that a remitting multiple migrant assumes the full share of remittances sent to the household. This could possibly suggest a strategy where multiple sibling migrants take turns to meet the remittance needs of the household such that the remitting migrant bears the full share of the remittances. Unfortunately, given the cross-sectional nature of our data, we are unable to determine whether this feature is persistent across other periods.

Migrant characteristic variables

We do not find statistically significant effects for the age and education level of the sibling migrant in either the probit or the OLS models. Sibling migrants who are employed (self-employed) are found to be 43 (28) percentage points more likely to remit and remit about 50,000 (25,000) shillings more compared to sibling migrants who are either students[13] or unemployed, on average and *ceteris paribus*. This corresponds to an increase of 86 (56)% in the probability of remitting, relative to the mean, and an increase of 83 (42)%[14] in the amount of remittances sent for employed and self-employed siblings, respectively. This is to be expected since employed siblings are likely to earn more and thus assume more of the remitting responsibility.

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[13] In general the uncharacteristically high number of students represented in the survey as a whole suggests the need for some interpretational caution in regard to this estimate. However, in this chapter we see that the estimates we obtain are robust to the exclusion of students from the sample.

[14] The mean value of remittances sent for the sample of positive remitters is 59,942 shillings.

Married sibling migrants are eight percentage points more likely to remit than single sibling migrants, on average and *ceteris paribus*, but the effect on the amount of remittances sent is found to be statistically insignificant.[15] Living with relatives or friends decreases the probability of remitting by nine percentage points, on average and *ceteris paribus*, but has no effect on the amount of remittances, compared to living alone. As *per* the co-insurance theory, siblings living with relatives or friends are likely to draw on their social capital to eliminate uncertainty and secure stability in the destination. In such circumstances, they are less likely to rely on insurance from the household of origin. However, this explanation is somewhat weakened by the finding of an insignificant effect for this variable in the remittance level model, as well as the insignificance registered in both the probability and remittance level model for the variable living with a spouse and/or children in the destination.

The estimated effects for the migration duration splines appear to offer support for the remittance decay hypothesis, albeit weakly. Although the estimated coefficients are not as well determined as we would like, the positive and significant effect in the spline for 1 to 3 years on the probability of remitting and the amount of remittances sent and the insignificant effect in the spline for 4 to 5 years broadly suggest an increase in the amount remitted in earlier years and a decrease in subsequent ones. Most studies in the literature find support for the remittance decay hypothesis (e.g., Niimi *et al.* 2009, Liu and Reilly 2004).

Sibling migrants who receive transfers from the household of origin are less likely to remit but the receipt of such transfers has no effect on the amount of remittances sent. The data reveal that most remittance transfers to migrants are going to students. Nearly 50% of students in the sample receive transfers from the household, while only 9% of migrants who are not students receive such transfers. There is no statistically significant effect of external location on the probability of remitting. However, siblings located in external destinations remit about 79,000 shillings more than

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[15] We investigate the suggestion by Markova and Reilly (2007) that the presence of immediate family members at the destination implies potentially weaker ties to the household of origin thus affecting remittances negatively. We test this by interacting the married dummy variable with living with the spouse and/or children dummy variable. We find that married siblings who live with their spouse and/or children are less likely to remit, but the effect on the amount of remittances sent is statistically insignificant. This seems to support altruistic motives towards one's immediate family.

do internal migrants. This is equivalent to an increase of 132% in the amount of remittances sent relative to the mean. It seems likely that this large effect could be explained by differences in the income levels at internal and external destinations.

Household characteristic variables

Some of the findings on the household variables have already been discussed in the context of the results obtained for the multiple sibling migrant dummy variable. Characteristics of the household such as the age and the education level of the household head, and the proportion of elderly people in the household, do not seem to influence the remittance behaviour of sibling migrants. The proportion of children in the household (i.e., individuals less than seven years) has a negative effect on both the probability and the amount of remittances sent. This may, for example, reflect that children at this age consume less and also incur no educational expenses. Households with a higher proportion of children may therefore have relatively less expenses and thus require less remittances. Migrants are less likely to send remittances if the head is male. This is possibly because female headed households have greater economic needs. An increase in the size of the household increases the probability of remitting by 31 percentage points on average and *ceteris paribus*. This probably reflects the greater need of those households with more members. The presence of a non-sibling migrant decreases the probability of remitting by nine percentage points. This is similar to the finding on the multiple sibling migrant dummy variable. A t-test to determine if the effect of other sibling migrants is different from that of non-sibling migrants results in the null hypothesis of equality being upheld (p-value = 0.904). Finally, we see that migrants are less likely to send remittances to urban households compared to rural ones.

5.5.2   IV model estimates

The preliminary analysis revealed that the traditional remittance sending motives that are found in the literature (*viz.* self-interest competitive, independent co-insurance, and pure altruistic motives) do not adequately explain the remittance behaviour of Kenyan siblings. We alluded to the fact that there may be other motives that may influence the remittance behaviour of siblings such as a sharing of remitting responsibilities among multiple migrants. In this follow-up analysis, we narrow

down the sample to multiple sibling migrants only. We estimate the effect of the total amount of remittances sent by other siblings belonging to the same household of origin on the amount of remittances sent by a sibling. As in Antman (2012), the rationale in using the total remittances sent by other siblings as the explanatory variable of interest is that siblings are assumed to care about the total remittances received by their parents, as opposed to the average.

Due to the exclusive focus on multiple sibling migrants, the sample is now smaller than that for the initial analysis comprising a total of 700 siblings. We anticipate that if there is some form of sharing of remitting responsibilities, there could be a positive relationship between the amount of remittances sent by other siblings and a sibling's own remittances. This would imply that the remittances of multiple siblings are complementary. On the other hand, there could be a negative relationship if the remittances of multiple siblings are substitutes. Lastly, a non-response may point to the remittance needs of the household being fully met at a given time when other siblings remit such that there is no corresponding remittance response from a sibling within that period. However, we acknowledge that it is difficult to assert the form of the sharing as the cross-sectional nature of the data prevents us from observing the remittance behaviour of siblings in other periods.

As in the first analysis reported in the current chapter, the failure of the tobit specification implies that a Heckman two-step procedure would be the more appropriate estimation procedure. However, as anticipated from the findings of the first phase of the analysis, the correlation between the unobservable determinants of the propensity to remit and the unobservable determinants of the amount of remittances sent (ρ) is also found to be statistically indistinguishable from zero for the sample of multiple sibling migrants. Thus the null hypothesis of a random sample of remitters is upheld by the data implying that an OLS model based on the sample of positive remitters (but with no selection correction term) is an appropriate one to use here.[16]

Having determined that the uncorrected OLS model is the most suitable for our analysis, a major concern is that its parameters may not be identified because the variable measuring the

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[16] We exclude those variables that only have an effect on the probability of remitting but not on the level of remittances as revealed by the Heckman two-step model.

remittances of other sibling migrants may be endogenous due to a simultaneity bias. That is, the remittances of sibling i are a function of the remittances of other siblings and *vice versa*. Such simultaneity is referred to by Manski (1993) as a "reflection" problem that arises when the behaviour of an individual affects, and is also affected by, the behaviour of a reference group, in this case his/her other siblings. For example, in raising their children, parents may instil values of loyalty towards the family that then influence their remittance behaviour in adulthood. In some cases, the correlation in behaviour among siblings may be a result of their participation in institutions that teach about giving in their earlier lives (e.g., churches). Another potential cause of a correlation between unobservables may be siblings remitting if they believe that the money they send will be used wisely. The standard errors in the OLS model are clustered at the household level in order to correct for the correlation in the unobservables between siblings belonging to the same household. However, the clustering of standard errors only has an impact on the efficiency of the estimates and not their consistency. It is well known that when explanatory variables are endogenous, OLS yields biased and inconsistent estimates of the causal effect of an explanatory variable on an outcome variable (see Bound *et al.* 1995). A common strategy for dealing with this endogeneity is to use instrumental variables (IV) estimation, using as instruments variables thought to have no direct association with the outcome of interest but highly correlated with the regressor of interest. After some experimentation,[17] we find the following variables to be the most suitable instruments: (i) the total number of other sibling migrants with secondary education and (ii) the total number of other sibling migrants living in an external destination.

In the literature, Antman (2012) also uses summations of other sibling characteristics as instruments for the amount of remittances sent by a sibling. These instruments should be relevant in predicting the amount of remittances sent by other siblings (i.e., in the reduced form equation) but orthogonal to the error term of sibling i's remittance equation in order to qualify as a valid set

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[17] We consider all the characteristics relating to other sibling migrants (e.g. their age, employment and marital status, living situation, gender and length of migration) as possible instrumental variables. In addition, we also attempt to use unemployment rates in the destination as instrumental variables. The unemployment rate in the destination may influence a sibling to remit independently of other sibling's remittance decisions due to co-insurance motives. However, a large proportion of siblings are located in the same destination as other sibling migrants thus invalidating the suitability of this variable for use as an instrument. Moreover, the evidence obtained in the initial analysis of this chapter was at variance with remittances being driven by independent co-insurance motives.

of instruments. To test for the orthogonality of the instruments, we use both the Sargan and Hansen test statistics. The null hypothesis that the instruments are orthogonal to the error process in the main equation is upheld using both the Sargan (chi2(1) = 0.448) and Hansen (chi2(1) = 0.194) tests.

In testing for the relevance of these instruments, we find them to be jointly statistically significant at the 1% level of significance in the remittance equation for other siblings (F(2, 327) = 7.74). However, because the F-value of 7.74 is below the rule-of-thumb of 10 suggested by Staiger and Stock (1994) we infer that the instruments are weak and may not be relevant for the task at hand. The implications of this are that the IV procedure will incorporate a small sample bias in the estimate relative to OLS, and the nominal size of any tests will be incorrect given the second stage estimator does not converge on a normal distribution regardless of the sample size used.

We anticipated that these instruments may be weak. For example a sibling may take into account the characteristics of other siblings in deciding how much to remit.[18] Hence, even if the instruments do not affect the dependent variable directly, they may do so indirectly through other channels that are not controlled for in our regression. The null hypothesis of the Wu-Hausman test for the exogeneity of the variable capturing the amount of remittances sent by other siblings is upheld by the data (p-value = 0.164) suggesting that the variable is exogenous. However, given the weak instruments, the power of the Wu-Hausman test is acknowledged to be poor and therefore we proceed to employ an IV strategy but the approach adopted caters for the weak instruments used.

It has been established in the literature that when instruments are weak, the point estimators of a linear IV model are biased and Wald tests are unreliable (Stock *et al.* 2002 provide a review of this). Employing an IV approach is likely to result in the standard errors on IV estimates being larger than OLS estimates, and much larger if the excluded instrumental variables are only weakly

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[18] However, these variables are found to be the most suitable ones in the dataset to use as instruments based on their statistical (in)significance in the main and reduced form equations. An attempt to use unemployment rates and other economic indicators in the destination of a sibling was futile owing to a lack of variation in these variables. This is largely because the majority of siblings are located in the same destination as other siblings belonging to the same household.

correlated with the endogenous variable (Nichols 2006). Bound *et al.* (1995) demonstrate that if the correlation between the instruments and the endogenous explanatory variable is weak, then even a small correlation between the instrument and the error term can produce a larger inconsistency in the IV estimate than in the OLS estimate (see also Angrist *et al.* 1996). This therefore casts doubt on the reliability of the IV model estimates. Moreira (2003) proposes a Conditional Likelihood Ratio (CLR) test that is robust to the use of weak instruments within an IV framework. The test also provides a confidence interval for the parameter for the endogenous variable that is robust to the presence of weak instruments and the exclusion of relevant instruments, and allows valid inference for the parameter (see Moreira and Poi 2003, Mikusheva and Poi 2006). We thus employ this approach in the current analysis.

The results obtained are reported in Table 5.7. The first column of the table reports the OLS model estimates based on the sample of positive remitters. The estimates for the OLS model reveal that a one shilling increase in the amount of remittances sent by other siblings increases the remittances sent by a sibling by 28 cents, on average and *ceteris paribus*. However, both the IV and Conditional IV results reveal that after correcting for the endogeneity of the variable for the amount of remittances sent by other siblings, there is no statistically significant effect on the remittances sent by a sibling to the household. As shown in the table, there is an upward bias on the OLS coefficient of the variable for the amount of remittances sent by other siblings. This suggests that there is a positive correlation between the unobservables that determine the remittances sent by siblings.[19]

The insignificant effect of the amount of remittances sent by other siblings holds for both the IV and Conditional IV when we estimate the models separately for cash and in-kind remittances. The results obtained contrast with those of Antman (2012) who reports a positive effect for the financial contributions of other siblings after employing an IV strategy.

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[19] The upward bias on the OLS coefficient is not indicative of measurement error as this would have biased the OLS coefficient towards zero.

Table 5.7: OLS, IV and Conditional IV regression estimates (multiple sibling migrants only)

Variables	OLS	IV	Conditional IV
Amount of remittances sent by other siblings	0.282***	0.0752	0.0752
	(0.0510)	(0.156)	(0.160)
Conditional Likelihood Ratio test confidence interval			[-0.31, 0.38], p-value= 0.669
F-test of instruments		F(2, 327) = 7.74, p-value = 0.0005	
Sargan test (assuming homoscedasticity)		chi2(1) = 0.448, p-value = 0.503	
Hansen's J-statistic (assuming heteroscedasticity)		chi2(1) = 1.69, p-value = 0.194	
Wu-Hausman exogeneity test		F(1,327) = 1.95, p-value = 0.164	
Weak instrument robust tests for endogenous variable:†			
Conditional Likelihood Ratio test		stat (.) = 0.20, p-value = 0.658	
Anderson-Rubin test		chi2(2) = 0.65, p-value = 0.722	
Lagrange multiplier test		chi2(1) = 0.20, p-value = 0.656	
J test for over-identification		chi2(1) = 0.45, p-value = 0.502	
Wald testᶠ		chi2(1) = 0.23, p-value = 0.629	
Other explanatory variables	Yes	Yes	Yes
N	347	347	347
R-squared	0.250	0.203	0.203

Notes to the table:

(i)   ***, ** and * denote statistical significance from zero at the 0.01, 0.05 and 0.10 level respectively using two-tailed tests.

(ii)   Robust standard errors clustered at the household level are reported in parentheses.

(iii)   Other variables are included in these models but not shown here in order to conserve space (see Table 5.5).

(iv)   The following variables are used as instruments in the IV and Conditional IV models: the total number of other sibling migrants with secondary education and the total number of other sibling migrants residing in an external destination.

(v)   † These are tests of the significance of the coefficient on the endogenous variable in the IV model which are robust to weak instruments.

(vi)   ᶠ This a Wald test of the significance of the coefficient on the endogenous variable in the IV model and is not robust to weak instruments.

Overall, when we treat the remittances of other siblings as exogenous, the total amount of remittances sent by other siblings has a positive and statistically significant effect on the remittances of a sibling. This seems to suggest that the remittances of multiple sibling migrants are complementary. However, after controlling for the endogeneity of the remittances, we find that the amount of remittances sent by other siblings has no statistically significant effect on sibling

remittances. The finding mirrors the results obtained in the earlier analysis reported in this chapter. The insensitivity of a sibling's remittances to those sent by other siblings suggests that in and of themselves, remittances sent by others have no direct effect on the remittances of a sibling. Rather, there seems to be an underlying factor motivating multiple sibling migrants to remit to the household, other than the amount remitted by other family members. Thus, the remittances of multiple sibling migrants neither complement nor substitute each other. As mentioned earlier, a potential explanation for this may be that if there is a sharing of remittance responsibilities, the remittance needs of the household may be fully met by particular siblings at any given time.

5.6   Summary and conclusions

The evidence reported in this chapter reveals that multiple sibling migrants are less likely to remit compared to sole sibling migrants. However, being a multiple sibling migrant has no effect on the amount of remittances sent if a migrant remits. In addition, when we narrow the analysis to multiple sibling migrants only and treat the remittances sent by other siblings as endogenous, we find that the amount of remittances sent by other siblings exert no statistically significant effect on the remittances sent by a sibling.

Our empirical findings suggest no support for pure altruism as the main remittance motivator for Kenyan sibling migrants. While the finding that multiple migrants are less likely to remit in the probability model suggests altruism as a potential driver of the remittances sent by migrants, we do not find other persuasive evidence in its support. The variables that capture the level of need of the origin household are found to be either statistically insignificant or to have perverse signs for such a motive. For example, household heads who are unemployed are found to receive less remittances, and those who are retired do not receive any more or less remittances compared to those who are employed. This is at variance with what is suggested by an altruistic model.

Our findings are also in conflict with competitive remittance behaviour among multiple sibling migrants. This is contrary to most of the existing evidence on the motives of migrant remittances in Kenya. For example, Hoddinott (1994) finds that remittances are driven by self-interest motives related to inheriting land from parents. The deviation of our findings from those of past studies

may be explained by differences in the samples employed. For example, in contrast to Hoddinott our sample includes both internal and external migrants. In addition, Hoddinott's sample is based on rural households in the Central province of Kenya. The migrants in that sample are likely to be driven by rather different motivations than migrants in our one who are drawn from all provinces within Kenya and are not confined to the rural areas. In addition, the time periods differ substantially. Our study is more recent compared to that of Hoddinott, and is separated in time by about a quarter of a century.

The evidence obtained also shows that the statistically insignificant effect of the presence of other migrants on the amount of remittances sent is inconsistent with independent co-insurance motives whereby the migrant self-insures with the household of origin. For example, we find largely insignificant effects for variables capturing the living situation of migrants. In addition, transfers from the household of origin are primarily received by students thus weakening the co-insurance proposition. Following Agarwal and Horowitz (2002), we included a risk variable measuring the unemployment rate in the destination. We obtained an insignificant effect for the risk variable in the OLS model and a negative effect in the probability model thus casting further doubt on the validity of the co-insurance motive in our sample. This finding is different to that of Knowles and Anker (1981) who find that remittances sent by Kenyan migrants act as a form of insurance for future return to the household of origin. However, their study uses data collected in 1974 and is comprised of only internal migrants. Thus, differences in both the time period and the type of migration make it difficult to draw any direct comparisons with that study. Unfortunately, our dataset lacks suitable risk measures and thus we cannot test the co-insurance motive more directly.

We therefore propose that there could be other motives that are relevant in explaining the remitting behaviour of Kenyan siblings besides those that are to be found in the extant remittance literature. The evidence we obtained revealed that the earnings capacity of siblings, as proxied by their employment status, has a significant effect on both the probability of remitting and the amount of remittances sent. Unfortunately, a lack of earnings data precludes us from investigating this further. The insignificant effect obtained on the amount of remittances sent by others when the

IV method is employed may point to the fact that Kenyan siblings do not respond to the remittances of others *per se* but rather there are other factors that influence their remittances. We allude to the notion of a sharing of remittance responsibilities among multiple siblings but cannot fully ascertain the form of such a strategy given that the data are cross sectional. We propose that as an agenda for future research, the remittance literature needs to be expanded in order to incorporate other remittance motives that are not fully captured in the current literature.

A weakness relating to the dataset we use is that the household of origin responded to the survey, and not migrants themselves. Thus, we are unable to capture any remittances transmitted among multiple sibling migrants. This is a potentially important phenomenon for the co-insurance motive as siblings could be co-insuring each another. However, given data limitations, this is beyond the scope of our analysis.

We are careful not to draw strong conclusions from our empirical findings reported above. Firstly, given the weak instruments used in the IV model, we remain sceptical about the validity of our estimates even after employing the various tests and methods assumed robust to weak instrumentation. The current analysis is somewhat limited in its scope given the data are drawn from a cross-sectional survey. Hence, while our findings allude to the remitting behaviour of Kenyan multiple sibling migrants being influenced by a sharing of remitting responsibilities, we are unable to exactly ascertain the form of the strategy. It may be the case that siblings take periodic turns to remit to their households of origin but this cannot be observed given the absence of data for other time periods. A second caveat is that the information about the remittances sent by siblings was provided by the household head, or in a few cases, his/her deputed representative. The challenge inherent in this is that of recall error as the head may not accurately remember the exact amount of remittances sent by each sibling. Another potential bias resulting from the head being the respondent may arise from, for example, an unwillingness to disclose the fact that some of his/her children may not have been supporting the household as much as he/she would have liked. It could be the case, therefore, that the reported per sibling remittance amounts are biased towards equality. This then has implications for the estimates obtained in the empirical analysis. However,

the evidence for measurement error is not obvious when the IV approach is applied. Rather,

applying the IV approach suggests that there is a positive correlation between the unobservables

that determine the remittances of multiple siblings. Nevertheless, the absence of strong instruments

demands caution in the interpretation of the last set of empirical results reported in this chapter.

Appendix

Table A5.1: Heckman two-step selection model (coefficients)

Variables	Remittance level model	Selection model
Individual characteristic variables:		
= 1 if multiple sibling migrant	-7,822	-0.362***
	(13,947)	(0.124)
= 1 if aged 26 to 35	16,515	0.130
	(14,710)	(0.126)
= 1 if aged 26 to 45	21,904	0.123
	(18,553)	(0.167)
= 1 if aged 46+	-12,938	0.0683
	(23,961)	(0.202)
= 1 if male	-4,745	-0.144
	(10,580)	(0.0956)
= 1 if university	30,534*	0.169
	(18,265)	(0.172)
= 1 if secondary	4,344	0.00332
	(14,427)	(0.129)
= 1 if employed	44,692	1.597***
	(43,763)	(0.128)
= 1 if self-employed	20,833	1.014***
	(38,178)	(0.180)
= 1 if married	-9,151	0.285*
	(15,833)	(0.150)
= 1 if lives with spouse and/or children	8,652	-0.231
	(14,833)	(0.152)
= 1 if lives with relatives and/or friends	22,480	-0.342**
	(18,355)	(0.135)
Migration length: spline 1	9,352**	0.0839**
	(4,265)	(0.0353)
Migration length: spline 2	780.2	-0.0133
	(1,183)	(0.00874)
= 1 if receives transfers from hh of origin	-6,854	-0.651***
	(26,413)	(0.151)
= 1 if located in external destination	78,811***	0.124
	(11,409)	(0.104)
Household characteristic variables:		
= 1 if head aged 25 to 44	-4,005	-0.0183
	(26,194)	(0.236)
= 1 if head aged 45 to 54	7,306	0.0572
	(18,269)	(0.174)
= 1 if head aged 55 to 65	-6,158	-0.0101
	(13,178)	(0.127)
= 1 if head has university	43,045*	-0.171

	(23,593)	(0.201)
= 1 if head has secondary	-9,590	0.125
	(11,576)	(0.114)
= 1 if head is self-employed	-25,915	0.0304
	(15,984)	(0.152)
= 1 if head is unemployed	-12,076	-0.390**
	(21,590)	(0.191)
= 1 if head is retired	-50,831***	-0.240
	(18,517)	(0.171)
Proportion of children in origin hh	-61,537	-1.345***
	(48,708)	(0.464)
Proportion of elderly people in origin hh	41,716	0.0887
	(28,087)	(0.251)
=1 if hh owns land/house	3,505	0.0325
	(18,831)	(0.166)
= 1 if head is male		-0.250**
		(0.113)
Size of hh of origin		0.116***
		(0.0285)
= 1 if non-sibling migrant present		-0.335**
		(0.147)
= 1 if hh of origin in urban location		-0.229**
		(0.109)
λ		-5,352
		(40,498)
Regional dummies	Yes	Yes
N	1,092	1,092
Number of censored N	542	

Notes to the table:

(i) The dependent variable in the selection model takes the value of 0 if migrant did not send remittances and 1 if the migrant sent remittances. In the remittance equation, the dependant value is the value of cash and in-kind remittances sent by the migrant in the past 12 months, measured in Kenyan shillings.

(ii) ***, ** and * denote statistical significance from zero at the 0.01, 0.05 and 0.10 level respectively using two-tailed tests.

(iii) Other variables are included in these models but not shown here in order to conserve space (see text for details).

(iv) VCE robust standard errors clustered at the household level are reported in parentheses.

Table A5.2: Multinomial logit model (impact effects)

VARIABLES	I: None	II: Cash only	III: In-kind only	IV: Both cash and in-kind
Multiple sibling migrant	0.108***	-0.0264	-0.0114	-0.0705***
	(0.0352)	(0.0365)	(0.0187)	(0.0252)
Other variables	Yes	Yes	Yes	Yes
N	1,092	1,092	1,092	1,092
Pseudo R-squared		0.248		

Notes to the table:
(i)   ***, ** and * denote statistical significance from zero at the 0.01, 0.05 and 0.10 level respectively using two-tailed tests.
(ii) Other variables are included in these models but not shown here in order to conserve space (see text for details).

Table A5.3: OLS regression: Cash vs. in-kind vs. both remittances (coefficients)

VARIABLES	I: Cash only	II: In-kind only	III: Both cash and in-kind
Multiple sibling migrant	-8,381	-601.0	235.9
	(12,769)	(1,239)	(7,119)
Other variables	Yes	Yes	Yes
N	542	542	542
R-squared	0.165	0.152	0.085

Notes to the table:
(i)   ***, ** and * denote statistical significance from zero at the 0.01, 0.05 and 0.10 level respectively using two-tailed tests.
(ii) Other variables are included in these models but not shown here in order to conserve space (see text for details).

Table A5.4: Probit model (marginal/impact effects) and OLS regression (coefficients) - sample excluding students

VARIABLES	Probit model marginal/impact effects (remit = 1)	OLS model coefficients (remit value)
= 1 if multiple sibling migrant	-0.120***	-2,298
	(0.0387)	(14,098)
Other variables	Yes	Yes
N	894	521
R-squared		0.236
Pseudo R-squared	0.236	

Notes to the table:
(i)   ***, ** and * denote statistical significance from zero at the 0.01, 0.05 and 0.10 level respectively using two-tailed tests.
(ii) In columns (I) and (II), robust standard errors clustered by household are reported in parentheses.
(iii) Other variables are included in these models but not shown here in order to conserve space (see text for details).

6 How Do Remittances Shape the Expenditure Patterns of Kenyan Households?

6.1 Introduction

There is no general consensus in the literature regarding what remittances are used for at the receiving household level. For example, some studies argue that remittances are mainly spent on immediate consumption goods such as food and utilities. An alternative view in the literature asserts that households consider remittances to be a form of transitory income. As such, households spend more at the margin on human and physical capital investments than on consumption goods and this potentially contributes positively to local economic development (Adams 1998) and poverty reduction (Maimbo and Ratha 2005). Examining evidence on the uses of remittances is therefore an important research topic, more so as migration is likely to continue as an economic phenomenon into the future.

In the current chapter, we empirically investigate the uses of remittances by Kenyan households. The evidence in the literature on the uses of remittances in the Kenyan context to date suggests that they are often allocated to income generating activities and expenditures related to education, health, housing and food (see, e.g., Kiiru 2010). Remittances have also been shown to act as a social safety net for Kenyan households (Lacroix 2011). However, to the author's knowledge, no empirical study has assessed the effect of remittances on expenditure patterns for the case of Kenya using the econometric methods employed in this chapter, or addressed research questions concerning their uses in the approach adopted here. The current chapter aims to fill these lacunae in the literature through the use of the household survey outlined in chapter 3. This survey was specifically designed to capture migration and remittance flows in order to make inferences about remittance uses in a way no previous survey has done thus far for Kenya. The behaviour of Kenyan households in allocating remittances to household expenditure is therefore a valuable research topic to explore as it gives insights into the impact remittances have on the welfare of the recipient households.

6.1.1   Research questions

The objectives of this chapter are three-fold. Firstly, we set out to investigate whether the expenditure patterns of Kenyan households differ by type of household by comparing the marginal spending behaviour of households on a range of commodities. This enables us to determine whether different types of households behave differently in terms of their expenditure patterns. In particular, we compare the expenditure patterns of migrant households to those of non-migrant households using an Almost Ideal Demand Systems (AIDS) approach. The following seven categories of commodity are incorporated into the analysis: food, non-food, utilities, durable goods, physical investments, education and health. Using a similar approach for migrant households only, we explore whether there are differentials in spending behaviour according to the remittance receipt status of the household. The key research question in this part of the analysis relates to whether there are differences in the allocation of expenditure budget shares according to whether or not a migrant household receives remittances.

Secondly, we investigate whether the budget shares of migrant households are sensitive to the source of remittances, specifically the identity of the remitter. We classify remitters according to their relationship to the household of origin as follows: siblings, spouses, other significant relatives, or any combination of the aforementioned categories (see section 6.3.2 for the definitions). This part of the analysis provides an insight into the relative bargaining powers of different types of remitters and the impact they exert on the expenditure patterns of households. It allows us to interrogate whether household preferences for the type of expenditure that remittances are allocated to differ by remitter source.

Alongside this, we also analyse the impact of the total amount of remittances received on the budget shares of Kenyan migrant households. A research question central to this analysis is whether there is complete pooling of income within the household or if income out of remittances is allocated differently to income from other sources. One of the views in the literature considers remittances to be fungible and thus spent at the margin like income from any other source. In other words, households treat a shilling from remittance income like a shilling from wage income and

therefore do not alter their expenditure behaviour upon receiving remittances. This is consistent with the theory of unitary models where households are considered to be a single entity with all members possessing unified preferences such that only total income, and not the composition of income, matters. We are able, therefore, to test the unitary model proposition to ascertain whether Kenyan migrant households pool their income together when allocating it to expenditure.

Finally, we undertake a novel investigation which entails comparing what Kenyan households report to have spent their remittances on to the way in which they actually apportion their general income to expenditure. This part of the analysis involves estimating and comparing remittance budget shares[20] to expenditure budget shares for the corresponding sample of households that reported positive remittance expenditure for specific commodities. The presence of information on how remittances were spent provides a unique opportunity to carry out this analysis. The key research question here relates to whether Kenyan households' reported use of remittances coincides with their allocation of expenditure out of general income.

6.1.2   Research contribution

The current chapter provides some important contributions to the existing literature. Firstly, a number of studies have examined remittance uses using budget share equations but, to the author's knowledge, only one study (Simiyu 2013) has done so for Kenya. This chapter therefore contributes to the literature by investigating the effect of remittances on household expenditure in a context for which few studies have been conducted to date.

One of the dominant household decision making model paradigms in the literature is the collective model where interests and bargaining power may differ among members, with the composition and source of household income being a relevant factor in explaining expenditure decisions (e.g., Bourguignon and Chiappori 1992, Browning *et al.* 1994). The literature has mainly analysed this topic from a remitter gender angle (e.g., De la Briere *et al.* 2002, Lopez-Erka *et al.* 2011, Gobel 2013), and/or for the case of internal versus external remittances (e.g., Adams and

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[20] Remittance budget shares refer to the share of remittances, out of total cash remittances received by the household, allocated to a specific category of commodity.

Cuecuecha 2010). Guzman *et al.* (2008) provide an exception by considering the relationship of the remitter to the household in much the same way as we do. However, our context and motivations are quite distinct from those of their study. As such, the current chapter provides additional perspectives on the dynamics of household budget allocations according to the source of income. Examining the extent of the bargaining power that different remitters (as classified by their relationship to the household) exert on the expenditure patterns of households represents a novel analysis that does not explicitly feature in the current literature.

Most of the evidence for the effect of remittances on household expenditure patterns in Kenya draws from early studies and is somewhat mixed. For example, Rempel and Lobdell (1978) conclude that remittances from rural-to-urban migrants have little impact on the development of the region of origin. In contrast, Collier and Lal (1984) report for rural Kenya that remittances enable the recipient households to hold more productive capital than non-recipient ones. In a more recent study, Simiyu (2013) finds that remittances are mainly used for immediate consumption needs such as utilities and transportation costs for the Rift Valley and Nyanza provinces of Kenya. However, the study employs a small sample of 295 households. In addition, no data are available on remitters hence households receiving remittances are assumed to be receiving them from just one remitter. Thus, in contrast to the current study, the effect of the identity of the remitter cannot be isolated.

Finally, another contribution of the current chapter is the comparison of household self-reported uses of remittances to the uses from general income. This provides a more in-depth understanding of household remittance use behaviour and permits inferences regarding the accuracy of the reported uses of remittances. This analysis provides the first of its kind in the literature to the knowledge of the author.

The chapter is structured as follows. Section 6.2 provides a review of the empirical evidence on the expenditure behaviour of remittance receiving households. Section 6.3 discusses the data used to explore the research questions presented in section 6.1.1, including presenting and discussing summary statistics for the key variables of interest in the econometric analysis. This is followed by

section 6.4 which provides a discussion of the econometric methodologies employed to undertake the analysis. Section 6.5 presents and discusses the empirical results. Finally, section 6.6 provides some concluding remarks.

6.2   Literature review

A number of studies in the literature have employed various econometric methods to assess the effect of remittances on household expenditure behaviour. For example, Zarate-Hoyos (2004) examined the consumption patterns of remittance receiving households using the 1989 Mexican income and expenditure survey exploiting Engel curve analysis. The study models the expenditure shares of various commodities using variables measuring household income, the receipt (or non-receipt) of remittances, and the size of the household. Their findings reveal that households that receive remittances do not spend a disproportionate share of their remittance income on current consumption, health and education but instead save a larger proportion of their income than households that do not receive remittances.

Taylor and Mora (2006) control for the endogeneity of migration decisions and test for differences in expenditure patterns between migrant and non-migrant households using data from the 2003 Mexico national rural household survey. They find that households with international migrants have large marginal budget shares for investments, health and consumer durables and small marginal budget shares for food and housing. Households with internal migrants are found to have relatively large marginal budget shares for health, housing, services and education and small marginal budget shares for supermarkets, consumer durables, and investments. They use a simultaneous equation model in which household expenditure shares are influenced by the decision to spend income on certain consumption and investment goods and also the decision to participate or not in migration. The authors use a two-stage approach. In the first stage a probit model is estimated for the purchase decisions in each expenditure category. In the second, inverse-Mills ratio terms from the first stage are included as right-hand side variables in the corresponding budget share equations. A system of expenditure equations is then estimated using the Almost Ideal Demand System (AIDS) framework. The estimates reveal that as total expenditures in households

with migrants increase, the share of income used for investments also increases, while the share spent on consumption falls, especially for international migration relative to non-migrant households.

Castaldo and Reilly (2007) investigate, using an Engel curve approach, the extent to which the consumption patterns of Albanian households are affected by the receipt of migrant remittances. The data used are drawn from the 2002 Albania Living Standards Measurement survey. They model the budget shares of good j in household i on the log of total household expenditure controlling for a vector of household and regional characteristics. They also include dummy variables measuring whether internal, external, or no remittances were received by the household. They find that external remittances increase the household budget shares for durable goods and utilities, and decrease the budget share on food. However, these households are found to have a more expenditure elastic demand for food than households not receiving remittances. Internal remittances are found to exert no independent effect on the spending patterns of households.

Adams and Cuecuecha (2010) analyse how the receipt of internal and international remittances affects the marginal spending behaviour of households using data from the 2000 Guatemala ENCOVI survey. They again use a two-stage selection model with the probability of receiving remittances modelled in the first stage equation and budget share expenditures in the second. The Dubin and McFadden method is used to correct for the correlation in error terms between the remittance and consumption models. The authors find that compared to households not receiving any remittances, those that receive international remittances have a lower marginal propensity to consume food, and those receiving either internal or international remittances have a higher marginal propensity to consume education and housing.

Adams (1991) studies how remittances affect the consumption behaviour of rural households in Egypt using household surveys conducted in 1986-87 by calculating expenditure elasticities and marginal propensities to consume over a range of expenditure levels using the Engel curve method. He finds that migrant households do not spend a disproportionate share of their remittance earnings on consumption but on other items, including housing.

Adams and Cuecuecha (2013) use household survey data from the 2005/6 Ghana Living Standards Survey (GLSS 5) to investigate how internal and external remittances affect the marginal spending behaviour of households on food, consumer goods/durables, housing, education, health and other expenditure. They find that households receiving internal or external remittances in Ghana spend less at the margin on food than those that do not receive remittances with similar income levels and characteristics. They also find that households receiving internal or external remittances spend more at the margin on education, housing, and health. These results hold after controlling for the endogeneity of remittances and potential selection bias in the household receipt of remittances.

Cattaneo (2012) also uses an Engel curve framework to investigate the effect of the receipt of remittances on education expenditures by households in Albania. The study treats total income as endogenous. Using both parametric and semi-parametric econometric methods, the author finds that remittances do not increase spending on education. A quantile regression analysis shows that remittances have a positive effect only among the bottom deciles, but the effect is small in size with no statistically significant difference across selected percentiles of the conditional distribution. The findings imply that incomes from different sources are not pooled together within the household thus providing support for non-unitary household models.

Edwards and Ureta (2003) find that remittances reduce the hazard rate of dropping out of school. The effect of remittances is also found to be statistically different from that of other income sources thus offering further support for non-unitary models.

Simiyu (2013) investigates the effect of remittances on household expenditure categories using panel data for 2007 and 2009 for rural households from the Rift Valley and Nyanza provinces of Kenya. A set of budget share equations for different expenditure categories are estimated using a household fixed effects model[21] and a remittance variable is added as an independent variable in each equation. The results obtained indicate that remittances are mainly used for immediate consumption needs such as utilities and transportation costs. The study finds that remittance

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[21] The use of a fixed effects model with only two time periods is somewhat wasteful of the variation in the data.

receipts exert a negative impact on education expenditure as a share of total household expenditure, but impact positively on food, health and other household expenditure categories. The author attributes this finding to the small size of remittances[22] which means they can generally only be spent on daily consumption needs and basic necessities. However, the study is quite restricted in its analysis especially as the sample used is relatively small comprising just 295 households and drawn from only two of the eight provinces in Kenya. In addition, no data are available on remitters hence households receiving remittances are assumed to be receiving them from just one remitter. As such, in contrast to the current study, the effect of the identity of the remitter cannot be determined.

Hines (2014) uses the same dataset as the current thesis to investigate the impact of migration and remittances on household human capital investment in Kenya using OLS and 2SLS that controls for selection into migration. The 2SLS takes into account the potential endogeneity of remittances in the education expenditure model by using the following instrumental variables: GDP per capita in the destination country, the stock of Kenyan migrants in the destination country, household ownership of a bank account, and the average amount of remittances received by households in a district. The dependent variable used for this model is the log of education expenditure and the explanatory variable of interest is the log of remittances. A caveat associated with using logged variables in this manner is the presence of zero values as some households did not spend on education and/or receive remittances. The study employs a rather crude technique to circumvent this problem by taking the log of one where there are zero values. The study also examines the impact of remittances on the share of education expenditure allocated to the total budget. The study finds that remittances are correlated with higher levels of expenditure in education. However, remittances are found to have no significant effect on the share of total expenditure allocated to education.

Aga *et al.* (2014) employ World Bank survey data for Burkina Faso, Kenya, Nigeria, Senegal and Uganda to investigate the link between international remittances and household financial inclusion using a simple linear probability model. To control for the potential endogeneity of remittances, the

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[22] The average amount of remittances received per year is 13,610 shillings.

following economic indicators in the migrant host countries are used as instruments: a weighted per capita income of the countries where migrants reside and the proportion of international migrants from the household that are currently employed. The study finds that the receipt of international remittances exerts a positive effect on the probability of a household opening a bank account in all five countries.

6.3 Data and summary statistics

6.3.1 Dependent variables

The key dependent variables of interest in the current empirical analysis are the budget shares for the following seven broad expenditure categories: food, non-food, utilities, durable goods, physical investments, education and health. The use of the budget share instead of absolute values as the dependent variable enables us to exploit the Almost Ideal Demand Systems (AIDS) framework (see section 6.4 for a discussion of the AIDS model) popularized by Deaton and Muellbauer (1980). These budget shares are constructed by classifying the expenditures that are self-reported by the household head (or his/her representative) into broad categories consisting of related commodities based on recalling how much money was spent on each expenditure item. Figure 6.1 in the appendix provides a copy of the expenditure section of the survey questionnaire. From this we can see that for expenditure on food, the household reports for the past completed week how much it spent on meat and non-meat products including the consumption of food self-produced by the household. In the non-food category, a range of goods and services such as transport costs, clothing and footwear, wedding/engagement/funeral, home improvements, personal care/leisure/entertainment, luxury goods (including jewellery and luxury cars), mortgages and loan repayment, and other expenditure (e.g. cigarettes, alcohol, and beauty salon) are included. In this category, transport costs and personal care/leisure/entertainment are reported for the period relating to the past week, and the rest of the items are reported for the past six months. The utilities category includes expenditure on cooking fuels, rent for housing (including imputed rent), and payments for gas, water, electricity, etc. Cooking fuels are reported for the past completed week while the remaining items are reported for the past six months. Items such as household appliances, vehicles, mobile phones, computers, and electronic goods are classified as durable goods. The

amount of money spent on these over the previous six months is reported. Physical investments comprise the establishment of a business, the purchase of a house or a tract of land, the purchase of productive assets such as a sewing machine or water pump, and purchasing farming equipment such as trucks, tractors, and spraying machines. The money spent on all these items is also reported for the past six months. Expenditures on education relate to money spent on schooling or entrepreneurship (e.g., tuition and tutor fees, school uniforms, and books and supplies) and are reported for the past six months. Health expenditure is also reported for the past six months and includes spending on doctor fees, hospital fees and medicines. Table 6.1 reports the expenditure categories used and the items contained in each of the broadly defined commodity groups.

The distinction between durable goods and physical investments merits some discussion here given our focus on these two items in the subsequent chapter. In this study, durable goods refer to expenditure on consumer goods used to meet more long term needs. Physical investments refer to those outlays for which the individual expects to enjoy some pecuniary return in the future. There is some debate in the literature regarding whether expenditure on housing should be classified under durable goods (see Adams 1991)[23] or physical investments (see Taylor and Mora 2006, Adams and Cuecuecha 2010). We classify expenditure on housing as a physical investment as we take the view that new and improved housing offers possible economic returns to the household and also can be a direct stimulus to the local construction industry. The classification of housing in the physical investments category seems justifiable within the Kenyan context where there is a huge shortfall in housing provision by the government to the extent that housing development plays an important role in providing local employment (albeit on a short-term basis), boosting the demand for local housing inputs as well as providing rental accommodation (see, e.g., Mitullah 2013).

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[23] Adams (1991) classifies housing expenses as both durable goods and investments.

Table 6.1: Description of expenditure categories

Categories	Goods/commodities
Food	Grains, cassava, plantain, yam, pulses, fruits, vegetables, including self-consumption
	Meat: fish, chicken, red meat including self-consumption
Non-food	Transportation (e.g., bus/taxi, gasoline)
	Clothing and footwear
	Wedding/engagement/funerals
	Home improvements (e.g., roof, floor, plumbing)
	Luxury goods (jewellery and luxury cars)
	Mortgage and loan repayment
	Other[24]
Utilities	Cooking fuels (e.g., kerosene)
	Rent for housing (imputed rent)
	Payments for utilities (e.g., gas, water, electricity)
Durables	Household appliances (e.g., furniture, kitchen ware, refrigerators, air conditioners, bedding, carpet)
	Car/motorcycle/vehicle/tuk tuk
	Cell phone/mobile phone (initial cost)
	Computer
	Other electronic goods (e.g., DVDs, TV)
Physical investments	Setting up a business/opening a store
	House or land purchase
	Productive assets (e.g., sewing machine, water pump)
	Farming equipment (e.g., trucks, tractor, ox plough, harvester, spraying machines, water pumps)
Education	Education/apprenticeship (including tuition fees, tutor fees, school uniforms, books, and supplies)
Health	Health (doctor fees, hospital fees, medicines, drugs)

A main challenge we have with the data is the variation in the time period over which different expenditure items are reported. The expenditures are divided into two different periods of recall based on frequency of purchase, and these are the past one week and the past six months. On the other hand, remittances received by the household (which represent a key explanatory variable for the empirical analysis) are reported for the period relating to the previous 12 month period. Thus, to ensure comparable time coverage for the array of expenditure items in our analysis, we make a number of assumptions regarding the spending behaviour of households that enable us to compute annualized values. We aggregate items relating to expenditures in the past week to their yearly

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[24] Other expenditure reported for the past one week includes personal care/leisure/entertainment (e.g., cigarettes, alcohol, and beauty salon). It also includes any other expenditure which is not specified (this is reported for the past six months). For the latter, only 53 households reported this kind of expenditure.

values. For most items relating to spending in the past six months, we include the values as they are reported. This is because we assume that expenditure on one-off events such as weddings, engagements and funerals, durable items such as household appliances, vehicles and electronics, and physical investments such as land or house purchases are non-recurrent. However, we compute yearly values for the following expenditure items reported for the period covering the past six months: education costs, health costs, clothing and footwear, rent for housing, utilities, and mortgage/loan repayment. For this set of expenditure items, it appears reasonable that spending over the most recent six months would be reflective of spending in the six months preceding that period as they represent recurring expenses. However, there are obviously some shortcomings associated with the reporting and construction of these data, as well as some of the assumptions made. For example, the fact that households report expenditure on durable goods, physical investments, utilities and non-food for the previous six months may distort the data if some households purchased items in the six months prior to this reference period. Thus, a household that reports a zero expenditure on physical investments in the past six months may have allocated expenditure to this item in the six months prior to the time period referred to. As such, taking such a household as having spent nothing in the physical investment category for the year may be incorrect. However, the way the data were collected in the survey prevents us from being able to redress this particular problem. We undertake some robustness checks in the subsequent analysis to determine the effect of aggregating the data in this manner.

Another limitation associated with the data collection is that the survey was undertaken between 24 October and 23 December 2009. This variation in timing may affect the amount of money spent on different items. For example, because expenditures such as food and transport are reported for the past completed week, households interviewed closer to Christmas may report higher spending than households interviewed in October and November as a reflection of the increase in spending associated with the holiday season. We attempt to capture such seasonal variation by including among the explanatory variables dummy variables for the month in which a household was interviewed. In the sample, 35% of households were interviewed in December, and the remainder in November or earlier. In addition, the fact that food and meat consumption are

imputed means that food prices reported by households that produce their own food may differ from those that do not. Controlling for the urban/rural location of the household potentially captures this effect since the majority of rural households in Kenya produce at least some of the food they consume.

6.3.2   Explanatory variables

A set of explanatory variables was constructed for the age, gender, education level, and employment status of the household head. Measures were also computed for the total expenditure per capita[25] of the household, the number of children less than seven years, the number of elderly people greater than 59 years, and the household size. In addition, dummy variables capturing whether a household is located in an urban or a rural area, as well as controls for the regional location were also included in the budget share specifications.

The variables relating to the receipt of remittances by the household are of primary concern for the current analysis. Variables measuring whether or not the household received remittances and the amount of cash as well as in-kind remittances received by the household are constructed from the survey data. Cash remittances are defined as money transfers by migrants to the household in the 12 months prior to the date of interview. In-kind remittances are goods sent to the household by migrants in the 12 months preceding the interview date.[26] In addition, dummy variables capturing the relationship of the remitter to the household of origin are defined as follows: sibling, spouse, significant relative, or a combination of the former three categories. Sibling remitters are those remitters who are children of the household head. Spouse remitters are husbands or wives of the household head who sent remittances. Significant relatives are sons or daughters-in-law, parents, siblings, grandchildren, or other relatives of the household head who sent remittances to the household. In the sample, the majority of remittances are mainly sent by the children of the household head (62%), followed by spouses (18%) and siblings of the head (10%).

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[25] Total expenditure per capita is constructed by adding up all the separate expenditure items reported by the household in the survey, annualized where relevant, and dividing this by the total number of members in the household.

[26] In-kind remittances include the following: refrigerators, freezers, TVs, HiFi systems, washing machines, furniture, stove/cooker, microwave, air conditioners, computers and accessories, DVD/video, cars, posh mills, hair dressing equipment, sewing machine, agricultural equipment, mobile phones, etc.

6.3.3   Summary statistics

The main explanatory variables that feature in the empirical analysis are described in Table 6.2 and Table 6.3 presents summary statistics for the variables. After the elimination of some observations due to missing responses, the final sample of usable data consists of 1,871 households, of which 35% do not have any migrants. In addition, among the 1,214 households that have migrants, 64% received remittances. Table 6.3 also reports t-tests/z-scores for the differences in means/proportions for migrant versus non-migrant households, and remittance receiving versus non-remittance receiving households for the case of migrant households only.

The first entries in the table report the average budget shares for the seven commodity categories of interest (i.e., food, non-food, utilities, durable goods, physical investments, education, and health). The table reveals that non-migrant households spent five percentage points more on food than migrant households. Migrant households spent respectively 0.6, 2.3, and 1.8 percentage points more on durable goods, education, and health than non-migrant households. There are no statistically significant differences between migrant and non-migrant households in the average budget shares for non-food commodities, utilities, and physical investments. In addition, Table 6.3 reports that there are no statistically significant differences between the average budget shares of remittance receiving and non-receiving migrant households for all categories of commodities.

Table 6.3 also reveals that migrant households had higher total expenditure per capita than non-migrant households. The summary statistics also indicate that migrant households tend to have older heads compared to non-migrant households. The proportion of male headed households is larger for non-migrant than migrant households. The proportion of households with heads who have primary education is smaller for migrant than non-migrant households. We also note that there is a higher proportion of employed heads in non-migrant compared to migrant households, while the opposite is the case for unemployed heads. Migrant households are also shown to have more children than non-migrant households.

Table 6.2: Description of variables used in the analysis

Variable	Variable description
Food share (fd_sh)	The ratio of the total (annual) expenditure on food to the total (annual) expenditure of the household
Non-food share (nonfd_sh)	The ratio of the total (annual) expenditure on non-food to the total (annual) expenditure of the household
Utilities share (uti_sh)	The ratio of the total (annual) expenditure on utilities to the total (annual) expenditure of the household
Durables share (dur_sh)	The ratio of the total (annual) expenditure on durables to the total (annual) expenditure of the household
Physical investments share (phy_sh)	The ratio of the total (annual) expenditure on physical investments to the total (annual) expenditure of the household
Education share (educ_sh)	The ratio of the total (annual) expenditure on education to the total (annual) expenditure of the household
Health share (heal_sh)	The ratio of the total (annual) expenditure on health to the total expenditure of the household
Log of total household expenditure per capita (ln_perK_totexp)	The logarithm of the per capita total (annual) expenditure of the household
Total remittances (tot_rem)	The total (annual) amount of cash remittances received by the household measured in Kenyan shillings
Receipt of remittances (rec_rem)	= 1 if the household received cash remittances; = 0 otherwise
No cash remittances received (no_rem)	= 1 if the household did not receive any cash remittances; = 0 otherwise
Receipt of sibling remittances (sib_rem)	= 1 if the household received cash remittances from a sibling; = 0 otherwise
Receipt of spouse remittances (spo_rem)	= 1 if the household received cash remittances from a spouse of the household head; = 0 otherwise
Receipt of significant relatives remittances (sig_rem)	= 1 if the household received cash remittances from other significant relatives of the household head; = 0 otherwise
Receipt of combined remittances (com_rem)	= 1 if the household received cash remittances from a combination of spouse, siblings and other significant relatives of the household head ; = 0 otherwise
Receipt of in-kind remittances (inkind_rem)	= 1 if the household received in-kind remittances; = 0 otherwise
Head age < 30 (head_age1)	= 1 if the household head is aged less than 30; = 0 otherwise
Head age 30 to 40 (head_age2)	= 1 if the household head is between 30 and 40 years; = 0 otherwise
Head age 40 to 50 (head_age3)	= 1 if the household head is between 40 and 50 years; = 0 otherwise
Head age 50 to 60 (head_age4)	= 1 if the household head is between 50 and 60 years; = 0 otherwise
Head age > 60 (head_age5)	= 1 if the household head is more than 60 years; = 0 otherwise
Gender of the head (head_sex)	= 1 if the household head is male; = 0 otherwise
Head primary education (head_pri)	= 1 if the household head has primary education; = 0 otherwise
Head secondary education (head_sec)	= 1 if the household head has secondary education; = 0 otherwise
Head university education (head_uni)	= 1 if the household head has university education; = 0 otherwise
Head employed (head_emp)	= 1 if the household head is employed; = 0 otherwise
Head self-employed (head_self)	= 1 if the household head is self-employed; = 0 otherwise
Head unemployed (head_unemp)	= 1 if the household head is unemployed; = 0 otherwise
No. of children (chn_num)	The number of children in the household
Household size (hh_size)	The total number of people in the household
Urban/rural (urbrural)	= 1 if the household is located in an urban area; = 0 otherwise
December	= 1 if household was interviewed in December; = 0 otherwise

Table 6.3: Summary statistics of main explanatory variables

	Combined	Non-migrant (0)	Migrant (1)	t-test/z-score†	Rec-rem (0)	Rec-rem (1)	t-test/z-score†
Dependent variables:							
fd_sh	0.415 (0.238)	0.447 (0.229)	0.397 (0.240)	4.32***	0.399 (0.245)	0.396 (0.238)	0.20
nonfd_sh	0.227 (0.200)	0.226 (0.190)	0.228 (0.201)	-0.21	0.231 (0.196)	0.227 (0.203)	0.31
uti_sh	0.2 (0.164)	0.203 (0.157)	0.198 (0.168)	0.57	0.205 (0.173)	0.195 (0.165)	1.06
dur_sh	0.023 (0.061)	0.019 (0.049)	0.025 (0.067)	-1.86**	0.023 (0.058)	0.026 (0.072)	-0.84
phy_sh	0.017 (0.078)	0.014 (0.063)	0.018 (0.085)	-1.19	0.015 (0.079)	0.02 (0.088)	-0.97
educ_sh	0.081 (0.137)	0.066 (0.117)	0.089 (0.146)	-3.56***	0.088 (0.148)	0.09 (0.144)	-0.21
heal_sh	0.037 (0.083)	0.025 (0.053)	0.043 (0.095)	-4.57***	0.039 (0.092)	0.046 (0.097)	-1.25
Explanatory variables:							
ln_perK_totexp	10.913 (1.267)	10.606 (1.223)	11.080 (1.259)	-7.85***	11.258 (1.409)	10.977 (1.154)	3.76***
tot_rem	73157 (548631)	4639 (43063)	110238 (677572)	-3.99***	---	173354 (843412)	---
rec_rem	0.450 (0.50)	0.104 (0.305)	0.636 (0.481)	-25.70***	---	---	---
Remitter relationship dummies:							
sib_rem	0.184 (0.387)	---	0.283 (0.013)	---	---	0.283 (0.451)	---
spo_rem	0.083 (0.276)	---	0.128 (0.276)	---	---	0.128 (0.334)	---
sig_rem	0.136 (0.343)	0.104 (0.305)	0.154 (0.361)	-3.05***	---	0.154 (0.361)	---
com_rem	0.045 (0.207)	---	0.069 (0.254)	---	---	0.069 (0.254)	---
no_rem	0.552 (0.497)	0.896 (0.304)	0.366 (0.482)	25.60***			
χ² test (remitter relationships)				541.02***			
inkind_rem	5002 (60398)	390 (3602)	7499 (74827)	-2.43***	3742 (29756)	9650 (91048)	-1.32*
Household head age dummies:							
head_age1	0.139 (0.346)	0.209 (0.407)	0.101 (0.302)	6.47***	0.077 (0.267)	0.115 (0.320)	-2.13**
head_age2	0.208 (0.406)	0.336 (0.473)	0.139 (0.346)	10.30***	0.138 (0.345)	0.140 (0.347)	-0.09
head_age3	0.203 (0.402)	0.225 (0.418)	0.190 (0.393)	1.80**	0.210 (0.408)	0.179 (0.383)	1.35*
head_age4	0.189 (0.391)	0.114 (0.318)	0.229 (0.420)	-6.12***	0.301 (0.459)	0.188 (0.391)	4.56***
head_age5	0.259 (0.438)	0.116 (0.320)	0.336 (0.473)	-10.70***	0.267 (0.443)	0.376 (0.485)	-3.88***
χ² test (head age)				226.90***			31.17***
head_sex	0.687 (0.464)	0.785 (0.411)	0.634 (0.482)	6.81***	0.762 (0.426)	0.561 (0.500)	7.16***
Head education dummies:							
head_pri	0.345 (0.476)	0.367 (0.482)	0.334 (0.472)	1.44*	0.301 (0.459)	0.352 (0.478)	-1.83**
head_sec	0.383 (0.486)	0.400 (0.490)	0.373 (0.484)	1.15	0.367 (0.482)	0.377 (0.485)	-0.36
head_uni	0.115 (0.320)	0.104 (0.305)	0.122 (0.327)	-1.19	0.190 (0.393)	0.083 (0.276)	5.56***
χ² test (head education)				8.23**			32.14***
Head employment dummies:							
head_emp	0.335 (0.472)	0.443 (0.497)	0.276 (0.447)	7.41***	0.369 (0.483)	0.223 (0.416)	5.54***
head_self	0.381 (0.486)	0.393 (0.489)	0.375 (0.484)	0.76	0.353 (0.478)	0.387 (0.487)	-1.19
head_unemp	0.155 (0.362)	0.110 (0.313)	0.180 (0.384)	-4.01***	0.140 (0.348)	0.202 (0.402)	-2.71***
χ² test (head employment)				94.25***			32.68***
chn_num	0.595 (0.870)	0.489 (0.831)	0.791 (0.908)	7.27***	0.400 (0.780)	0.540 (0.855)	-2.83***
hh_size	4.258 (2.333)	4.231 (2.287)	4.273 (2.358)	-0.37	4.041 (2.420)	4.405 (2.313)	-2.60***
urbrural	0.487 (0.500)	0.498 (0.500)	0.482 (0.500)	0.65	0.597 (0.491)	0.416 (0.493)	6.18***
december	0.349 (0.477)	0.355 (0.479)	0.346 (0.476)	0.38	0.312 (0.464)	0.365 (0.482)	-1.87**

N	1871	657	1214		442	772

Notes to the table:
(i)   Standard deviations are reported in parentheses.
(ii) † The hypothesis under test here is: H₀: μ₀ = μ₁/ H₀: π₀ = π₁. The column provides the t-ratios/z-scores for mean/proportion differences between non-migrants and migrants (or remittance receiving and non-receiving).
(iii) *, **, *** represent the statistical significance of the differences for the 10%, 5% and 1% significance levels respectively.
(iv) The χ² tests are testing for differences between non-migrant and migrant (or remittance receiving and non-receiving) households for categorical variables.

Some differences relating to remittance receiving and non-remittance receiving migrant households are also revealed in the summary statistics. Non-remittance receiving migrant households appear to have higher per capita expenditure compared to remittance receiving migrant households. We also note from the table that migrant households with male heads are less likely to receive remittances. A higher proportion of migrant households with heads who have primary education received remittances compared to those that did not, while the opposite is true for the case of heads with a university education. The proportion of migrant households that received remittances is lower for the case of employed heads and higher for unemployed heads. We also note that a higher proportion of households that received remittances had more children compared to those that did not receive remittances. Finally, the household size is larger for those migrant households that received remittances, and migrant households in urban areas were less likely to receive remittances compared to rural households.

6.3.4   Self-reported remittance data

There are other dependent variables used in the empirical analysis in this chapter to compare household remittance budget shares to the corresponding general expenditure budget shares. These include the self-reported share of remittances out of total cash remittances received by the household allocated to a specific category of commodity. We derive self-reported remittance uses from the following question: *How did your household spend the money sent by (NAME) in the past 12 months? Food, education, health, rent (house, land), marriage/funeral, cars/trucks, rebuilt house, built new house, business, land purchase, livestock purchase, improved farming, migrant physical investment, financial assets (bonds, stocks), transferring to intended recipient, other (specify).* The amount of remittances, if any, spent on each of these categories is specified. For each category, we restrict the analysis to only those households

that reported positive (i.e., non-zero) remittance expenditure in a given category. As such, the samples are different in size and composition for each category. There is a reduction in the sample sizes across the categories due to censorship in the reported uses of remittances. Of the households that received remittances, 74% report having spent them on food, 26% on non-food, 43% on education, 43% on health, and 35% on physical investments. Only 87 households report having spent the remittances received on utilities. After eliminating observations based on missing data, the sample size for utilities becomes even smaller. We therefore exclude this category from our analysis due to the small sample size. We also exclude the durable goods category for the same reason.

In the sample 71% of households reported how the total amount of remittances they received were spent. The remainder just reported the use of only a proportion of the remittances received. As such, the reported remittances do not add up to the total amount of remittances received for this latter set of households. Several explanations could account for this. For example, it could be that some households saved some of the remittances received. However, the absence of questions relating to whether and how much of remittances were allocated to savings leaves us unsure as to whether this is actually the case or not. The shortfall could also be the result of recall errors in the way households reported how they used remittances. Or, it could be that at the time of the survey some households had not yet spent all of the remittances they had received in the previous 12 months.

Table 6.4 presents summary statistics for these additional variables, namely the average remittance budget shares. We see that the largest share (nearly half) of total cash remittances received is reported to have been spent on physical investments. This is followed by spending on food (45%), education (36%), non-food (33%) and health (21%).

Several points need to be noted about the way households self-reported their uses of remittances. As shown above, the question concerning the uses of remittances provided a list of the different commodities on which the household may have spent remittances. Households then indicated how much, if any, of the remittance income received was spent on each item. The listing of commodities may have elicited biased responses if households were more inclined to report

higher amounts for categories they found appealing. However, the fact that questions relating to the expenditure of households on different commodities were posed in a broadly similar way provides a basis to make comparisons between the two. In addition, the advantage of listing the commodities is that it avoids mis-reporting that may result from reliance on free recall. Furthermore, listing commodities has the advantage of enabling us to make more meaningful comparisons across households. This is because an open-ended question may have resulted in too many divergent responses, thus making it difficult to classify into commodity groups.

Table 6.4: Summary statistics for dependent variables for self-reported remittance uses

Variable	Variable description	Mean (stan dev)	N
fdrem_sh	The ratio of remittances reported to have been spent on food to total cash remittances received by the household	0.45 (0.311)	572
nonfdrem_sh	The ratio of remittances reported to have been spent on non-food items to total cash remittances received by the household	0.33 (0.320)	197
edurem_sh	The ratio of remittances reported to have been spent on education to total cash remittances received by the household	0.36 (0.287)	329
healrem_sh	The ratio of remittances reported to have been spent on health to total cash remittances received by the household	0.21 (0.217)	331
phyrem_sh	The ratio of remittances reported to have been spent on physical investments to cash total remittances received by the household	0.49 (0.318)	271

Notes to the table:

(i)   The household compositions differ under each category.

Another issue is that the way the uses of remittances are reported reveals the presence of spikes at predictable thresholds of the remittance shares.[27] In particular, the data reveal bunching at the following proportions: 1, 0.5, 0.333, 0.25, 0.666 and 0.166. This shows that in responding to the question, respondents most likely estimated how much they spent out of total remittances using fractions. For instance, a respondent may reason that they spent one-half or a third of the remittances received on food. This implies that the responses provided may be subject to a measurement error due to the manner in which the use of remittances was recalled.[28] A potential consequence of this measurement error is to inflate the standard errors of the coefficients in the

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[27] This is not the case when households report their uses of general income.

[28] The presence of spikes could potentially be dealt with econometrically using an interval regression model, for example. However, this approach is not pursued in the current study.

regression model thus making it more difficult to reject the null hypothesis (see, e.g., Wooldridge 2010, p. 79-82).

In addition, there are four cases where the sum of the self-reported uses of remittances exceeded the total amount of remittances the households are reported to have received. We eliminate these four observations from the final analysis. Finally, the samples that we use in conducting the remittance use analysis are very selective. It is quite likely that there is selection bias with regards to the type of households that report spending remittances on certain categories of goods. However, these types of bias are ignored for the purpose of this analysis as they are difficult to model econometrically in the absence of good instrumentation and more adequate information.

6.4   Empirical methodology

6.4.1   Almost Ideal Demand System framework

The empirical methodology we adopt uses a demand analysis structure to estimate household budget shares for different commodities within an Almost Ideal Demand System (AIDS) framework (see Deaton and Muellbauer 1980). The AIDS model is one of the most popular demand system models used in the literature. The model and its variants have been used extensively in empirical studies to analyse household consumer behaviour. Within the AIDS framework, the budget shares of the various commodities are linearly related to the logarithm of real total expenditure and the logarithms of relative prices. The model possesses most of the properties that are desirable in conventional demand analysis and has a functional form which is consistent for use with household budget and cross-sectional data (Deaton and Muellbauer 1986, Deaton 1997). In cross-section studies it is concerned with the explanation of behavioural differences between households (Deaton and Muellbauer 1980 p. 18). In such studies, it is usually assumed that all households face identical prices such that the explanations for behavioural differences are found exclusively in terms of the differences in total expenditure and in household characteristics.

The AIDS model has been applied across a wide range of applications in order to compute, *inter alia*, expenditure elasticities and marginal budget shares for different categories of commodities. For example, Case and Deaton (1998) assess the effects of pension cash receipts on the allocation

of income to food, schooling, transfers and savings. Other studies that have employed variants of the AIDS model to analyse the expenditure patterns of households include Maitra and Ray (2003), Zarate-Hoyos (2004), Adams (2005), Taylor and Mora (2006), Castaldo and Reilly (2007), Tabuga (2007), and Adams and Cuecuecha (2010).

A common functional form for the AIDS model is the Working-Leser model which describes household expenditure behaviour by relating budget shares linearly to the logarithm of total household expenditure (see Working 1943, Leser 1963) and can be expressed as follows:

$$w_{ij} = \alpha_j + \beta_j \, lnx_i + \varepsilon_{ij} \tag{6.1}$$

where w_{ij} represents the share of good j in household i (i.e., the ratio of expenditure on good j to total household expenditure). This implies that the proportion of total expenditure devoted to good j tends to decrease in an arithmetic progression as total expenditure increases in a geometric progression. x_i is total household expenditure, α_j and β_j are unknown parameters to be estimated and ε_{ij} is an error term.

A key property of the demand function is the adding-up restriction. Adding up requires that $\sum w_{ij} = 1$ and this is satisfied provided the following parametric restrictions are met:

$$\sum \alpha_j = 1, \qquad \sum \beta_j = 0 \tag{6.2}$$

If equation (6.1) is estimated equation by equation using ordinary least squares,[29] the parameter estimates $\hat{\alpha}_j$ and $\hat{\beta}_j$ will satisfy equation (6.2) automatically (see Deaton and Muellbauer 1980 p. 23-24).

A number of extensions have been introduced into the basic Working-Leser model to include other factors that may affect the budget shares of different types of goods. Following Castaldo and Reilly (2007), we include controls for the different sources of migrant remittances and specify the model as follows:

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[29] A shortcoming encountered in using OLS is that it does not take into account the correlation in the error terms across all the budget equations. As a robustness check, we use the seemingly unrelated regression estimator (SURE) as it addresses this issue.

$$w_{ij} = \alpha_j + \beta_j \, lnx_i + z_i'\gamma_j + D_i'\theta_j + v_{ij} \tag{6.3}$$

where $i = 1, 2, ..., N$ households. w_{ij} is the budget share of good j in household i, x_i is the total expenditure per capita of household i, z_i' is a vector of household and regional characteristics (see Table 6.3). The α_j and β_j are again the unknown parameters corresponding to the jth good, γ_j is an unknown parameter vector to be estimated, and v_{ij} is an error term that captures the unknown variation in the jth budget share for the ith household. The D_i vector contains a mutually exclusive set of dummy variables capturing whether the household received remittances from a sibling, spouse, significant relative, a combination of the former, or no remittances at all. The estimates for the θ_j vector reveal the magnitude of the impact of different types of remittances received on the relevant budget share.

An important assumption of this variant of the AIDS model is the separability of preferences. This means that commodities can be partitioned into groups so that preferences within groups can be described independently of the quantities in the other groups (Deaton and Muellbauer *op. cit.* p. 122 - 127). This implies that we can have a sub-utility function for each group and that the values of these sub-utilities combine to yield total utility. Thus, we can assume that households will allocate their income among different commodities in the same manner as each other.

Marginal budget shares and expenditure elasticities can be computed from the OLS estimates from the budget share equations. Following Castaldo and Reilly (2007), we present expressions for the marginal budget shares and expenditure elasticities. In equation (6.3), the marginal budget share for good j and household i is defined as follows:

$$mbs_{ij} = \frac{\partial c_{ij}}{\partial x_i} \tag{6.4}$$

where c_{ij} is the consumption of good j by household i, and x_i is the total consumption by household i. The budget share of good j and household i is defined as:

$$w_{ij} = \frac{c_{ij}}{x_i} \tag{6.5}$$

After some manipulation the marginal budget share is derived as:

$$mbs_{ij} = \beta_j + \frac{c_{ij}}{x_i} = \beta_j + w_{ij} \qquad (6.6)$$

OLS estimates and the mean budget shares can be used to calculate the above expression.

Using the definition of elasticity, the expenditure elasticity of good j for household i is computed in the conventional way as follows:

$$\eta_{ij} = \left(\beta_j + w_{ij}\right)\frac{1}{w_{ij}} = \frac{\beta_j}{w_{ij}} + 1 \qquad (6.7)$$

The computation of elasticities has the advantage that it allows us to determine if a good is a luxury ($\eta_{ij} > 1$), necessity ($\eta_{ij} < 1$) or indeed an inferior good ($\eta_{ij} < 0$). The sampling variances for (6.6) and (6.7) are easily computable assuming w_{ij} is evaluated at its sample mean.

A main concern in the application of budget share equations to cross-sectional household data is that there is a censorship effect when it comes to the decision of whether or not to spend on certain expenditure items. In the current application, it is reasonable to treat certain expenditure categories as non-censored as there are only a small number of households that report zero expenditures. These include the categories of food, non-food and utilities.[30] On the other hand, durable goods, physical investments, education and health are censored given 50%, 84%, 40%, and 32% of households have respectively zero expenditure for these categories. It is intuitive that many households will have zero expenditures for these categories as the assets comprising the categories are quite lumpy (e.g., vehicles, houses, land, and equipment). For education, there are households that do not have children of school going age. In terms of health, some households may not have anyone requiring medical treatment during the period of observation, and thus have a zero expenditure in this category. Hence, household expenditure on these categories is observed only when its spending is greater than zero. Thus, the three main reasons for a zero expenditure on a good are permanent zero expenditures,[31] zero expenditure during the survey period[32] and optimal

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[30] There are only four (0.2%), 99 (5%), and 67 (4%) households with zero expenditures for these respective categories.

[31] Permanent zero expenditure occurs in the case where a household will never consume the commodity.

zero expenditure[33] (Tafere *et al.* 2010). The budget shares for the aforementioned categories are thus censored at zero. This implies that the samples for which positive expenditures in these categories are observed may not be random and failure to correct for this will yield potentially biased and inconsistent parameter estimates.

One way to address this censorship would be to use a two-step procedure where a probit model is estimated in the first stage for expenditure on each category and the inverse-Mills ratios are then computed. In the second stage, the inverse-Mills ratios are then included as right hand variables in the corresponding budget share equations as a way of correcting for the truncation effect. However, the main challenge of doing this is that of identifying variables that shift the probability but not the level of spending. It is very difficult to obtain relevant identifying variables in cross-sectional household data. However, we only employ this method as a robustness check in this case here.

Another important issue to consider is the potential endogeneity of the remittances variable itself. This endogeneity may arise due to the presence of variables that affect the receipt of remittances by households as well as their expenditure on certain categories. Failure to control for the endogeneity of remittances is likely to result in biased estimates for the effects of remittances on commodity expenditures.

Having noted that the dependent variable for commodity expenditure is potentially censored in certain circumstances and that remittances are potentially endogenous, the subsequent chapter addresses these two issues in more detail for the case of physical investments and durable goods.[34]

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[32] This type of zero expenditure arises when the frequency with which households purchase the goods is such that the survey period is not long enough to capture it.

[33] Optimal zero expenditure occurs if households would potentially purchase the good at a different price and income level.

[34] Focussing on these two categories is justified by the fact that the budget shares analysis presented and discussed in section 6.5 reveals that they are the only two categories for which the receipt of remittances has a positive and significant effect on the household budget shares.

6.5   Empirical results

6.5.1   Budget share expenditure estimates

We first start by investigating the marginal spending behaviour of the different types of Kenyan households. Table 6.5 presents estimates of the marginal budget shares and expenditure elasticities for the seven categories of interest and separately for non-migrant (0) and migrant (1) households. These estimates are computed from budget share equation coefficients corresponding to the logarithm of total expenditure per capita estimated using OLS on equations (6.1) and (6.3) (see Table A6.1 of the Appendix). The table also presents test statistics for t-tests that were conducted for the differences in marginal budget shares and elasticities between non-migrant and migrant households for each category of commodity.

The t-tests to determine whether the expenditure elasticities are statistically different between migrant and non-migrant households reveal that they are only different for the utilities category. Non-migrant households have a more elastic expenditure response to utility purchases than migrant households. The classification of utility purchases is as a necessary good for migrant households but a luxury one for non-migrant households. There are no differences in the responsiveness of expenditure to purchases for the majority of the commodity categories. Food is shown to be a necessary good for both migrant and non-migrant households. Non-food, durable goods, physical investments, education and health are all shown to be luxury items for both sets of households.

The t-tests computed to determine whether the marginal budget shares are statistically different between migrant and non-migrant households reveal that there are statistically significant differences for all the commodity categories. In particular, a one shilling increase in the household budget per capita results in a 0.29 of a shilling increase in expenditure on food commodities, on average and *ceteris paribus*, for migrant households, and a 0.32 of a shilling increase for non-migrant households. A one shilling increase in the household budget per capita increases expenditure on non-food commodities by 0.28 and 0.30 of a shilling for migrant and non-migrant households respectively, on average and *ceteris paribus*, and increases expenditure on utilities by 0.19 and 0.22 of

a shilling respectively. These findings reveal that non-migrant households spend more at the margin on goods which yield short-term utility and are immediately consumable.

Table 6.5: Marginal budget shares and expenditure elasticities (migrant vs. non-migrant households)

	MBS (0)	MBS (1)	t-test†	η (0)	η (1)	t-testf
fd_sh	0.32***	0.29***	-2.82***	0.72 ***	0.73***	0.41
	(0.008)	(0.007)		(0.018)	(0.016)	
nonfd_sh	0.3***	0.28***	-1.75*	1.31***	1.25***	-1.22
	(0.009)	(0.007)		(0.039)	(0.030)	
uti_sh	0.22***	0.19***	-3***	1.09***	0.93 ***	-3.25***
	(0.008)	(0.006)		(0.039)	(0.030)	
dur_sh	0.03***	0.04***	2.36***	1.42***	1.49 ***	0.36
	(0.003)	(0.003)		(0.157)	(0.119)	
phy_sh	0.03***	0.04***	1.77*	2.11***	1.97***	-0.39
	(0.004)	(0.004)		(0.287)	(0.203)	
educ_sh	0.08***	0.11***	3.84***	1.14***	1.25***	1.12
	(0.006)	(0.005)		(0.084)	(0.051)	
heal_sh	0.03***	0.06***	6.71***	1.16***	1.27 ***	0.97
	(0.002)	(0.004)		(0.075)	(0.085)	

Notes to the table:
(i) ***, ** and * denote statistical significance from zero at the 0.01, 0.05 and 0.10 level respectively using two-tailed tests.
(ii) The marginal budget shares and the elasticities were derived from the OLS estimates presented in Table A6.1 (see section 6.4.1. for the formulas). The same sets of variables were used in both regressions, with the exception of remittance dummy variables which appear only in the regression for migrant households.
(iii) Standard errors are reported in parentheses.
(iv) † The null hypothesis under test is H_0: $MBS_1 - MBS_0 = 0$.
(v) f The null hypothesis under test is H_0: $\eta_1 - \eta_0 = 0$.
(vi) t-tests for unitary expenditure elasticity for migrant households gave the following test statistics: -16.59; 8.25; -2.2; 4.14; 4.8; 4.91; 3.21, respectively.
(vii) t-tests for unitary expenditure elasticity for migrant households gave the following test statistics: -15.5; 7.9; 2.2; 2.66; 3.87; 1.69; 2.15, respectively.

The table also reveals that Kenyan migrant households spend more at the margin than non-migrant households on productive and human capital investments. In particular, the effect induced by a one shilling increase in the household budget per capita is at least 0.01 of a shilling higher for expenditure on durable goods, physical investments, education and health for migrant compared to non-migrant households, on average and *ceteris paribus*. Migrant households therefore spend more on investments that yield long-term utility. Thus, there are significant differentials in the marginal spending behaviour of households according to their migrant status.

Adams (1991) also found evidence that Egyptian migrant households did not spend a disproportionate share of their income on consumption goods but rather on durable and investment goods. However, we note that Adam's study is not directly comparable to ours due to differences in expenditure classifications. For example, Adams classifies housing under durable goods while we classify it here under physical investments. However, the study's broad findings are in comport with ours. Another comparable study is that of Taylor and Mora (2006) who find that as total expenditures in Mexican households with migrants increase, the share of income used for investments also increases, while the share spent on consumption falls compared to non-migrant households.

The use of per capita household expenditure without adjusting expenditure using adult equivalence scales may raise concerns about measurement error here. To assess the impact of this possible bias, we adjust the per capita expenditure measure such that each child (below seven years) counts as half an adult and re-estimate the OLS models. Table A6.2 of the Appendix reveals the OLS estimates using the adjusted expenditure variable separately for migrant and non-migrant households. We see that the per capita expenditure and the adjusted expenditure coefficients are comparable in terms of their signs, magnitudes and statistical significance. Table A6.3 of the Appendix reports estimates of the marginal budget shares and expenditure elasticities computed using the adult equivalent expenditure and the t-tests for differences between migrant and non-migrant households. We see that the same differences between the marginal budget shares and the expenditure elasticities obtained using the non-adjusted total expenditure per capita variable are revealed when adult equivalent expenditure is used for all categories of expenditure. In addition, the classification of commodities remains unchanged. Thus, the results are invariant to the use of adult equivalence scales.

We now restrict the analysis of the marginal budget shares and expenditure elasticities to those households that have migrants. We limit the sample to migrant households only in order to account for selection in terms of the migration decision. It could be argued that there are systematic differences in unobservable characteristics between migrant and non-migrant households. For

example, migrant households could have access to certain resources that are not available to non-migrant ones.[35] One way of addressing this selection bias would be to employ an instrumental variables approach. However, a lack of adequate instruments prevents us from exploring this approach in a meaningful way.[36] We therefore conduct the analysis conditional on migration.

Table 6.6 contains estimates of the marginal budget shares and expenditure elasticities for the seven categories of interest for remittance receiving and non-receiving migrant households (see Table A6.4 of the Appendix for the corresponding OLS estimates).

Table 6.6: Marginal budget shares and expenditure elasticities (remittance vs. non-remittance receiving migrant households)

	MBS (0)	MBS(1)	t-test †	η (0)	η (1)	t-test ᶠ
fd_sh	0.29***	0.29***	0	0.73***	0.73***	0
	(0.010)	(0.009)		(0.024)	(0.022)	
nonfd_sh	0.29***	0.28***	-0.70	1.28***	1.24***	-0.64
	(0.011)	(0.009)		(0.049)	(0.039)	
uti_sh	0.2***	0.18***	-1.60	0.96***	0.91 ***	-0.81
	(0.011)	(0.006)		(0.052)	(0.033)	
dur_sh	0.03***	0.04***	1.77*	1.49***	1.49***	0
	(0.004)	(0.004)		(0.191)	(0.159)	
phy_sh	0.03***	0.04***	1.41	1.85***	2.02***	0.42
	(0.005)	(0.005)		(0.302)	(0.262)	
educ_sh	0.11***	0.11***	0	1.27***	1.23***	0.35
	(0.009)	(0.005)		(0.102)	(0.055)	
heal_sh	0.05***	0.06***	1.39	1.17***	1.32***	0.80
	(0.006)	(0.004)		(0.162)	(0.093)	

Notes to the table:

(i) ***, ** and * denote statistical significance from zero at the 0.01, 0.05 and 0.10 level respectively using two-tailed tests.
(ii) The marginal budget shares and the elasticities were derived from the OLS estimates reported in Table A6.4 in the Appendix (see section 6.4.1. for the formulas). The same sets of variables were used in both regressions.
(iii) Standard errors are reported in parentheses.
(iv) † The null hypothesis under test is H_0: $MBS_1 - MBS_0 = 0$.
(v) ᶠ The null hypothesis under test is H_0: $\eta_1 - \eta_0 = 0$.
(vi) t-tests for unitary expenditure elasticity for remittance receiving households gave the following test statistics: -12.13; 6.25; -2.68; 3.07; 3.89; 4.12; 3.39, respectively.
(vii) t-tests for unitary expenditure elasticity for non-remittance receiving households gave the following test statistics: -11.24; 5.59; -0.82; 2.56; 2.8; 2.64; 1.03, respectively.

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[35] For instance, migrants could pass on knowledge acquired in the destination to households and this may affect their expenditure decisions.

[36] For example, we consider using historical rainfall shocks. The argument is that rainfall is correlated with agricultural production and income, and so too little rainfall in one year may cause people to migrate out of rural areas (see Adams and Cuecuecha 2010). Rainfall from previous time periods should however not be correlated with current expenditure patterns. However, variables measuring rainfall from various historical time periods yield statistically insignificant effects for the migrant status of the household thus failing to provide relevant instruments. This may be due to a lack of adequate variation in the rainfall variables as we can only access rainfall data at the level of the enumeration area. Because the dataset does not contain any geographic coordinates, we cannot determine the exact location of households and use more disaggregated rainfall measures.

The elasticity estimates reveal that food and utilities are necessary goods for both remittance and non-remittance receiving migrant households. The remaining commodities are shown to be luxury goods for both sets of households. The t-tests for the differences in elasticity estimates between the two sets of migrant households reveal that there are no statistically significant differences in elasticities for these households across any of the commodities. Therefore, we see that the responsiveness of expenditure to purchases of commodities is similar for migrant households whether or not they receive remittances. In the literature, Zarate-Hoyos (2008) finds that remittance receiving households have lower income elasticities for current consumption and durable consumer goods than non-receiving households. However, the study does not report separate elasticities for each component of current consumption (i.e., food, non-food, and utilities expenditure). It is therefore not possible to make a more elaborate comparison of the elasticity estimates between our study and that of Zarate-Hoyos.

The t-tests for differences in the marginal budget shares between the two groups of households reveal that the marginal budget share for durable goods is higher for remittance receiving households at the 10% level of significance. In particular, a one shilling increase in the household budget per capita increases expenditure on durable goods by 0.04 and 0.03 of a shilling for remittance receiving and non-receiving migrant households respectively, on average and *ceteris paribus*. There are no statistically significant differences in marginal budget shares between these two household types for the other categories. Thus, the findings reveal that migrant households receiving remittances are spending more at the margin towards durable goods than those not receiving remittances.

In the literature, the findings of Adams and Cuecuecha (2010) differ from ours in a number of key respects. They find that Guatemalan households receiving international remittances spend less at the margin on food compared to what they would have spent on this good without remittances. In addition, households receiving either internal or international remittances spend more at the margin on education and housing compared to what they would have spent on these goods without

remittances. However, it is quite challenging to compare our findings with those obtained by similar studies in the literature due to differences in commodity classifications.

Overall, we see that the findings reveal little differences in the expenditure behaviour of migrant households that receive remittances and those that do not. However, given the finding that the marginal budget shares for durable goods are larger for remittance receiving than non-receiving households, we anticipate that there may be some differential allocation of income towards expenditure according to the source of income (i.e., remittance versus general income). We now therefore undertake an analysis that enables us to determine whether or not households pool their general and remittance income together when allocating the budget towards different expenditure categories. In other words, do remittance and general income exert different household expenditure behavioural impacts? The ensuing analysis enables us to test the unitary model which posits that households pool their income together when allocating it to expenditure such that it is total income, and not the composition of income that matters.

A standard approach used in the literature to test the unitary model is to include separate variables for general and other income in the budget share equations and determine whether other income has a significant effect on the budget shares (see, e.g., Maitra and Ray 2003, Case and Deaton 1998). Thus, a modified version of equation (6.1) is re-estimated to include a dummy variable capturing whether or not a household received remittances. We also estimate another model where the actual amount of cash remittances received by households is the variable of interest rather than using a remittance receipt dummy variable. A central motivation in using the actual amount of remittances is that a dummy variable aggregates remittances received into one category. For example, the receipt of 100 shillings is treated the same as the receipt of 10,000 shillings. In addition, a dummy variable may reflect other things besides the effect of remittance income on household expenditure. For instance, there could be a transfer of knowledge or information by the remitter that influences the way the household allocates its budget. The use of the actual amount of remittances received by households allows us to further explore the effect of

remittances while taking into account the actual variation in the amount of remittances received by households.

Table 6.7 reports OLS budget share estimates for the seven categories of commodities. The top panel of the table reports the effect for the dummy variable measuring whether or not a household received remittances and the bottom panel reports the effect for the total amount of cash remittances received. In the bottom part of the table, the estimates for the non-food share category suggest that a 10,000 shilling increase in annual remittances reduces the non-food expenditure share by 0.09 of one percentage point, on average and *ceteris paribus*. The sample mean of remittances for migrant households is 110,238 shillings. Hence, a 10,000 shilling increase represents an increase of about 10% relative to the sample mean.

Table 6.7: OLS estimates for budget share equations with remittances variables (migrant households only)

VARIABLES	fd_sh	nonfd_sh	uti_sh	dur_sh	phy_sh	educ_sh	heal_sh
ln_perK_totexp	-0.108***	0.0566***	-0.0129**	0.0120***	0.0182***	0.0225***	0.0119***
	(0.00649)	(0.00683)	(0.00585)	(0.00293)	(0.00376)	(0.00459)	(0.00366)
rec_rem	-0.0104	0.00240	-0.00466	0.00781**	0.00359	0.00442	-0.00312
	(0.0121)	(0.0119)	(0.00995)	(0.00395)	(0.00454)	(0.00841)	(0.00572)
Regional dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Other variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	1,214	1,214	1,214	1,214	1,214	1,214	1,214
R-squared	0.376	0.138	0.169	0.068	0.068	0.136	0.095
ln_perK_totexp	-0.109***	0.0573***	-0.0125**	0.0119***	0.0176***	0.0224***	0.0119***
	(0.00653)	(0.00684)	(0.00582)	(0.00296)	(0.00365)	(0.00464)	(0.00366)
tot_rem	-2.11e-09	-8.92e-09**	-8.72e-09**	5.69e-09***	1.11e-08	3.57e-09	-5.65e-10
	(5.27e-09)	(4.31e-09)	(4.29e-09)	(2.09e-09)	(7.65e-09)	(9.46e-09)	(1.74e-09)
Regional dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Other variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	1,214	1,214	1,214	1,214	1,214	1,214	1,214
R-squared	0.375	0.139	0.170	0.069	0.075	0.137	0.094

Notes to the table:
(i)   ***, ** and * denote statistical significance from zero at the 0.01, 0.05 and 0.10 level respectively using two-tailed tests.
(ii) Robust standard errors are reported in parentheses.
(iii) The regression model also includes other explanatory variables that are not shown here in order to conserve space (see text for details).

The estimates for the utilities category suggest that a 10,000 shilling increase in annual remittances reduces the utilities expenditure share by 0.09 of one percentage point, on average and *ceteris paribus*.[37]

We see that the receipt of remittances increases the share of the budget allocated to the durable goods category by 0.78 of one percentage point, on average and *ceteris paribus*. The estimates for the durable goods category suggest that a 10,000 shilling increase in annual remittances increases the durable goods expenditure share by 0.06 of one percentage point, on average and *ceteris paribus*. This finding mirrors the earlier finding that remittance receiving households spend more at the margin on durable goods compared to non-receiving households.

The explanation for these findings may be that the remittance sender or receiver has specific preferences for what remittances should be used for. If this is the case, the preference is for remittances not to be spent towards consumable goods but rather towards goods that yield utility over time. The uses of remittances according to their source are the subject of more detailed investigation in the subsequent analysis. Thus, for durable goods the evidence we obtain here suggests a rejection of the unitary model in support of non-unitary models where different types of income appear to be allocated to expenditure differentially. Studies such as Edwards and Ureta (2003) and Cattaneo (2012) have also obtained evidence against the unitary model in the uses of remittances by households.

As a robustness check, we re-estimate the model discussed above using expenditure figures for six months (as opposed to aggregating expenditure to the yearly level). Given that the remittances reported are at the yearly level (see section 6.3.1), we proxy their value for the six months corresponding to that reported for expenditure by halving them. The estimates we obtain are reported in Table A6.5 of the Appendix. There are no major differences in the findings obtained in terms of the signs and significance of the coefficients, though, as expected, the magnitudes are different.

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[37] The finding of significant effects in the non-food and utility categories may be due to the receipt of in-kind remittances that fall within these categories (see the explanation provided in relation to Table 6.8 below).

We also include, in addition to the variable measuring the total amount of cash remittances received, a variable capturing the total value of in-kind remittances received by the household.[38] Table 6.8 reveals that a 1,000 shilling increase in such remittances increases the food expenditure share by 0.0001 of one percentage point, on average and *ceteris paribus*. The sample mean value of in-kind remittances is 7,499 shillings. Therefore, a 1,000 shilling increase represents an increase of 13% relative to the sample mean. The finding of a positive effect for in-kind remittances on the food category appears reasonable because households reported imputed values for their food expenditures. It also potentially reveals that in-kind remittances complement food expenditure shares. A 1,000 shilling increase in in-kind remittances decreases the utilities and education expenditure shares by 0.00001 and 0.00008 of a percentage point respectively, and increases the durables expenditure share by 0.00003 of a percentage point, on average and *ceteris paribus*. These represent fairly modest effects in all cases. The receipt of in-kind remittances has a negative effect on the utilities and education categories possibly because households in the survey do not report imputed values of expenditure for these two categories of commodity.[39] Therefore, any in-kind remittances received by the household that fall into these categories are not captured in the expenditure figures but would have a negative effect on expenditure, and thus present as a negative coefficient for the in-kind remittances variable. The negative effect also suggests that in-kind remittances substitute utilities and education expenditure shares. On the other hand, the positive effect on durable goods could potentially be explained by the fact that the receipt of in-kind remittances frees up income that is then re-allocated to durable goods expenditure. This finding is consistent with the reported estimate for the cash remittances variable.[40] Thus, in-kind remittances complement the share of expenditure allocated to durable goods.

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[38] It could be argued that in-kind remittances should be treated as part of the dependent variable. However, it is difficult to neatly separate in-kind remittances into the dependent variable expenditure categories as their value is aggregated in some cases.

[39] In the utilities category, only rent is imputed.

[40] A similar analysis is conducted for the sample of remittance receiving households only. The findings are consistent with those discussed above.

Table 6.8: OLS estimates for budget share equations with cash and in-kind remittances (migrant households only)

VARIABLES	fd_sh	nonfd_sh	uti_sh	dur_sh	phy_sh	educ_sh	heal_sh
ln_perK_totexp	-0.109***	0.0573***	-0.0121**	0.0117***	0.0177***	0.0229***	0.0117***
	(0.00656)	(0.00685)	(0.00582)	(0.00298)	(0.00367)	(0.00465)	(0.00366)
tot_rem	-2.94E-09	-8.80e-09**	-8.25e-09*	5.46e-09**	1.11E-08	4.17E-09	-7.68E-10
	(4.82E-09)	(4.33E-09)	(4.29E-09)	(2.12E-09)	(7.72E-09)	(9.10E-09)	(1.74E-09)
inkind_rem	1.08e-07***	-1.59E-08	-6.18e-08***	3.01e-08**	-8.92E-09	-7.77e-08***	2.64E-08
	(2.25E-08)	(2.37E-08)	(2.13E-08)	(1.39E-08)	(1.64E-08)	(2.50E-08)	(4.16E-08)
Other variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Regional dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	1,214	1,214	1,214	1,214	1,214	1,214	1,214
R-squared	0.376	0.139	0.17	0.07	0.075	0.138	0.095

Notes to the table:
(i) ***, ** and * denote statistical significance from zero at the 0.01, 0.05 and 0.10 level respectively using two-tailed tests.
(ii) Robust standard errors are reported in parentheses.
(iii) The regression model also includes other explanatory variables that are not shown here in order to conserve space (see text for details).

We now proceed to investigate the impact of the relationship of the remitter to the household on the budget shares of households. The key research question here is whether different types of remitters exert differential impact on the allocations of remittances to expenditure. Thus, we ascertain how the relationship of the remitter to the household impacts household budget allocations. Table 6.9 provides OLS budget share estimates for migrant households only and includes dummy variables for the relationship of the remitter to the household as the variables of primary interest (see equation (6.3)). The estimates reveal that there are only two cases where there are differences in the allocation of the budget shares according to the identity of the remitter. We see that the receipt of remittances from sibling migrants increases the share of the budget allocated to the durable goods category by 1.23 percentage points, on average and *ceteris paribus*, compared to not receiving any remittances. The sample average budget share of expenditure on durable goods is 0.023. The impact effect of the budget share increase of household expenditures on items within this category corresponds to a 54% increase relative to the mean. Thus sibling remitters have a significant say in the use of the remittances they send towards durable goods.

The receipt of spouse remittances increases the budget share allocated to physical investments by 2.1 percentage points, on average and *ceteris paribus*, relative to not receiving any remittances. The sample average budget share of expenditure on physical investments is 0.017. Hence, the impact effect here suggests that the budget shares of physical investments are about 124% higher, on average and *ceteris paribus,* for migrant households that receive spouse remittances compared to those that receive no remittances at all.

Table 6.9: OLS estimates for budget share equations with remitter dummy variables (migrant households only)

VARIABLES	fd_sh	nonfd_sh	uti_sh	dur_sh	phy_sh	educ_sh	heal_sh
ln_perK_totexp	-0.108***	0.0564***	-0.0129**	0.0123***	0.0179***	0.0226***	0.0119***
	(0.00651)	(0.00684)	(0.00587)	(0.00297)	(0.00373)	(0.00460)	(0.00371)
sib_rem	-0.0157	0.00772	-0.00367	0.0123**	0.00141	0.00405	-0.00610
	(0.0151)	(0.0145)	(0.0123)	(0.00524)	(0.00592)	(0.0112)	(0.00771)
spo_rem	-0.00492	-0.000806	-0.0195	-0.000481	0.0205*	0.00577	-0.000486
	(0.0213)	(0.0207)	(0.0160)	(0.00569)	(0.0111)	(0.0131)	(0.00865)
sig_rem	-0.00245	-0.00617	0.000364	0.00803	-0.000893	-0.000886	0.00201
	(0.0172)	(0.0163)	(0.0129)	(0.00587)	(0.00449)	(0.0111)	(0.00733)
com_rem	-0.0355	0.0184	0.0209	0.000499	0.00120	-0.000839	-0.00469
	(0.0227)	(0.0256)	(0.0223)	(0.00460)	(0.00993)	(0.0177)	(0.0126)
no_rem				base group			
Other variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Regional dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	1,214	1,214	1,214	1,214	1,214	1,214	1,214
R-squared	0.377	0.139	0.171	0.072	0.072	0.137	0.095

Notes to the table:
(i) ***, ** and * denote statistical significance from zero at the 0.01, 0.05 and 0.10 level respectively using two-tailed tests.
(ii) Robust standard errors are reported in parentheses.
(iii) The regression model also includes other explanatory variables that are not shown here in order to conserve space (see text for details).

The foregoing effects demonstrate fairly sizeable increases in the durable goods and physical investments budget shares attributable to the receipt of sibling and spouse remittances respectively. There a number of possible explanations for these findings. The findings could be explained within a principal-agent framework where the remitter has specific preferences for how remittances should be spent but the household actually allocates the remittances. The closeness of the relationship of the remitter to the household may affect the extent to which the remitter can enforce his/her contract upon the receiving household as well as the ability of the remitter to monitor and/or

control the use of remittances. Since sibling and spouse remitters are closely related to the household of origin, they are likely to be in a better position to monitor or enforce the uses of the remittances they send. Thus, instead of the household pooling remittances by siblings and spouses together with general income[41], we see that these remittances are allocated differently to household expenditure than remittances from other remitters who are less able to monitor or enforce how their remittances are spent. As such, we see that the preference of remitters closely related to the household is for the use of remittances towards goods that yield utility over time rather than those that are expended immediately. Thus, under the reasonable assumption that sibling and spouse remitters have a significant say as to the uses of the remittances they send, we see a preference for the uses of remittances towards physical investments and durable goods.

Also, the greater ability of spouses and siblings to monitor the uses of remittances (e.g. during visits or communications with other members of the household) suggests that the uses of remittances by the household are more likely to comply with the desires of the remitter. There is evidence in the literature suggesting that to prevent remittances from being diverted towards uses they do not approve of, Kenyan spouse migrants actively monitor the uses of remittances sent to the household in a number of ways, including through relatives and during personal visits (see, e.g., de Laat 2014).[42] It therefore seems reasonable to assume that the uses of remittances by Kenyan households for the acquisition of physical investments and durable goods are uses that are approved by the remitters.

Several reasons may account for why spouses and siblings prefer remittances to be allocated towards these commodities. For example, physical investments and durable goods are more visible

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[41] This is the case for remittances from other remitters as no statistically significant effect is obtained on the remitter variables.

[42] Unfortunately in our dataset we do not have variables that could be used to proxy the extent to which the use of remittances can be monitored by migrants. For example, there is no information about the number of visits by migrants to the household over the past year. We attempt to use the number of remittance transfers to the household as a proxy under the assumption that migrants who transfer remittances frequently have regular contact with the household and may be better able to control the uses of remittances. However, the variable yields a statistically insignificant effect for all categories of commodities. We also use variables capturing the channel of remittance transfer. The use of remittances brought by the migrant in person may be easier to monitor compared to those transmitted through channels such as Western Union or M-PESA. However, we find no significant effect for the variable capturing the transmission of remittances in person. This may be due to the fact that they are only a few households (94 households) who report to have received remittances from migrants in person.

and last longer than, say, consumable goods. As such, it is easier to monitor whether remittances have been used to acquire such commodities. Also, since these commodities yield utility over time, remitters may be in a position to derive utility from them during visits, or upon eventual return to the household. It is plausible to assume that spouse migrants will eventually return to the household. The acquisition of physical investments would enable them to utilize such investments through, for instance, engaging in some form of productive activity, or in the case of housing, residing in the house. By investing in durable goods, siblings may be able to utilize them during visits (e.g. a car can provide transportation during a visit) or upon eventual return to the household. Unfortunately our data lack information relating to the return plans of migrants and therefore we are unable to test these suggestions.

Another explanation for the allocation of remittances towards physical investments and durable goods may be found in the permanent income hypothesis. This hypothesis asserts that households are likely to spend transitory income (like remittances) towards investments while permanent income is likely to be spent on consumption goods (see Adams 1998). Thus, the impact of sibling and spouse remittances on durable goods and physical investments which are not immediately consumable may reflect that the household views remittances as transitory as opposed to permanent income. As already suggested, it can be plausibly assumed that at some point a spouse migrant will return to the household of origin and therefore not remit anymore. For sibling remittances, in chapter 5 we found evidence of the remittance decay hypothesis as sibling migrants are more likely to remit in the initial years of their migration, compared to later years. There is also extensive evidence in the literature in support of the remittance decay hypothesis (e.g. Johnson and Whitelaw 1974, Banerjee 1984, Funkhouser 1995). Thus, the view that remittances are not permanent income may induce households to spend them towards goods that have longer utility. Or, the remitters themselves may perceive the remittances they send to be transitory in nature and therefore prefer them to be spent on more durable goods and investments. The fact that the impact is only significant for the case of sibling and spouse remitters, and not for other remitters, seems to favour the idea that it is the remitters influencing the allocation of remittances towards specific commodity categories, rather than the receiving household itself. Hence, the more plausible

explanation seems to be one where the relative bargaining powers of sibling and spouse remitters influence the uses of remittances towards physical investments and durable goods. The possible reasons for these preferences have been discussed above.

Alternatively, there is evidence in the literature suggesting that remitters may be concerned about their prestige or social status within the community or among household members (see, e.g., Naiditch and Vranceanu 2011). Since durable goods and physical investments are conspicuous commodities, their acquisition may be a way of signalling success in the destination and thus increasing social status.

Overall the findings reveal little evidence that remitter identities matter in influencing budget share allocations except in the case of physical investments and durable goods. Those remitters that have the closest relationship with the household (i.e., siblings and spouses) have a significant say over how remittances are spent and prefer remittances to be allocated to physical investments and durable goods. These two categories of expenditure will be the subject of detailed investigation in the subsequent chapter. In contrast, other types of remitters do not, or are unable to, enforce or specify the uses of the remittances they send.

Our findings are in contrast with those of Guzman *et al.* (2008) who examine the effect of the relationship of the remitter to the household. They find that if the remitter is a child of the head (defined as sibling in the current chapter), this increases the share of the budget allocated to health and decreases the share to education. If the remitter is a sibling of the head (this falls under the significant remitter category in this chapter), the share of the budget allocated towards consumer and durable goods is reduced.

In order to further clarify how the remitter identities affect the consumption behaviour of Kenyan households, we use interactive terms to enable us to determine whether the receipt of remittances from the various remitters also affects the household marginal propensity to consume out of each type of commodity. This enables us to identify other potential differences in the expenditure behaviour of those households that receive remittances from spouses, siblings, significant relatives, or a combination of remitters, and those that do not. A modified version of the

model just discussed, and reported in Table A6.6 of the Appendix, is now re-estimated to include four interactive variables defined as the product of the logarithm of total household expenditure per capita and the four variables capturing the identities of the remitters. The estimates reveal that both the marginal budget shares and the expenditure elasticity of demand for households receiving sibling remittances are higher than those for households not receiving any remittances for the non-food and utilities categories. In addition the marginal budget shares and expenditure per capita elasticity of demand for households receiving remittances from combined remitters are lower than those for households not receiving any remittances for the durable goods category. In particular, for a one shilling increase in the household per capita budget, on average and *ceteris paribus*, households in receipt of sibling remittances spend respectively about 0.01 and 0.18 of a shilling more on non-food and utilities than those households that do not receive any remittances. Households in receipt of combined remittances spend about 0.01 of a shilling less on durable goods than households that do not receive any remittances. Thus, we infer from this that households exhibit a couple of differences in expenditure behaviour according to the type of remittances they receive defined in terms of the identity of the remitter.

To ensure that the findings we obtain are robust, we undertake a couple of robustness checks. Firstly, a concern that was raised in section 6.3.1 relates to the aggregation of expenditure to yearly values given that expenditure is reported for the period relating to the previous six months for some commodities. We adjust total expenditure as well as the different categories of budget shares to the equivalent six month figures and re-estimate the OLS equations discussed above. Table A6.7 of the Appendix reveals the estimates we obtain when we do this. We see that aggregating at the six month instead of yearly level results in only minor differences in the estimated coefficients.

Secondly, it may be argued that the use of OLS for the budget share analysis is inadequate as it does not take into account the correlation of the errors across the budget share equations. As a robustness check, we undertake the same analysis using the seemingly unrelated regression estimator (SURE) (see Greene 2003). The SURE estimates are reported in Table A6.8 of the Appendix. Overall, the SURE estimates are consistent with our core findings and confirm that

remittances exert a positive and significant effect on the expenditures on durable goods and physical investments.

It may be argued that the results obtained could be driven by the higher volume of sibling and spouse remittances compared to others. In particular, the finding of positive and significant sibling and spouse remittance effects on the share of the budget allocated to durable goods and physical investments may be an artefact of the volumes of remittances rather than the preferences of remitters *per se*. In order to interrogate this claim, we re-estimate the budget share equations and include the total amount of remittances received by the household in addition to the remitter identity variables. Table A6.9 in the appendix reveals the results obtained. We see that controlling for the volume of remittances received, the receipt of sibling remittances has a positive and significant effect on the share of the budget allocated to durable goods. This is entirely consistent with our main findings. We also find a positive effect on the budget share of physical investments of the receipt of spouse remittances. However, this time the effect is statistically insignificant. One view is that this may be driven by the very small proportion of spouse remitters in the sample.[43]

Another concern is that because total expenditure is jointly determined with the budget shares of the specific commodities in the demand model, it is potentially endogenous. This potential endogeneity problem may be addressed by using a two-step procedure (see Blundell and Robin 1999). Total expenditure is first regressed on a set of exogenous variables comprising identifying instruments and variables which directly influence budget shares. The residuals from this reduced-form regression are included as an explanatory variable in the budget share equations together with total expenditure. The t-test for the significance of the coefficient for the residuals in the augmented regression serves as a test for the exogeneity of total expenditure in the budget share equations (Blundell and Robin 1999). This approach has been used by other authors in the literature (e.g., Tafere *et al.* 2010). In the current chapter, the residuals are found to be insignificant in the augmented budget share regressions for durable goods, education and health. Thus, it is not imperative to employ an IV strategy for these commodities. We estimate IV models for the food,

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[43] The number of spouse remitters is only half of that or sibling remitters.

non-food, utilities and physical investments budget shares as total expenditure is found to be endogenous in these equations.

Table A6.10 of the Appendix reports the IV estimates in conjunction with the OLS estimates where total expenditure is treated exogenously for these four categories of commodity. The instrumental variables used are selected for their statistical relevance and are listed in the table for each category. We see that the standard errors are larger in the IV model and the total expenditure variable is now statistically insignificant in three of the four IV models. For the non-food category where the expenditure effect is still significant, the magnitude of the coefficient is lower than that generated by the OLS model. However, our major findings regarding the statistical significance of the receipt of spouse remittances on the budget share allocated to physical investments are invariant to the use of an IV procedure. In fact, the coefficient for the spouse remitter variable is better determined in the IV model.

As discussed previously, an additional issue concerns the censorship of some of the categories of expenditure. In particular, the durable goods, physical investments, education and health categories are censored owing to the presence of zero expenditures on these categories for some households in the survey. In order to correct for this censorship, the Heckman two-step estimation procedure can be applied (see Heckman 1979). In the first stage, a probit model is estimated for purchasing in each of the four censored expenditure categories. Inverse-Mills ratios terms are computed from these probit models and then included as right-hand side variables in equation (6.3) under the corresponding budget share equations as a way of correcting for selection into positive spending. Studies such as Taylor and Mora (2006) have employed similar techniques to address this kind of censorship problem in budget share models. The major problem with this type of selection correction, and as alluded to earlier, relates to the identification of the model parameters. In order to ensure identification, at least one explanatory variable in the first stage comprising the reduced form should not be included in the second stage model (see Maddala 1986, Amemiya 1985). This is not a simple task as it is quite challenging to obtain variables that have a statistically significant effect in the first stage but are insignificant in the second. For example, we are unable to obtain

suitable identifying variables for the physical investments model. Therefore, we cannot compute the inverse-Mills ratio for this category and are unable to implement the second stage for the analysis.

However, we are able to obtain identifying variables that are suitable for use based on their joint significance in the probit equations and statistical insignificance in the budget share equations for the durable goods, education and health categories. Dummy variables for whether or not the household was interviewed in December and whether or not bricks/stones are the major construction material of the exterior walls of the household dwelling provide suitable identifying variables for the durable goods category. Living in a house made of bricks/stones appears to be a reasonable proxy for the safety and security of the dwelling, which may provide the household more confidence to invest in durable goods. In addition, it seems reasonable to expect households to be less likely to spend on durable goods in December and more on items associated with the holiday season (e.g., food and travel costs). However, the level of spending depends on the market prices of durable goods, and is not a direct feature of the dwelling material itself, or the month of the year. A dummy for whether or not the household was interviewed in December is found to be a suitable identifying variable for the education model. It is unlikely that households would be spending towards education in December given that the academic calendar in Kenya ends in December. However, it could be argued that if a household does spend on education, how much it spends depends on the cost of education and the related expenses and not directly on the month of the year. Finally, we find a dummy variable for whether or not the household has electricity[44] and the size of the household to provide appropriate identifying variables for the health model. Because households that do not have electricity are likely to use alternative sources of fuel and lighting that are less healthy (e.g., charcoal or wood) they may be more likely to be affected by respiratory, eye, and other diseases compared to households that use electricity. This increases the probability of such households spending part of their budgets on health care. In addition, larger households are more likely to have at least a member needing medical attention by virtue of their size. However,

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[44] In the sample, 55% of households have electricity.

how much households spend may depend more on the market costs of health services and medicines and not directly on the household size or type of fuel used.[45]

Table A6.11 in the Appendix reports the estimates for the Heckman two-step procedure discussed here under three specifications. In the first specification, we report the probit model estimates for the three categories of expenditure, including tests for the joint statistical significance of the identifying variables used. In the second specification, estimates for the budget share models and the inverse-Mills terms are reported. These models incorporate the identifying variables and tests are reported showing their joint statistical insignificance. The third specification provides estimates for the budget shares models which include the inverse-Mills terms as one of the explanatory variables (but do not include the identifying variables). We see that the estimated effect for the inverse-Mills ratio is statistically insignificant in the durable goods and health expenditure models and only significant in the education model. The insignificance of the inverse-Mills ratio in the former expenditure categories suggests that the variables included in the regression models fully capture the selection of households into spending on these particular categories. Thus, a correction for selection bias is not required in these two models. Comparing the non-corrected to the corrected estimates in the education model, we find that the standard errors are larger for the latter, which is not surprising.

Overall, the various robustness checks we conduct confirm that spouse and sibling remitters have a positive and significant effect on the allocation of the budget towards physical investments and durable goods, respectively.

6.5.2 Comparing household remittance versus general income budget shares

In this final part of the empirical analysis, we investigate whether households accurately report the uses of remittances received. We estimate remittance budget shares[46] using information reported by households about how they spent remittances they received, and compare these to

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[45] We acknowledge that these identifying variables may be subject to criticism. However, these were found to be the most suitable based on their statistical (in)significance in the probit and OLS models and the narrative provided.

[46] This refers to the share of remittances, out of total cash remittances received by the household, allocated to a specific category of commodity.

household allocations from general income (i.e., their reported household expenditure budget shares).[47] A study close in spirit to the analysis undertaken here is Case and Deaton (1998). This latter study uses a 1993 nationally representative survey to examine the effects of cash receipts in the form of pension income on the allocation of expenditure to food, schooling, transfers, and savings for South Africa. Their dependent variables include household expenditure on food, clothing, housing, alcohol and tobacco, schooling, and health, among other things. Their independent variables of interest are non-pension and pension income. The results they obtain are consistent with the view that pension income is spent in much the same way as non-pension income.

We exploit questions concerning how much of the remittances received by Kenyan households were spent on specific expenditure items to estimate remittance expenditure shares using household characteristics, including variables capturing the identity of the remitter. We also estimate expenditure budget shares out of general income for the same set of households using a similar set of explanatory variables. Even though household expenditures out of general income are also obtained from self-reported data, they are less likely to be influenced by the same biases that influence self-reported remittance uses. For example, it seems likely that respondents may rationalize how remittances should have been used, or report what they perceive to be the right uses of remittances, whether they were used in that manner or not. However, this bias is unlikely to be similar to biases relating to how expenditures out of general income were reported especially as questions about how remittances were used were asked after those questions relating to the amount of money the household spent on different commodities. Hence, because respondents did not anticipate the question concerning how remittances were used, they would not have adjusted their responses to how much they had spent on different commodities out of general income to cohere with what they reported regarding remittance uses. In addition, as discussed in section 6.3.4, the remittance data exhibit the presence of spikes at specific points of the remittances shares

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[47] This is defined as the share of expenditure, out of the household's total expenditure, allocated to a specific category of commodity.

distribution. On the other hand, the data relating to expenditure shares do not exhibit these spikes. Thus there may be potential measurement error in the remittances variable.

Nonetheless, the presence of data relating to the expenditure of households out of general income as well as responses about what the households reported spending out of remittances provides a unique opportunity to compare budget allocations with respect to remittance income and general income. This enables us to draw inferences about the remittance expenditure behaviour of households against their behaviour when spending out of general income. The analysis also enables us to compare our previous findings on the uses of remittances to their self-reported uses. This may provide insights into the veracity of household self-reported uses of remittances.

Table 6.10 reports the results of OLS estimates for remittance budget shares against general income budget shares for the following categories of commodities: food, non-food, education, health, and physical investments.[48] Under each category, specification one presents the estimates for the remittance income budget share model and specification two those for the general income budget share model.

As can be seen from the table, the sample sizes are considerably reduced in each category compared to the earlier analysis reported in section 6.5.1. This is because for each category, we confine the estimation of both regression models to the sample of households that reported positive remittance expenditure in that particular category. This is done to ensure comparability of the estimates across the two budget share models. The logarithm of total remittances per capita variable reports the effect for remittance income on the remittance budget shares of households while the logarithm of total expenditure per capita variable measures the effect for general income on the expenditure budget shares.

We see that the receipt of spouse (compared to sibling) remittances decreases the share of general income allocated to the non-food and education categories by 10 and 4.5 percentage points respectively, on average and *ceteris paribus*. This corresponds to a decrease of 37% and 32%, relative

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[48] Due to the very small samples of households that reported positive remittance expenditures for durable goods and utilities, we exclude these categories from the analysis.

to the mean. Further, the receipt of remittances from significant relatives (compared to siblings) decreases the share of general income allocated to the physical investments category by 3.4 percentage points, on average and *ceteris paribus*. This corresponds to a decrease of 113% relative to the sample mean. The findings for the non-food and education categories contrast sharply with those obtained in the main empirical analysis given remitter identities are shown not to have any effect on these categories. This perhaps is due to the selective nature of the sample here. However, the finding for the physical investments category is broadly consistent with that obtained in section 6.5.1.[49] On the other hand, the identity of the remitter exhibits no differential effect on the share of remittances allocated to any of the aforementioned categories. This reveals that the reported uses of remittances received are inconsistent with their actual impact on household expenditure.

The receipt of combined (compared to sibling) remittances decreases the share of remittances allocated to the food and health categories by 6.54 and 7.37 percentage points respectively, on average and *ceteris paribus*. The sample average budget shares for remittance expenditure on food and health are 0.45 and 0.21, respectively. The impact effects for the budget share of household expenditures on items within these categories correspond to a decrease relative to the mean of 14.5% and 35.1% respectively. Converse to this, there is no differential effect for remitter identity on the share of general income allocated to these categories. In addition, these effects are not consistent with the findings reported in the main empirical analysis. Therefore, the veracity of the reported remittance uses appears questionable. In general, these findings reveal that there are differences in how households claim to apportion general versus remittance income to particular expenditure categories.

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[49] We note that the reference groups differ given the restricted sample in this section. In the main analysis, spouse remittances were found to have a significant effect on the budget share of physical investments, relative to not receiving any remittances.

Table 6.10: OLS remittance versus general income budget share estimates with remitter dummy variables (select remittance receiving households)

VARIABLES	Food		Non-food		Education		Health		Physical investments	
	I fdrem_sh	II fd_sh	I nonfdrem_sh	II nonfd_sh	I edurem_sh	II educ_sh	I healrem_sh	II heal_sh	I phyrem_sh	II phy_sh
lntotremperK	-0.107***		-0.0621***		-0.0574***		-0.0464***		0.0279**	
	(0.00672)		(0.0154)		(0.0101)		(0.00928)		(0.0141)	
ln_perK_totexp		-0.112***		0.0244		0.0113		0.0253***		0.0362***
		(0.00993)		(0.0184)		(0.00909)		(0.00947)		(0.0111)
spo_rem	-0.0557	0.0282	-0.0686	-0.100**	-0.0337	-0.0445*	-0.0187	0.0211	-0.000219	0.0178
	(0.0350)	(0.0280)	(0.0714)	(0.0479)	(0.0476)	(0.0240)	(0.0363)	(0.0241)	(0.0650)	(0.0272)
sig_rem	-0.0194	0.00362	0.0354	-0.0658	-6.93e-05	-0.0397	-0.00104	0.0255	0.0709	-0.0340**
	(0.0350)	(0.0279)	(0.0837)	(0.0470)	(0.0519)	(0.0296)	(0.0399)	(0.0291)	(0.0650)	(0.0164)
com_rem	-0.0654*	-0.0246	-0.0399	0.0264	-0.0674	-0.0530	-0.0737**	0.00267	-0.0687	0.00152
	(0.0348)	(0.0272)	(0.0677)	(0.0519)	(0.0455)	(0.0328)	(0.0373)	(0.0201)	(0.0548)	(0.0282)
sib_rem					base category					
Other variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Regional dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	572	572	197	197	329	329	331	331	271	271
R-squared	0.382	0.343	0.256	0.185	0.249	0.149	0.274	0.163	0.200	0.180

Notes to the table:
(i)   ***, ** and * denote statistical significance from zero at the 0.01, 0.05 and 0.10 level respectively using two-tailed tests.
(ii)   Robust standard errors are reported in parentheses.
(iii)   The regression models also include other explanatory variables that are not shown here in order to conserve space (see text for details).

A possible explanation for the differences that we see between the reported uses of remittances and their actual uses may be due to self-reported remittances failing to take into account the fungibility of remittances. For example, when households receive remittances, overall household income can be reallocated such that even though the household claims to be using remittances on certain commodities, expenditure on other commodities could change in a manner that is not obvious to the household.

Table 6.11 reports the marginal budget shares and elasticity estimates corresponding to Table 6.10. Again, specification one presents estimates for the remittance share model and specification two for the general income budget share model for each category. Matched pair t-tests between the average remittance and general income budget shares reveal a rejection of the null hypothesis of no difference between the two for all the categories (see Table A6.12 of the Appendix). In Table 6.11 we see that food is considered a necessity under both remittance and general income. This is consistent with what we find in the preceding analysis in section 6.5.1. Non-food commodities, education and health are considered necessities under remittance income but luxury commodities under general income. In our earlier analysis, we found that these categories were considered to be luxuries. Thus, the classifications of these commodities under the general income specifications are consistent with those in the earlier analysis. On the other hand, the classifications obtained from the remittance income specifications are inconsistent with those reported in the earlier analysis. This seems to indicate that the way households report their uses of remittances is not entirely accurate as it does not appear to conform to what is revealed in the actual uses of their remittances.

However, we see that physical investments are considered luxuries under both remittance and general income. This is consistent with the findings for the earlier analysis. It therefore indicates a more accurate reporting of the use of remittances for this category of commodities. This thus strengthens our earlier findings of remittances being specifically sent for the acquisition of physical investments and also proves a more accurate reporting by households for this category. Unfortunately, due to a small sample size, we are unable to conduct analysis for the durable goods category and therefore cannot compare our earlier findings here.

The t-tests to determine whether there is a statistical difference between the remittance and general income elasticities reveal statistically significant differences at the 1% level of significance for all categories with the exception of food. The t-tests to determine whether remittance income marginal budget shares are different from general income budget shares yield statistically significant differences for all categories. The marginal budget shares are larger for remittances than general income for the food, education, health and physical investments categories. The converse holds only for the non-food category. This further supports the inconsistencies between reported expenditure out of remittance income and from general income. This seems to indicate that it is quite difficult for households to identify the allocation of remittances to specific uses. As mentioned earlier, a possible explanation for this is the fact that it is difficult for the household to differentiate the uses of remittances from those of any other sources of cash income as remittances are fungible. Besides the fungibility of remittances, other biases may also contribute towards the inaccurate reporting of remittance uses.

For example, Ratha *et al.* (2011) suggest that recipients may recall more recent expenses, especially on infrequent bulky purchases and underestimate the amounts spent on day-to-day expenses. Households may also be reluctant to divulge details of remittances if they were used for purposes that the remitter may not have intended or approved of.

There are some issues that merit caution in interpreting the results obtained in this section. As discussed at the beginning of the section, there is potential measurement error relating to the way households reported their remittance uses. The use of OLS in the presence of such measurement error may lead to inflated standard errors thus making it more difficult to reject the null hypothesis in any particular case (see, e.g., Wooldridge 2010 p. 79-82). Thus, in cases where we obtain an insignificant effect for the remittance variable, we cannot tell whether the effect would have been significant in the absence of such measurement error. However, given the effect of measurement error in the dependent variable is to inflate the standard errors when using OLS, we do have confidence that the significant effects obtained on the remittance variable are valid.

Table 6.11: Marginal budget shares and expenditure elasticities for self-reported and budget share estimates

	Food		Non-food		Education		Health		Physical investments	
	I fdrem_sh	**II** fd_sh	**I** nonfdrem_sh	**II** nonfd_sh	**I** edurem_sh	**II** educ_sh	**I** healrem_sh	**II** heal_sh	**I** phyrem_sh	**II** phy_sh
Marginal budget share	0.34***	0.30***	0.26***	0.30***	0.30***	0.15***	0.16***	0.09***	0.52***	0.07***
	(0.007)	(0.010)	(0.015)	(0.018)	(0.010)	(0.009)	(0.009)	(0.009)	(0.014)	(0.011)
Elasticity	0.76***	0.73***	0.81***	1.09***	0.84***	1.08***	0.78***	1.38***	1.06***	2.06***
	(0.015)	(0.024)	(0.047)	(0.068)	(0.028)	(0.065)	(0.044)	(0.135)	(0.029)	(0.37)

Notes to the table:

(i)   ***, ** and * denote statistical significance from zero at the 0.01, 0.05 and 0.10 level respectively using two-tailed tests.

(ii)   The corresponding remittances per capita and total expenditure per capita coefficients are shown in Table 6.10 above.

We also should exercise some caution in interpreting the results obtained given the modest sizes of the samples used and their highly selective nature. This follows from the fact that the samples comprise only those households that reported positive spending of remittances for commodities. Thus, there could be selection bias due to systematic differences in the unobservables between households that report using remittances for specific commodities and those that do not. However, the coefficients we obtain on the total expenditure per capita variable in Table 6.10 are not very different from those obtained in the earlier analysis, which employed the full set of migrant households. This acts to ease our concerns in regard to this particular issue. Nevertheless, given we remain unclear as to what extent these results are driven by measurement error and other biases in household responses concerning their uses of remittances, caution in interpreting the results reported in this section is warranted. However, in general we find that there are large differences between the reported uses of remittance versus general income by Kenyan households. The evidence indicates that the way households report how remittances are spent is quite different from the way they actually use such remittances.

6.6   Summary and conclusions

This chapter employed a variant of the AIDS model to estimate the allocation of household budget expenditures by a sample of Kenyan households. The main findings of the chapter reveal that migrant households spend more at the margin on productive and human capital investments, compared to non-migrant households. On the other hand, non-migrant (relative to migrant) households spend more at the margin on consumption goods. After conditioning the analysis on migration, we find that at the margin remittance receiving households allocate a larger proportion of their budget shares to durable goods compared to non-receiving households.

In addition, the evidence we provide supports non-unitary household budget models as we find that households do not pool remittance and general income together when allocating them to durable goods.

The interrogation of remittance uses on the basis of remitter identities enables us to analyse household-remitter bargaining power relationships. Our findings reveal that the receipts of sibling

and spouse remittances induce fairly sizeable increases in the durable goods and physical investments budget shares. Thus, the bargaining powers of spouse and sibling migrants, relative to other types of remitters, are shown to be higher for these categories of goods. This evidence seems to offer support for the collective bargaining model where the composition of household income is a relevant factor in explaining expenditure decisions (Bourguignon and Chiappori 1992, Browning *et al.* 1994). In general, the significance of spouse and sibling remittances in the physical investments and durable goods budget share equations is invariant to a host of robustness checks. These include correcting for the correlation of the errors between the budget share equations, correcting for the potential endogeneity of total expenditure, as well as controlling in certain cases for the censorship of the budget shares.

Contrary to findings reported in other Kenyan studies in the literature, our estimates reveal that migrant households that receive remittances do not spend them on consumption goods. The use of remittances for the purchase of durable goods and for the acquisition of physical investments indicates that remittances may potentially contribute towards poverty reduction at the household level and enhance local economic development. For example, physical investments could be used to generate income thus contributing towards income source diversification and perhaps generating employment for household members. Alternatively, durable goods and physical investments could be sourced locally thus boosting local businesses.

Finally, our analysis also compared what Kenyan households report to have spent their remittances on to the way in which they apportion their general income on expenditure. We find that there are large differences between the reported uses of remittance as opposed to general income by Kenyan households. This casts doubt on the veracity of the uses of remittances as reported by households.

Appendix

Figure 6.1: Sample of survey questionnaire for questions relating to household expenditure

3.2

How much in total has your household spent on the following items in the given period?

In the past one week:

Category	Amount (In local currency
1. Food (e.g. grains, cassava, plantain, yam, pulses, fruits, vegetables, including self-consumption)	
2. Meat (fish, chicken, red meat including self-consumption)	
3. Cooking fuels (e.g. kerosene)	
4. Transportation (e.g. bus/taxi, gasoline)	
5. Personal care/leisure/entertainment(e.g. cigarettes, alcohol, beauty salon)	

In the past 6 months:

Category	Amount (Kshs)
6. Clothing and footwear	
7. Household appliances (e.g. furniture, kitchen ware, refrigerators, air conditioners, bedding, carpet)	
8. Car/motorcycle/vehicle/tuk tuk	
9. Cell phone/mobile phone (Initial cost)	
10. Computer	
11. Other electronic goods (e.g. DVDs, TV)	
12. Productive assets (e.g. sewing machine, water pump)	
13. Farming Equipment (e.g. trucks, tractor, ox plough, harvester, spraying machines, water pumps)	
14. Luxury goods (Jewelry and luxury cars)	
15. Rent for housing (imputed rent)	
16. Payments for utilities (e.g. gas, water, electricity)	
17. Education / apprenticeship (including tuition fees, tutor fees, school uniforms, books, and supplies)	
18. Health (doctor, fees, hospital fees, medicines, drugs)	
19. Wedding/ Engagement / Funerals	
20. Setting up a business / Opening a store	
21. House or land purchase	
22. Home improvements (e.g. roof, floor, plumbing)	
23. Mortgage and loan repayment	
24. Other (specify)	

Table A6.1: OLS estimates for budget share equations

VARIABLES	fd_sh	nonfd_sh	uti_sh	dur_sh	phy_sh	educ_sh	heal_sh
				Migrant households			
ln_perK_totexp	-0.108***	0.0564***	-0.0129**	0.0123***	0.0179***	0.0226***	0.0119***
	(0.00651)	(0.00684)	(0.00587)	(0.00297)	(0.00373)	(0.00460)	(0.00371)
Other variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Regional dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	1,214	1,214	1,214	1,214	1,214	1,214	1,214
R-squared	0.377	0.139	0.171	0.072	0.072	0.137	0.095
				Non-migrant households			
ln_perK_totexp	-0.124***	0.0701***	0.0173**	0.00805***	0.0154***	0.00934*	0.00402**
	(0.00800)	(0.00887)	(0.00786)	(0.00303)	(0.00398)	(0.00552)	(0.00187)
Other variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Regional dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	657	657	657	657	657	657	657
R-squared	0.409	0.238	0.191	0.068	0.071	0.131	0.096

Notes to the table:
(i) ***, ** and * denote statistical significance from zero at the 0.01, 0.05 and 0.10 level respectively using two-tailed tests.
(ii) Robust standard errors are reported in parentheses.
(iii) The regression model also includes other explanatory variables that are not shown here in order to conserve space (see text for details).

Table A6.2: OLS estimates for budget share equations (adult equivalent expenditure)

Migrant households							
Variables	fd_sh	nonfd_sh	uti_sh	dur_sh	phy_sh	educ_sh	heal_sh
ln_perK_totexp (adjusted)	-0.108***	0.0568***	-0.0133**	0.0124***	0.0179***	0.0228***	0.0119***
	(0.00654)	(0.00686)	(0.00587)	(0.00297)	(0.00373)	(0.00460)	(0.00374)
Other variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Regional dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	1,214	1,214	1,214	1,214	1,214	1,214	1,214
R-squared	0.377	0.139	0.171	0.072	0.072	0.137	0.095

Non-migrant households							
ln_perK_totexp (adjusted)	-0.125***	0.0700***	0.0177**	0.00814***	0.0155***	0.00948*	0.00426**
	(0.00805)	(0.00896)	(0.00792)	(0.00306)	(0.00402)	(0.00554)	(0.00188)
Other variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Regional dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	657	657	657	657	657	657	657
R-squared	0.410	0.237	0.191	0.069	0.072	0.131	0.096

Notes to the table:
(i) ***, ** and * denote statistical significance from zero at the 0.01, 0.05 and 0.10 level respectively using two-tailed tests.
(ii) Robust standard errors are reported in parentheses.
(iii) The regression model also includes other explanatory variables that are not shown here in order to conserve space (see text for details).

Table A6.3: Marginal budget shares and expenditure elasticities: migrant vs. non-migrant households (adult equivalent expenditure)

	MBS(0)	MBS(1)	t-test†	η (0)	η (1)	t-test͏ᶠ
fd_sh	0.32	0.29	-2.82***	0.72	0.73	0.42
	(0.008)	(0.007)		(0.018)	(0.016)	
nonfd_sh	0.30	0.28	-1.75*	1.31	1.25	-1.20
	(0.009)	(0.007)		(0.04)	(0.03)	
uti_sh	0.22	0.18	-4.00***	1.09	0.93	-3.25***
	(0.008)	(0.006)		(0.039)	(0.03)	
dur_sh	0.03	0.04	2.36***	1.43	1.50	0.35
	(0.003)	(0.003)		(0.161)	(0.119)	
phy_sh	0.03	0.04	1.77*	2.11	1.99	-0.34
	(0.004)	(0.004)		(0.287)	(0.207)	
educ_sh	0.08	0.11	3.84***	1.14	1.26	1.21
	(0.006)	(0.005)		(0.084)	(0.052)	
heal_sh	0.03	0.05	4.47***	1.17	1.28	0.96
	(0.002)	(0.004)		(0.075)	(0.087)	

Notes to the table:

(i) ***, ** and * denote statistical significance from zero at the 0.01, 0.05 and 0.10 level respectively using two-tailed tests.

(ii) The marginal budget shares and the elasticities were derived from the OLS estimates presented in Table A6.2 above (see section 6.4.1 for the formulas). The same sets of variables were used in both regressions, with the exception of remittance dummy variables which appear only in the regression for migrant households.

(iii) Standard errors are reported in parentheses.

(iv) † The null hypothesis under test is H_0: $MBS_1 - MBS_0 = 0$.

(v) ᶠ The null hypothesis under test is H_0: $\eta_1 - \eta_0 = 0$.

Table A6.4: OLS estimates for budget share equations (remittance receiving and non-receiving migrant households)

VARIABLES	fd_sh	nonfd_sh	uti_sh	dur_sh	phy_sh	educ_sh	heal_sh
			Remittance receiving households				
ln_perK_totexp	-0.106***	0.0555***	-0.0173***	0.0127***	0.0206***	0.0204***	0.0145***
	(0.00874)	(0.00888)	(0.00646)	(0.00414)	(0.00529)	(0.00495)	(0.00428)
Other variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Regional dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	772	772	772	772	772	772	772
R-squared	0.346	0.150	0.202	0.079	0.081	0.122	0.102
			Non-remittance receiving households				
ln_perK_totexp	-0.109***	0.0637***	-0.00878	0.0111**	0.0129***	0.0238***	0.00649
	(0.00970)	(0.0114)	(0.0107)	(0.00434)	(0.00461)	(0.00903)	(0.00630)
Other variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Regional dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	442	442	442	442	442	442	442
R-squared	0.456	0.177	0.167	0.091	0.076	0.192	0.108

Notes to the table:
(i) ***, ** and * denote statistical significance from zero at the 0.01, 0.05 and 0.10 level respectively using two-tailed tests.
(ii) Robust standard errors are reported in parentheses.
(iii) The regression model also includes other explanatory variables that are not shown here in order to conserve space (see text for details).

Table A6.5: OLS estimates for budget share equations with total remittances variable - expenditure and remittances adjusted to six months (migrant households only)

VARIABLES	fd_sh	nonfd_sh	uti_sh	dur_sh	phy_sh	educ_sh	heal_sh
ln_perK_totexp	-0.111***	0.0552***	-0.0187***	0.0201***	0.0282***	0.0165***	0.00952***
	(0.00612)	(0.00684)	(0.00525)	(0.00421)	(0.00493)	(0.00424)	(0.00333)
tot_rem	-2.57e-09	-2.37e-08**	-1.67e-08**	1.60e-08**	2.70e-08	1.44e-09	-1.42e-09
	(1.04e-08)	(9.28e-09)	(8.32e-09)	(6.45e-09)	(1.67e-08)	(1.66e-08)	(3.44e-09)
N	1,214	1,214	1,214	1,214	1,214	1,214	1,214
R-squared	0.393	0.130	0.174	0.092	0.105	0.123	0.084

Notes to the table:
(i) ***, ** and * denote statistical significance from zero at the 0.01, 0.05 and 0.10 level respectively using two-tailed tests.
(ii) Robust standard errors are reported in parentheses.
(iii) The regression model also includes other explanatory variables that are not shown here in order to conserve space (see text for details).

Table A6.6: OLS estimates for budget share equations with remitter interactive terms

VARIABLES	fd_sh	nonfd_sh	uti_sh	dur_sh	phy_sh	educ_sh	heal_sh
ln_perK_totexp	-0.110***	0.0490***	-0.00503	0.0103***	0.0160***	0.0293***	0.0107**
	(0.00766)	(0.00901)	(0.00845)	(0.00348)	(0.00426)	(0.00763)	(0.00489)
sib_rem	0.116	-0.262**	0.215*	-0.0823	-0.0851	0.133	-0.0352
	(0.126)	(0.129)	(0.112)	(0.0780)	(0.0864)	(0.102)	(0.0639)
spo_rem	-0.328	0.0982	0.113	0.0165	-0.0544	0.159	-0.00440
	(0.202)	(0.156)	(0.157)	(0.0663)	(0.0853)	(0.105)	(0.0525)
sig_rem	-0.0508	-0.157	0.109	-0.0181	0.0683	0.0658	-0.0170
	(0.147)	(0.146)	(0.118)	(0.0714)	(0.0516)	(0.118)	(0.102)
com_rem	-0.231	-0.0774	-0.0402	0.0914**	0.0506	0.275	-0.0687
	(0.252)	(0.285)	(0.241)	(0.0432)	(0.0633)	(0.207)	(0.104)
sibrem_exp†	-0.0121	0.0245**	-0.0198*	0.00860	0.00787	-0.0116	0.00262
	(0.0113)	(0.0121)	(0.0102)	(0.00741)	(0.00823)	(0.00931)	(0.00607)
sporem_exp†	0.0291	-0.00899	-0.0119	-0.00154	0.00668	-0.0137	0.000336
	(0.0182)	(0.0141)	(0.0142)	(0.00623)	(0.00808)	(0.00966)	(0.00492)
sigrem_exp†	0.00440	0.0137	-0.00978	0.00235	-0.00643	-0.00594	0.00172
	(0.0136)	(0.0139)	(0.0109)	(0.00692)	(0.00490)	(0.0111)	(0.00952)
comrem_exp†	0.0177	0.00859	0.00571	-0.00831**	-0.00454	-0.0250	0.00580
	(0.0232)	(0.0269)	(0.0224)	(0.00402)	(0.00610)	(0.0190)	(0.00975)
Other variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Regional dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	1,214	1,214	1,214	1,214	1,214	1,214	1,214
R-squared	0.381	0.144	0.175	0.078	0.077	0.140	0.096

Notes to the table:
(i) ***, ** and * denote statistical significance from zero at the 0.01, 0.05 and 0.10 level respectively using two-tailed tests.
(ii) Robust standard errors are reported in parentheses.
(iii) The regression model also includes other explanatory variables that are not shown here in order to conserve space (see text for details).
(iv) † represents the interacted variables.

Table A6.7: OLS estimates for budget share equations with remitter dummy variables - expenditure figures adjusted to six months (migrant households only)

VARIABLES	fd_sh	nonfd_sh	uti_sh	dur_sh	phy_sh	educ_sh	heal_sh
ln_perK_totexp	-0.111***	0.0544***	-0.0191***	0.0208***	0.0286***	0.0164***	0.00952***
	(0.00609)	(0.00686)	(0.00529)	(0.00421)	(0.00502)	(0.00419)	(0.00338)
sib_remdum	-0.0140	0.00196	-0.00303	0.0169**	0.000298	0.00338	-0.00551
	(0.0150)	(0.0150)	(0.0120)	(0.00701)	(0.00735)	(0.0109)	(0.00740)
spo_remdum	-0.00505	-0.00656	-0.0179	-0.00239	0.0255*	0.00589	0.000517
	(0.0210)	(0.0211)	(0.0158)	(0.00853)	(0.0138)	(0.0128)	(0.00832)
sig_remdum	-0.00382	-0.0111	-0.000447	0.0117	0.00176	-0.000794	0.00268
	(0.0171)	(0.0163)	(0.0125)	(0.00819)	(0.00643)	(0.0109)	(0.00718)
com_remdum	-0.0326	0.0102	0.0204	0.00182	0.00157	0.00193	-0.00336
	(0.0224)	(0.0260)	(0.0216)	(0.00723)	(0.0130)	(0.0174)	(0.0122)
Regional dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1,214	1,214	1,214	1,214	1,214	1,214	1,214
R-squared	0.394	0.129	0.175	0.095	0.103	0.123	0.085

Notes to the table:
(i)   ***, ** and * denote statistical significance from zero at the 0.01, 0.05 and 0.10 level respectively using two-tailed tests.
(ii) Robust standard errors are reported in parentheses.
(iii) The regression model also includes other explanatory variables that are not shown here in order to conserve space (see text for details).

Table A6.8: SURE estimates for budget share equations with remitter dummy variables (migrant households only)

VARIABLES	fd_sh	uti_sh	dur_sh	phy_sh	educ_sh	heal_sh
ln_perK_totexp	-0.108***	-0.0129***	0.0123***	0.0179***	0.0226***	0.0119***
	(0.00579)	(0.00467)	(0.00198)	(0.00249)	(0.00413)	(0.00277)
sib_remdum	-0.0157	-0.00367	0.0123**	0.00141	0.00405	-0.00610
	(0.0148)	(0.0119)	(0.00504)	(0.00635)	(0.0105)	(0.00706)
spo_remdum	-0.00492	-0.0195	-0.000481	0.0205**	0.00577	-0.000486
	(0.0206)	(0.0166)	(0.00702)	(0.00885)	(0.0147)	(0.00983)
sig_remdum	-0.00245	0.000364	0.00803	-0.000893	-0.000886	0.00201
	(0.0172)	(0.0139)	(0.00588)	(0.00740)	(0.0123)	(0.00823)
com_remdum	-0.0355	0.0209	0.000499	0.00120	-0.000839	-0.00469
	(0.0238)	(0.0192)	(0.00811)	(0.0102)	(0.0170)	(0.0114)
no_rem			base category			
Regional dummies	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1,214	1,214	1,214	1,214	1,214	1,214
R-squared	0.377	0.171	0.072	0.072	0.137	0.095

Notes to the table:
(i)   ***, ** and * denote statistical significance from zero at the 0.01, 0.05 and 0.10 level respectively using two-tailed tests.
(ii) Robust standard errors are reported in parentheses.
(iii) The regression model also includes other explanatory variables that are not shown here in order to conserve space (see text for details).

Table A6.9: OLS estimates for budget share equations with both remitter dummy variables and total amount of remittances received (migrant households only)

VARIABLES	fd_sh	nonfd_sh	uti_sh	dur_sh	phy_sh	educ_sh	heal_sh
sib_rem	-0.0156	0.00949	-0.00216	0.0113**	-0.000465	0.00345	-0.00605
	(0.0151)	(0.0145)	(0.0123)	(0.00525)	(0.00566)	(0.0113)	(0.00770)
spo_rem	-0.00461	0.00290	-0.0164	-0.00258	0.0165	0.00452	-0.000376
	(0.0216)	(0.0209)	(0.0162)	(0.00567)	(0.0115)	(0.0133)	(0.00879)
sig_rem	-0.00232	-0.00473	0.00159	0.00721	-0.00242	-0.00137	0.00205
	(0.0173)	(0.0162)	(0.0129)	(0.00586)	(0.00451)	(0.0112)	(0.00732)
com_rem	-0.0353	0.0211	0.0232	-0.00103	-0.00166	-0.00175	-0.00461
	(0.0228)	(0.0257)	(0.0223)	(0.00463)	(0.0102)	(0.0179)	(0.0127)
tot_rem	-8.14e-10	-9.70e-09**	-8.21e-09*	5.49e-09***	1.03e-08	3.27e-09	-2.88e-10
	(6.05e-09)	(4.20e-09)	(4.27e-09)	(2.12e-09)	(7.75e-09)	(9.76e-09)	(1.76e-09)
Other variables included	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Region dummy variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1,214	1,214	1,214	1,214	1,214	1,214	1,214
R-squared	0.377	0.140	0.172	0.074	0.079	0.137	0.095

Notes to the table:
(i) ***, ** and * denote statistical significance from zero at the 0.01, 0.05 and 0.10 level respectively using two-tailed tests.
(ii) Robust standard errors are reported in parentheses.
(iii) The regression model also includes other explanatory variables that are not shown here in order to conserve space (see text for details).

Table A6.10: OLS versus IV estimates for budget share equations (migrant households only)

VARIABLES	fd_sh: OLS	fd_sh: IV	nonfd_sh: OLS	nonfd_sh: IV	uti_sh: OLS	uti_sh: IV	phy_sh: OLS	phy_sh: IV
ln_perK_totexp	-0.108***	0.0183	0.0564***	0.0281**	-0.0129**	0.0208	0.0179***	-0.00606
	(0.00651)	(0.0223)	(0.00684)	(0.0137)	(0.00587)	(0.0161)	(0.00373)	(0.00842)
no_rem				base group				
sib_rem	-0.0157	-0.0230	0.00772	0.0114	-0.00367	-0.00620	0.00141	0.00285
	(0.0151)	(0.0170)	(0.0145)	(0.0147)	(0.0123)	(0.0122)	(0.00592)	(0.00640)
spo_rem	-0.00492	-0.0414*	-0.000806	0.00828	-0.0195	-0.0292*	0.0205*	0.0235***
	(0.0213)	(0.0218)	(0.0207)	(0.0206)	(0.0160)	(0.0175)	(0.0111)	(0.00823)
sig_rem	-0.00245	-0.00908	-0.00617	-0.00409	0.000364	-0.00115	-0.000893	-0.000373
	(0.0172)	(0.0200)	(0.0163)	(0.0170)	(0.0129)	(0.0142)	(0.00449)	(0.00754)
com_rem	-0.0355	-0.0687**	0.0184	0.0276	0.0209	0.0103	0.00120	0.00644
	(0.0227)	(0.0282)	(0.0256)	(0.0238)	(0.0223)	(0.0201)	(0.00993)	(0.0107)
F-tests of instruments		$F(6,1189) = 16.76$		$F(3, 1182) = 65.55$		$F(3, 1189) = 29.01$		$F(6, 1189) = 16.76$
Sargan test		p-value = 0.465		p-value = 0.503		p-value = 0.374		p-value = 0.821
Wu-Hausman exogeneity test		p-value = 0.000		p-value = 0.073		p-value = 0.043		p-value: 0.005
Other variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Regional dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	1,214	1,214	1,214	1,208	1,214	1,214	1,214	1,214
R-squared	0.377	0.129	0.139	0.120	0.171	0.134	0.072	†

Notes to the table:

(i) ***, ** and * denote statistical significance from zero at the 0.01, 0.05 and 0.10 level respectively using two-tailed tests. (ii) Robust standard errors are reported in parentheses. (iii) The regression model also includes other explanatory variables that are not shown here in order to conserve space (see text for details). (iv) In the non-food IV model, six observations are lost due to missing values on the radio ownership instrumental variable. (v) The following variables are used as instruments for the food category: dummy variables capturing the age and gender of the household head and a variable measuring the size of the household. (vi) The following instrumental variables are used for the non-food category: a dummy variable measuring whether the household owns a radio, the number of children in the household and the household size. (vii) The following instrumental variables are used for the utilities model: the number of children in the household and the educational status of the household head. (viii) The following instrumental variables are used for the physical investments model: dummy variables measuring the gender and age of the household head and a variable capturing the household size. (ix) † this regression is has a negative centred R-squared (-0.0001).

Table A6.11: Two-step procedure: correcting for censorship of budget shares

Variables	I: Probit models			III: Budget share OLS models			III: Budget share OLS model		
	dur_prob =1	educ_prob = 1	heal_prob = 1	dur_sh	educ_sh	heal_sh	dur_sh	educ_sh	heal_sh
ln_perK_totexp	0.328***	0.255***	0.222***	0.0225	0.00976	0.00505	0.0106**	0.0109*	0.0109***
	(0.0458)	(0.0475)	(0.0443)	(0.0147)	(0.00612)	(0.00682)	(0.00529)	(0.00606)	(0.00401)
sib_rem	0.0349	0.00667	-0.0198	0.0132**	0.00108	-0.00585	0.0120**	0.00149	-0.00595
	(0.104)	(0.110)	(0.109)	(0.00534)	(0.0112)	(0.00768)	(0.00536)	(0.0111)	(0.00769)
spo_rem	0.116	0.193	-0.0467	0.00354	-0.00563	0.000683	-0.00107	-0.00424	-0.000237
	(0.143)	(0.147)	(0.149)	(0.00747)	(0.0140)	(0.00877)	(0.00581)	(0.0136)	(0.00868)
sig_rem	0.125	0.0120	-0.107	0.0116	-0.00171	0.00454	0.00742	-0.00184	0.00258
	(0.117)	(0.130)	(0.122)	(0.00902)	(0.0111)	(0.00810)	(0.00617)	(0.0111)	(0.00754)
com_rem	0.113	0.0299	0.133	0.00497	-0.00546	-0.00752	-4.16e-05	-0.00467	-0.00516
	(0.167)	(0.178)	(0.190)	(0.00628)	(0.0177)	(0.0128)	(0.00458)	(0.0177)	(0.0125)
bricks/stones	0.259***			0.0151					
	(0.0935)			(0.0112)					
december	-0.336***	-0.326***		-0.0136	0.00757				
	(0.110)	(0.118)		(0.0166)	(0.0137)				
hh_size			0.102***			-0.00236			
			(0.0251)			(0.00305)			
electricity			-0.193*			0.0110			
			(0.104)			(0.00889)			
Inverse-Mills ratio				0.0564	-0.100***	-0.0567	-0.00756	-0.0916***	-0.00983
				(0.0650)	(0.0338)	(0.0532)	(0.0145)	(0.0320)	(0.0209)
Test for joint significance of identifying variables	$\chi^2_2 = 16.11$, p-val = 0.0003	$\chi^2_2 = 14.9$, p-val = 0.0006	$\chi^2_2 = 18.41$, p-val = 0.0001	F(2,1186) = 1.41, p-val = 0.246	F(2,1186) = 0.12, p-val = 0.90	F(2,1185) = 0.77, p-val = 0.463			
N	1,214	1,214	1,213	1,214	1,214	1,213	1,214	1,214	1,213
R-squared				0.074	0.143	0.096	0.072	0.143	0.095
Pseudo R-squared	0.113	0.204	0.128						

Notes to the table:

(i) ***, ** and * denote statistical significance from zero at the 0.01, 0.05 and 0.10 level respectively using two-tailed tests.

(ii) Robust standard errors are reported in parentheses.

(iii) Other variables are included in these models but not shown here in order to conserve space (see text for details).

(iv) One observation is lost for the durable goods category due to a missing observation for the variable measuring the availability of electricity.

Table A6.12: Remittance and general income average budget shares

Category	Remittances	General expenditure	t-test
Food	0.45	0.42	-2.4***
Non-food	0.33	0.27	-1.97***
Education	0.36	0.14	-15.07***
Health	0.21	0.07	-13.24***
Physical investments	0.49	0.03	-22.39***

Notes to the table:

(i) The t-test is a matched t-test for differences between the average budget shares of remittances and general income.

(ii) ***, ** and * denote statistical significance of the differences at the 0.01, 0.05 and 0.10 level respectively using two-tailed tests.

7 Do Remittances Affect Household Purchases of Physical Investments and Durable Goods?

7.1 Introduction

This chapter addresses one of the long standing debates in the literature concerning the uses of remittances by households. In particular, we ascertain whether Kenyan households utilize remittances in a productive manner through investing in physical capital and/or allocating them to goods that are not immediately consumed (i.e., durable goods). This is a relatively under-researched topic and one that is germane to the current literature.

In the preceding chapter, we provided evidence showing that households that receive remittances allocate more of their budget shares towards physical investments and durable goods. Therefore, focussing the analysis on these two categories of expenditure in the current chapter enables us to address some of the limitations encountered in the preceding chapter in a more detailed manner. Specifically, narrowing down the analysis provides the basis to treat remittances as endogenous given obtaining relevant instrumental variables becomes a more feasible task when fewer categories of commodity are the subject of investigation. Thus, in this chapter we employ empirical techniques that enable us to clarify the effects of remittances on the decisions of Kenyan households to purchase physical investments and durable goods.

7.1.1 Research contributions

A contribution provided by the research here relates to a long standing debate in the literature concerning whether or not remittances are used in a productive manner that potentially enhances local economic development. There is some evidence in the literature supporting the use of remittances for the acquisition of physical investments. For example, Adams and Cuecuecha (2010) find that Guatemalan households that receive remittances spend more at the margin on housing. Remittances are shown to play a role in financing the capital of microenterprises in urban Mexico (Woodruff and Zenteno 2001). In rural Pakistan, remittances have been shown to increase the propensity to invest in agricultural land (Adams 1998).

However, the evidence on the uses of remittances for investment in the context of Africa is quite limited (Ratha *et al.* 2011). In the case of Kenya, most of the evidence draws from early studies and is somewhat mixed. For example, after compiling evidence from various sources, Rempel and Lobdell (1978) conclude that remittances from rural-to-urban migrants in Kenya have little impact on the development of the region of origin. Rather, they find that remittances are often allocated towards consumption, education and better housing. In contrast, Collier and Lal (1984) report for rural Kenya that remittances enable the recipient households to hold more productive capital than non-recipient ones. In a more recent study, Simiyu (2013) finds that remittances are mainly used for immediate consumption needs such as utilities and transportation costs for the Rift Valley and Nyanza provinces of Kenya, and not towards investments. However, the study employs a small sample of 295 households.

The allocation of remittances towards physical investments and durable goods is an important research topic to explore. For example, physical investments may provide direct benefits to the household through improved housing services and also increase the housing stock of the local community. Indirect benefits include enabling households to undertake activities that potentially generate employment at the household or community level, or improve farming and other productivity. Also, the acquisition of durable goods may boost local businesses if their demand is met locally. Thus, these types of investment are likely to have multiplier effects in the local economy.

The chapter is structured as follows. Section 7.2 provides a brief review of the literature relating to the uses of remittances with a specific focus on productive investments. Section 7.3 presents and briefly discusses the data and summary statistics for the key variables used in the econometric analysis. In section 7.4 the econometric methodologies used to undertake the analysis are discussed. Section 7.5 presents and discusses the empirical results. Finally, section 7.6 provides some concluding remarks.

7.2   Literature review

A more extensive review of studies that have investigated the uses of remittances by households was undertaken in the preceding chapter. In general, it is acknowledged that the evidence for the uses of remittances for investments based on household surveys is somewhat limited for Africa (Ratha *et al.* 2011). It is especially the case that there are few empirical studies that explicitly investigate whether remittances are used for the acquisition of physical investments and commodities that yield utility over time instead of being consumed immediately.

Descriptive statistics based on household survey data collected as part of the Africa Migration Project reveal that a significant proportion of international remittances[1] are spent on land purchases, building a house, business, improving a farm, agricultural equipment, and other investments.[2] For international remittances, investment in these items as a share of total remittances represented 36 per cent in Burkina Faso, 55 per cent in Kenya, 57 per cent in Nigeria, 16 per cent in Senegal, and 20 per cent in Uganda (see Ratha *et al. op. cit.*). In addition, a substantial share of remittances sent by migrants resident in other African countries was also used for these purposes in the case of Burkina Faso, Kenya, Nigeria, and Uganda. However, the study indicates that the share of internal remittances allocated towards these investments was much lower in all of the countries surveyed, with the exception of Nigeria and Kenya. The statistics in this study are based on what the households surveyed reported to have used the remittances they received on. However, as we illustrated in the preceding chapter, such estimates are quite unreliable as households tend to report the uses of remittances inaccurately. Therefore, the current study contributes to the literature by employing empirical techniques that enable us to more accurately identify the uses of remittances to purchase physical investments and durable goods.

Rempel and Lobdell (1978) investigate the uses of remittances sent to rural households in Kenya. They find little evidence of urban-rural remittances being a significant means to rural economic development. Rather, they find that remittances are often allocated towards

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[1] The study defines international remittances as remittances sent by migrants resident outside of Africa.

[2] We classify these commodities under "physical investments" in the current thesis.

consumption, education and better housing. However, this study has been criticized for failing to take into account the fungibility of the financial resources of rural households (see Collier and Lal 1984). Their evidence is derived from rural households reporting to have used remittances for the following purposes: school fees (12 per cent), debt payment (2 per cent), farm maintenance (4 per cent), and supporting family and friends (96 per cent). As already mentioned, in the preceding chapter of the current thesis we demonstrated that self-reported remittance uses by households are quite unreliable and therefore unlikely to portray the true effect of the receipt of remittances on the expenditure behaviour of households.

Adams (1998) investigates the effects of remittances on the accumulation of physical assets using a five-year panel dataset on rural households in Pakistan. The study employs tobit models to estimate the changes in asset ownership over the period of observation. The findings reveal that remittances have a more statistically significant effect on the accumulation of rural assets than total labour income (excluding remittances).

Osili (2004) uses the U.S.-Nigeria survey conducted in 1997 to analyse migrants' housing investments in their communities of origin. The study employs probit and tobit models. In the probit model, the dependent variable measures whether or not a migrant initiated housing investments in the community of origin. The dependent variable for the tobit model is the share of a migrant's annual income that is devoted to housing investments in the home town. The study finds that older migrants are more likely to invest in housing in their hometown and to devote a larger share of household income to housing investments. The evidence obtained also suggests that migrants invest in order to preserve and maintain membership rights in the home community. In addition, the study shows that housing investments play an important role in signalling migrants' resources and support of their home family.

7.3   Data and summary statistics

7.3.1   Main variables

In the analysis undertaken here, there are two binary dependent variables of primary interest. These binary variables assume a value of one if the household purchased physical investments (durable goods) and zero otherwise. The classification of commodities into physical investments or durable goods is discussed in detail in chapter 6 (see section 6.3.1). Chapter 6 also discusses the construction of the explanatory variables that we use here. These explanatory variables include the age, gender, education level, and employment status of the household head. Measures were also computed for the total expenditure per capita of the household, the number of children less than seven years, the number of elderly people greater than 59 years, and the household size. Additional explanatory variables include dummy variables capturing whether a household is located in an urban or a rural area, whether or not a household was interviewed in December, and controls for the regional location.

The explanatory variables relating to the receipt of remittances by the household are of primary concern for the current analysis. A variable was constructed to measure whether or not the household received any cash remittances and the amount of cash remittances in Kenyan shillings received by the household in the 12 months prior to the date of interview.

7.3.2   Constructing a PCA index

A limitation inherent in the data is that there is no information on household income levels and thus we use the logarithm of household expenditure per capita as a proxy for the income level of the household. An extensive literature exists in support of the theoretical underpinnings of consumption expenditures as a measure of current and long-run household welfare (see, e.g., Deaton 1997, Deaton and Muellbauer 1986, Deaton and Zaidi 2002). In order to complement the expenditure variable, however, we also use an alternative proxy of household income obtained by constructing a linear index from asset ownership indicators, using principle component analysis (PCA) to derive the weights (see Filmer and Pritchett 2001). The PCA index did not feature in the

previous empirical chapters as chapters 4 and 5 are focussed on analysing migration and remittances using empirical methods where the individual is the unit of observation. We thus introduce this complementary measure of household income in the current chapter due to the focus on expenditure behaviour at the household level unit of observation.[3]

The Spearman rank correlation between total expenditure per capita and the PCA index is 0.64 (p-value = 0.000).[4] This high positive correlation with the total expenditure per capita variable suggests that it is a reasonable indicator of household income as it yields an acceptable correlation with a measure that has been validated in the literature. In addition, a correlation of 0.64 compares favourably with those obtained by Filmer and Pritchett (2001). The latter authors constructed PCA indices for Nepal, Pakistan and Indonesia using respectively data from the 1996 Nepal Living Standards Survey, the 1991 Pakistan Integrated Household Survey, and the 1994 Indonesia Demographic and Household Survey. In their study, the Spearman rank correlations between total expenditure per capita and the PCA indices are found to be 0.64, 0.56 and 0.43 for Nepal, Indonesia and Pakistan, respectively.

Table 7.1 shows the final set of variables used in the PCA analysis after excluding all asset variables that have less than a 1% sample average. The table presents the mean, standard deviation and scoring coefficients of the variables. Because all the asset variables, except those for the number of rooms, take only the values 0 and 1, the weights can be interpreted relatively easily. A move from 0 to 1 changes the index by $\frac{scoring\ coefficient}{standard\ deviation}$ as shown in the fourth column of the table (see Filmer and Pritchett 2001). For example, living in a dwelling made of bricks/stones raises the asset index by 0.253 and living in one made of mud lowers it by 0.265.

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[3] Chapter 6 is focussed on the budget shares of various commodities and therefore it is not feasible to use the PCA index there.

[4] As in Filmer and Pritchett (2001), the asset index is not adjusted for household size because the benefits of many of the assets, such as quality of housing materials, are present at the household level.

Table 7.1: Summary statistics and scoring factors

Variable	Mean	Standard deviation (SD)	Scoring coefficients	Scoring coefficient/SD
Dwelling owned = 1	0.663	0.473	-0.162	-0.342
Dwelling rent free/subsidized from employer = 1	0.036	0.186	0.004	0.020
Dwelling rented from employer = 1	0.016	0.127	0.028	0.220
Dwelling rent free/subsidized from relatives = 1	0.013	0.111	-0.019	-0.175
Dwelling rented privately = 1	0.252	0.434	0.161	0.371
Dwelling rented from other = 1	0.013	0.111	0.013	0.116
Live in family house = 1	0.732	0.443	-0.069	-0.156
Live in apartment = 1	0.062	0.241	0.126	0.523
Live in single room = 1	0.114	0.318	-0.025	-0.077
Live in house = 1	0.089	0.284	0.028	0.100
Dwelling made of bricks/stones = 1	0.631	0.483	0.253	0.523
Dwelling made of wood = 1	0.036	0.187	-0.044	-0.234
Dwelling made of mud = 1	0.249	0.433	-0.265	-0.611
Dwelling made of iron sheets = 1	0.064	0.245	0.009	0.037
Separate room for cooking = 1	0.659	0.484	0.041	0.084
Total number of separate rooms in main house	3.209	1.87	0.102	0.054
Total number of separate rooms (other)	0.783	1.303	0.051	0.039
Electricity = 1	0.511	0.5	0.320	0.641
Agricultural land = 1	0.626	0.484	-0.162	-0.335
Non-agricultural land = 1	0.204	0.403	0.065	0.161
House = 1	0.643	0.479	-0.100	-0.209
Other buildings = 1	0.196	0.397	0.037	0.094
Tuk tuk = 1	0.057	0.232	0.045	0.194
Radio = 1	0.852	0.356	0.100	0.280
Television = 1	0.567	0.496	0.300	0.605
Refrigerator = 1	0.26	0.439	0.320	0.729
Air conditioner = 1	0.126	0.332	0.240	0.721
Sound system = 1	0.156	0.363	0.245	0.676
VCR/DVD = 1	0.369	0.483	0.318	0.659
Computer = 1	0.197	0.398	0.267	0.671
Mobile phone = 1	0.802	0.399	0.135	0.338
Non-mobile phone = 1	0.109	0.311	0.174	0.559
Bicycle = 1	0.276	0.447	0.032	0.072
Animal drawn cart = 1	0.058	0.234	0.056	0.237
Car = 1	0.169	0.374	0.258	0.689
Motorcycle/scooter = 1	0.047	0.212	0.088	0.416
Lorry = 1	0.015	0.12	0.090	0.751

The index is robust to the type of assets included. For instance, when we exclude variables

measuring the dwelling characteristics of the household, there is a correlation of 0.94 with the PCA

index obtained from the full set of variables listed in the table. In constructing the index we make a deliberate effort to exclude community variables such as the household's source of water as these are indicators of welfare at the community rather than household level. As a robustness check, we exclude the electricity variable as well. The asset index proves robust to the exclusion of electricity. Overall, the index produces very similar classifications when different subsets of the variables listed in the table are included. In addition, we believe it innocuous to assume the index is not determined by any remittances received in the last 12 months.[5]

A possible drawback of the index is that it does not distinguish between urban and rural households, or the region in which a household is located. This may not be entirely reasonable as we expect the assets which indicate the income levels of households to differ by settlement type. This pooling together of urban and rural households may explain why we obtain unexpected signs on some of the scoring coefficients. For example, in Table 7.1, we report that owning a dwelling lowers a household's asset index by 0.342, living in a family house lowers it by 0.156, and owning agricultural land lowers it by 0.335.[6] Kenyan households located in rural rather than urban areas are more likely to comply with the aforementioned profile. At the same time, they are less likely to own assets such as radios and televisions. It seems that the index gives a positive weight to assets typically owned by urban households, and negative weights to those generally owned by rural households. Thus, households in urban areas are likely to be classified as having higher income levels than rural households. However, we anticipate that this shortcoming may be rectified when we undertake the empirical analysis as we pool together both sets of households while controlling for their urban/rural and regional location using standard dummy variables.

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[5] The proportion of households that report to have used remittances to purchase durable goods and physical investments is quite small (0.6 and 14.8 per cent, respectively)

[6] A concern here may be that the PCA index is dominated by smaller but more common assets such as radios and mobile phones thus providing perverse weights for less commonly owned assets. We reconstruct the PCA index excluding large and less commonly owned assets such as houses and land. A correlation coefficient of 0.98 is obtained between the PCA index that includes and excludes large assets. Thus, the PCA index discussed above is robust to the exclusion of large and/or less commonly owned assets.

7.3.3   Summary statistics

Table 7.2: Summary statistics of main explanatory variables

	Combined	Non-migrant (0)	Migrant (1)	t-test/z-score†
Dependent variables:				
= 1 if hh purchased physical investments	0.16 (0.37)	0.13 (0.34)	0.18 (0.38)	-2.55***
= 1 if hh purchased durable goods	0.50 (0.50)	0.47 (0.50)	0.51 (0.50)	-1.83**
Explanatory variables:				
Log of total household expenditure per capita	10.913 (1.267)	10.606 (1.223)	11.080 (1.259)	-7.85***
PCA index	-0.013 (2.351)	-0.409 (2.340)	0.202 (2.330)	-5.42***
Total cash remittances received	73157 (548631)	4639 (43063)	110238 (677572)	-3.99***
= 1 if hh received cash remittances	0.450 (0.50)	0.104 (0.305)	0.636 (0.481)	-25.70***
Head age < 30	0.139 (0.346)	0.209 (0.407)	0.101 (0.302)	6.47***
Head age 30 to 40	0.208 (0.406)	0.336 (0.473)	0.139 (0.346)	10.30***
Head age 40 to 50	0.203 (0.402)	0.225 (0.418)	0.190 (0.393)	1.80**
Head age 50 to 60	0.189 (0.391)	0.114 (0.318)	0.229 (0.420)	-6.12***
Head age > 60	0.259 (0.438)	0.116 (0.320)	0.336 (0.473)	-10.70***
χ^2 test (head age)				226.90***
= 1 if head is male	0.687 (0.464)	0.785 (0.411)	0.634 (0.482)	6.81***
= 1 if head has primary education	0.345 (0.476)	0.367 (0.482)	0.334 (0.472)	1.44*
= 1 if head has secondary education	0.383 (0.486)	0.400 (0.490)	0.373 (0.484)	1.15
= 1 if head has university education	0.115 (0.320)	0.104 (0.305)	0.122 (0.327)	-1.19
χ^2 test (head education)				8.23**
= 1 if head is employed	0.335 (0.472)	0.443 (0.497)	0.276 (0.447)	7.41***
= 1 if head is self-employed	0.381 (0.486)	0.393 (0.489)	0.375 (0.484)	0.76
= 1 if head is unemployed	0.155 (0.362)	0.110 (0.313)	0.180 (0.384)	-4.01***
χ^2 test (head employment)				94.25***
No. of children	0.595 (0.870)	0.489 (0.831)	0.791 (0.908)	7.27***
Household size	4.258 (2.333)	4.231 (2.287)	4.273 (2.358)	-0.37
= 1 if hh located in urban area	0.487 (0.500)	0.498 (0.500)	0.482 (0.500)	0.65
= 1 if hh interviewed in December	0.349 (0.477)	0.355 (0.479)	0.346 (0.476)	0.38
N	1871	657	1214	

Notes to the table:
(i) Standard deviations are reported in parentheses.
(ii) † The hypothesis under test here is: $H_0: \mu_0 = \mu_1$ / $H_0: \pi_0 = \pi_1$. The column provides the t-ratios/z-scores for mean/proportion differences between non-migrants and migrants.
(iii) *, **, *** represent the statistical significance of the differences for the 10%, 5% and 1% significance levels respectively.
(iv) The χ^2 tests are testing for differences between non-migrant and migrant households for categorical variables.

Table 7.2 presents summary statistics of the variables discussed above. We see that a larger proportion of migrant households purchased physical investments and durable goods, compared to non-migrant households. We also see that migrant households have higher levels of expenditure and also have higher income levels as proxied by the PCA index. The remainder of the variables

presented in the table were discussed in detail in the preceding chapter (see section 6.3.3) and are not subject to review here again.

7.4   Empirical methodology

An important issue to consider for the empirical methods employed is the potential endogeneity of the remittances variable itself. This endogeneity may arise due to the presence of variables that affect the receipt of remittances by households as well as their expenditure on certain categories. Failure to control for the endogeneity of remittances is likely to result in biased estimates for the effects of remittances on commodity expenditures. In addition, in chapter 6 we noted that the dependent variables for the physical investments and durable goods expenditure categories are censored. The empirical methods we employ therefore attempt to address both these issues.

7.4.1   Recursive bivariate probit model

We employ the bivariate probit model to analyse the effect of the receipt of remittances on the decision by the household to purchase durable goods and physical investments. Firstly, the bivariate probit model accounts for the endogeneity of remittances discussed above by modelling the receipt of remittances and the purchase of physical investments (durable goods) simultaneously and also including the binary remittance variable in the physical investments (durable goods) model. A simultaneous model is suitable because there is good reason to suspect that the decision by a household to spend on a certain category and the receipt of remittances are correlated but with no natural sequencing of the two processes. For example, migrants may send remittances to spend on the purchase of a specific commodity. At the same time, the decision by households to spend on that commodity may be influenced by the receipt of remittances. It thus seems appropriate to analyse the receipt of remittances and the decision to spend on a certain category as a two-equation system.

It has been established in the literature, both theoretically and empirically, that simultaneous likelihood estimation methods are superior to conventional two-stage instrumental variable procedures in cases where the researcher is interested in estimating the effect that a binary

endogenous variable has on a binary outcome in the presence of unobservables (e.g., Wooldridge 2010, Bhattacharya *et al.* 2006, Freedman and Sekhon 2010). We employ the simultaneous recursive bivariate probit model (Maddala 1986) as it allows us to estimate the effect that a binary endogenous remittance variable has on the binary outcome of purchasing physical investments (or durable goods), in the presence of unobservables. Moreover, a discrete choice model provides a suitable model for this analysis since our interest lies primarily in the discrete choices made by households in purchasing physical investments and durables goods, and in receiving remittances. At the same time, the use of a discrete outcome model enables us to overcome the censorship problem of household expenditures on durable goods and physical investments discussed above as it focuses on whether or not a decision was made, and not how much was spent. The bivariate probit model therefore provides a suitable approach as it allows us to model the two processes simultaneously while taking into account the discrete nature of both, as well as the endogeneity of the remittance receipt variable.

The recursive bivariate probit model can be formally presented as follows:

$$y_{i0}^* = x_i'\beta_0 + u_{i0} \tag{7.1}$$

$$y_{i1}^* = z_i'\beta_1 + y_{i0}\beta_2 + u_{i1} \tag{7.2}$$

where u_{i0} and u_{i1} are assumed to be correlated, such that $corr(u_{i0}, u_{i1}) = \rho$. y_{i0}^* and y_{i1}^* are latent dependent variables that determine the propensity of a household to receive remittances and spend on durable goods or physical investments respectively. x_i and z_i are vectors of explanatory variables. Two observable binary indicator variables can be defined to represent the latent variables y_{i0}^* and y_{i1}^* as follows:

$$y_{i0} = \begin{cases} 1 \; if \; y_{i0}^* > 0 \\ 0 \; if \; y_{i0}^* \leq 0 \end{cases} \tag{7.3}$$

$$y_{i1} = \begin{cases} 1 \; if \; y_{i1}^* > 0 \\ 0 \; if \; y_{i1}^* \leq 0 \end{cases} \tag{7.4}$$

where y_{i0} (included in expression (7.2)) and y_{i1} represent whether or not the household received

remittances and the actual decision of whether or not to spend on physical investments or durable

goods, respectively. The empirical focus is β_2, the parameter of the endogenous variable y_{i0}. The

parameters for the latent relationship can be estimated by Maximum Likelihood. Because both y_{i0}

and y_{i1} are observed for all i, a bivariate probit model with full observability is thus used here. Four

possible combinations of observed outcomes exist. From (7.3) and (7.4), the probabilities P_{jk} for

$j, k = 0, 1$ associated with each of the combinations for any set of parameters are:

$$P_{i00} = \Phi_2(-x_i'\beta_0, -z_i'\beta_1; \rho) \tag{7.5}$$

$$P_{i11} = \Phi_2(x_i'\beta_0, z_i'\beta_1 + \beta_2; \rho) \tag{7.6}$$

$$P_{i01} = \Phi_2(-x_i'\beta_0, z_i'\beta_1 + \beta_2; -\rho) \tag{7.7}$$

$$P_{i10} = \Phi_2(x_i'\beta_0, -z_i'\beta_1; -\rho) \tag{7.8}$$

where $\Phi_2(.)$ is the cumulative bivariate normal distribution function operator.

The maximum likelihood estimation for the bivariate probit is given by:

$$L(\beta_0, \beta_1, \beta_2, \rho) = \prod_{i=1}^N P_{i00}^{(1-y_{i0})(1-y_{i1})} . P_{i01}^{(1-y_{i0}).y_{i1}} . P_{i10}^{y_{i0}.(1-y_{i1})} . P_{i11}^{y_{i0}.y_{i1}} \tag{7.9}$$

7.4.2 IV probit model

An alternative way to approach this issue is to treat the remittances in their levels form. This is

informative to us especially as the use of a remittance dummy variable may conflate a number of

different factors other than remittance income and does not capture the scale of the remittances

received.

In order to correct for the potential endogeneity of the remittance levels variable, we employ an

instrumental variables (IV) approach. The first stage entails estimating a reduced form model of the

level of remittances received on all the variables included in the main regression as well as a set of

instrumental variables. Predicted remittances are obtained from this first stage and used as an

explanatory variable in the primary regression model of interest in place of the endogenous remittances variable. Given the censored nature of the levels of remittances received, it is arguable whether a censored tobit model would have been a more appropriate model (Tobin 1958). However, we noted in chapter 5 the problems associated with the censored tobit model and the fact that it was found to be mis-specified. Therefore, the OLS model is the preferred model for the reduced form equation in this case. While the use of OLS in this first stage may seem inappropriate due to the censored nature of the remittances variable, the use of the tobit model which is more appropriate for use with censored data is unsuitable given it is mis-specified. In any event, the use of a mis-specified model in the first stage has implications for the consistency of estimates in the second stage model (see Angrist 2001). The use of an OLS model in the first stage followed by a probit model in the second stage is equivalent to using an IV probit model (Wooldridge 2010 p. 591). This is the method we also employ in this part of the empirical analysis. The IV probit model has been shown to be appropriate for fitting models with binary dependent variables and continuous endogenous regressors (Wooldridge *op. cit*). It is acknowledged that the endogenous regressor is not strictly continuous in this case, but we believe this creates less of a problem in the current application than using a mis-specified model like a censored tobit to generate the first stage predictions.

The IV probit model can be formally presented as follows:

$$y_{i1}^* = y_{i2}\beta_1 + x_{i1}'\beta_2 + u_i \qquad (7.10)$$

$$y_{i2} = x_{i1}'\pi_1 + x_{i2}'\pi_2 + v_i \qquad (7.11)$$

where $i = 1, \ldots, N$ households, y_{i1}^* is a latent dependent variable that captures the ith household's propensity to spend on physical investments (durable goods). y_{i2} is the endogenous remittance variable, x_{i1} is a vector of exogenous variables, x_{i2} is a vector of instrumental variables, and the equation for y_{i2} is written in reduced form. u_i and v_i are the error terms of the model. β_1 and β_2 are parameter vectors of the main model and π_1 and π_2 are vectors containing the reduced-form

parameters. The IV probit model is a recursive model as y_{i2} appears in the equation for y_{i1}^*, but not *vice versa*. We do not observe y_{i1}^* but we do observe its observable counterpart as follows:

$$y_{i1} = \begin{cases} 1 \ if \ y_{i1}^* > 0 \\ 0 \ if \ y_{i1}^* \leq 0 \end{cases} \qquad (7.12)$$

where y_{i1} represents the actual decision to spend or not on physical investments (or durable goods). Thus, the probability of spending on physical investments (or durable goods) for the ith household can be represented as follows:

$$Prob[y_{i1} = 1] = \ \Phi(\beta_i \hat{y}_{i2} + x'_{i1}\beta_2) \qquad (7.13)$$

where $\Phi(\cdot)$ denotes the standard normal cumulative distribution function operator.

7.5   Empirical results

We estimate bivariate and IV probit models respectively for the binary and continuous remittance variables. In order to ensure identification of the parameters of the primary models of research interest, we include variables in the remittances models that do not feature in the physical investments (or durable goods) models and *vice-versa*. These instrumental variables should be relevant in predicting the remittance variable but orthogonal to the error term in the latent model for the physical investments (or durable goods) equations. The following dummy variables are found to be suitable instruments for both the bivariate and IV probit models: (i) the gender of the household head, (ii) whether or not the household possesses an ATM card, and (iii) if the household has any migrants that are located externally.[7] We check for the relevance of these instruments using the 'rule-of-thumb' F-value of 10 suggested by Staiger and Stock (1994). A linear probability model (LPM) is used in the first stage to conduct the relevance tests. In the case of the binary remittance variable, an LPM model is also employed in the second stage. This enables us to test for the orthogonality of the instruments using both Sargan and Hansen test statistics. It is

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[7] In the sample, 63% of household heads are male, 47% of households have an ATM card and 55% of households have external migrants.

acknowledged that this represents a modelling convenience as the aforementioned tests are only strictly appropriate for use when the first and second stage models have continuous dependent variables. However, we believe the approach we adopt here provides us with some approximate insights on the validity of the instruments used.

On the basis of the above testing approach, the instrumental variables satisfy the relevance criterion as they are highly correlated with the remittance variable in all cases. The variables are also found to be orthogonal to the error process in the second stage LPM for purchasing using both the Sargan and Hansen test statistics. Thus, the instruments could be interpreted as valid for the current application in a statistical sense given the important caveats noted above. The test results are provided in Table 7.3. However, we also need a narrative for why these variables are plausible identifying instruments in the current application. Firstly, the literature suggests that female headed households are often more economically disadvantaged than households headed by males (see, e.g., Carling 2008) and thus more likely to receive remittances. However, male/female headship may not necessarily affect the decision to purchase physical investments or durable goods in a direct manner. Secondly, the ownership of an ATM card can be considered a proxy for access to money transfer services and the ease of remittance transmissions by migrants. However, ATM card ownership is not expected to have a direct effect on the decision of the household to purchase physical investments and/or durable goods. Thirdly, due to the greater wage advantage, external migrants are likely to be able to afford to send remittances to the household of origin. There is extensive evidence in the literature that points to a strong positive correlation between labour market earnings and remittances (see, e.g., Liu and Reilly 2004). However, the location of migrants does not necessarily directly affect the decision to purchase physical investments or durable goods.

In addition, we use either the log of total per capita expenditure or the PCA index as identifying instruments in the durable goods (physical investments) models. It is customary to use household assets as instruments for household expenditure (see, e.g., Filmer and Pritchett 2001) so in some sense the latter may be viewed as more appropriate. However, we acknowledge that both may be weak instruments and their inclusion is more justified on the basis of need for a welfare

metric in the purchase equations. Thus, these income proxies appear only in the durable goods (physical investments) models but not in the remittance equations.[8]

We now test whether or not the remittance variables are exogenous in the purchase equations of interest here. Table 7.3 provides a summary of the different tests used to test for the exogeneity of the remittance variables in the various models.

Table 7.3: Testing the exogeneity of the remittances variables

	Physical investments	Durable goods
Remittance binary variable:		
F-test for instrument relevance	F(3, 1834) = 112.45 p-value = 0.000	F(3, 1834) = 112.45 p-value = 0.000
Sargan statistic (overidentification test of all instruments)	$\chi^2_2 = 2.23$ p-value = 0.328	$\chi^2_2 = 0.47$ p-value = 0.792
Hansen statistic (overidentification test of all instruments)	$\chi^2_2 = 2.12$ p-value = 0.346	$\chi^2_2 = 0.47$ p-value = 0.791
Wu-Hausman test for exogeneity	F(1,1834) = 4.063 p-value = 0.044	F(1,1834) = 0.055 p-value = 0.814
Biprobit likelihood-ratio test ($\varrho = 0$)	$\chi^2_2 = 2.71$ p-value = 0.0995	$\chi^2_2 = 0.391$ p-value = 0.532
Remittance continuous variable:		
F-test for instrument relevance	F(3, 1834) = 14.34 p-value = 0.000	F(3, 1834) = 14.34 p-value = 0.000
Sargan statistic (overidentification test of all instruments)	$\chi^2_2 = 2.23$ p-value = 0.313	$\chi^2_2 = 0.54$ p-value = 0.765
Hansen J statistic (overidentification test of all instruments)	$\chi^2_2 = 2.25$ p-value = 0.325	$\chi^2_2 = 0.55$ p-value = 0.761
Wu-Hausman test for exogeneity	F(1,1834) = 0.743 p-value = 0.389	F(1,1834) = 0.478 p-value = 0.489
IV probit exogeneity test	$\chi^2_1 = 0.99$ p-value = 0.320	$\chi^2_1 = 0.08$ p-value = 0.774

Notes to the table:
(i)   The tests reported here are undertaken for models where the log of total expenditure is used as a measure of household welfare. The results are largely invariant to the use of the PCA indicator as an alternative measure of welfare. The exception is the biprobit model for the physical investments category where, unlike in the table, the exogeneity tests for the remittance binary variable are upheld.

For the binary remittance variable, the Wu-Hausman test for exogeneity is rejected for the physical investments category at the 10% level of significance thus indicating that the variable is indeed endogenous. The endogeneity of this variable is also confirmed by the finding of a significant ρ in the physical investments bivariate probit model. This indicates that the bivariate probit model represents a suitable model in this case, albeit on the basis of a marginal test result.

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[8] It makes sense to exclude these variables from the remittance equations as they are obviously endogenous in these equations.

In the other three cases, the null hypothesis of exogeneity is upheld for the Wu-Hausman test. In addition, the exogeneity of the remittance binary variable for the durable goods category is confirmed by the insignificance of ρ in the bivariate probit model. The exogeneity of the total amount of remittances received is confirmed by the non-rejection of the Wald test for exogeneity in both the physical investments and durable goods IV probit models. This suggests that the univariate probit models with exogenous remittances are the preferred models in these three cases.

Thus, the receipt of remittances is found to be exogenous to the purchase of durable goods. The exogeneity of remittances implies that the receipt of remittances influences the decision by the household to spend on durable goods but not *vice-versa*. Thus, it seems that households make the choice to purchase durable goods contingent upon the receipt of remittances. In other words, households do not purchase durable goods and then in turn receive remittances. Rather, they decide to spend on durable goods on receiving remittances. In the previous chapter, we found that the receipt of remittances from sibling remitters had a positive effect on the allocation of the budget towards durable goods. Thus, the exogeneity of remittances here seems to support the view that it is the remitter who influences the spending of the remittances they send by specifying their use on durable goods, as opposed to the household itself anticipating or demanding that remittances be sent for this purpose. As such, the use of remittances for the acquisition of durable goods seems to be dictated by the remitter. Consequently, we could interpret remittances received for the purposes of purchasing durable goods as windfall or transitory income as the way in which they are sent precludes them from being a part of the permanent income of the household.

The fact that remittances are spent specifically on durable goods is also supported by findings in the preceding chapter which reveal that households do not pool remittance and general income together when allocating their budget towards durable goods. The possible reasons for remitters sending remittances for durable goods purchases were discussed in chapter 6. For example, the remitter may be able to utilize these goods during visits or upon eventual return to the household given that they yield utility over time and are not consumed immediately. Alternatively, it may be

easier to monitor the uses of remittances spent on durable goods since these are tangible and last longer.

On the other hand, the endogeneity of remittances in the case of physical investments indicates that the unobservables determining the receipt of remittances and those determining the investment decision are positively correlated. Thus, the decision by the household to purchase physical investments is influenced by the receipt of remittances and also the purchase of physical investments results in the household receiving remittances. As in the case of durable goods, this could be interpreted to imply that remittances are sent with instructions by the remitter to purchase physical investments. At the same time the decision by the household to purchase physical investments induces a corresponding response by migrants to send remittances. Hence, remittances represent transitory income here for the same reasons as discussed above for durable goods. However, remittances also represent expected or predictable income since the decision of the household to purchase physical investments induces the receipt of remittances. Hence, the endogeneity of remittances here seems to imply that there is also a reciprocal supply of remittances by migrants when households purchase physical investments. A possible explanation for this may be that, unlike durable goods, physical investments require some form of maintenance after their acquisition. This may be a reasonable explanation given the composition of physical investments.[9] For example, if the household opens a store they may rely on remittances to replenish the stock of goods, especially in the initial stages when the business may not yet be self-sustaining. Alternatively, it may be that the financial outlay for the acquisition of physical investments is not a one-off as they are likely to be costly. However, this information is not directly available from the dataset and this interpretation is therefore merely suggestive.

Table 7.4 reports marginal/impact effects for the durable goods univariate probit models. In specification one, the logarithm of total household expenditure per capita is used as a proxy of household income. In specification two, the PCA index is used instead. In the third specification, both the total expenditure variable and PCA index are included. However, a caveat associated with

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[9] Physical investments consist of setting up a business/opening a store, house or land purchase, productive assets such as sewing machines or water pumps, farming equipment such as trucks, tractors, and machines.

using the PCA index is that many of the goods that comprise the index fall under the durable goods (or physical investments) categories. An attempt to exclude those goods that constitute physical investments and durable goods from the PCA index produces an index that has far too few assets and so we use the PCA index without correcting for this problem. The estimates obtained on the PCA index should thus be interpreted with caution. The upper panel of the table reports the effects for the case where the binary remittances variable is the variable of main interest. In the bottom panel of the table, the estimated marginal effects for the continuous remittances variable are reported.

The estimates in the table reveal that the receipt of remittances, compared to non-receipt, increases the probability of purchasing durable goods by at least four percentage points, on average and *ceteris paribus*.[10] Given that the mean is 0.498, this corresponds to an eight per cent increase in the probability of purchasing durable goods relative to the mean. In addition, a 10,000 shilling increase in annual remittances is shown to increase the probability of purchasing durable goods by at least 0.16 of one percentage point, on average and *ceteris paribus*, which is equivalent to a 0.32 per cent increase in the probability of purchasing durable goods relative to the mean. Thus, the findings here are in comport with findings from the previous chapter. The receipt of remittances therefore induces Kenyan households to spend towards durable goods, though the effect is modest.

In the first and second specifications, we see that the total expenditure per capita and PCA index variables have positive effects on the purchase of durable goods. This illustrates that households with higher income levels are more likely to purchase durable goods. Controlling for both total expenditure per capita and the PCA index in the third specification, the PCA index becomes insignificant because the PCA index and the expenditure variable are correlated.

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[10] The results for specification (I) are invariant to the treatment of total expenditure as endogenous through instrumenting it using a select set of assets as instrumental variables.

Table 7.4: Univariate probit models for durable goods (marginal/impact effects)

Durable goods probit model with exogenous remittance binary variable

Variables	I	II	III
Log of total household expenditure per capita	0.134***		0.128***
	(0.0115)		(0.0129)
PCA index		0.0417***	0.00906
		(0.00718)	(0.00786)
= 1 if household received cash remittances	0.0439*	0.0583**	0.0402*
	(0.0229)	(0.0236)	(0.0231)
Other variables	Yes	Yes	Yes
Regional dummies	Yes	Yes	Yes
N	1,856	1,856	1,856

Durable goods probit model with endogenous remittance continuous variable

Variables	I	II	III
Log of total household expenditure per capita	0.131***		0.125***
	(0.0116)		(0.0129)
PCA index		0.0402***	0.00852
		(0.00728)	(0.00782)
Total cash remittances received	1.65e-07***	2.21e-07***	1.56e-07***
	(6.14e-08)	(7.66e-08)	(5.96e-08)
Other variables	Yes	Yes	Yes
Regional dummies	Yes	Yes	Yes
N	1,856	1,856	1,856

Notes to the table:
(i) ***, ** and * denote statistical significance from zero at the 0.01, 0.05 and 0.10 level respectively using two-tailed tests.
(ii) Robust standard errors are reported in parentheses.
(iii) The regression models also include other explanatory variables that are not shown here in order to conserve space (see text for details).

Table 7.5 provides marginal/impact effects for the physical investments univariate probit models. The table reveals that the receipt of remittances increases the probability of purchasing physical investments by at least six percentage points. [11] A 10,000 shilling increase in annual remittances increases the probability of purchasing physical investments by at least 0.04 of one percentage point, on average and *ceteris paribus*. This corresponds to an increase of 0.25 per cent relative to the mean. In specification three, we see that controlling for household expenditure per capita, the PCA index has a negative effect on the purchase of physical investments. This is possibly

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[11] The results for specification (I) are invariant to the treatment of total expenditure as endogenous.

because, to the extent that physical investments provide a source of generating income, households with higher income levels have less need for acquiring such commodities.

Table 7.5: Univariate probit models for physical investments (marginal/impact effects)

Physical investments probit model with exogenous remittance binary variable

Variables	I	II	III
Log of total household expenditure per capita	0.0765***		0.0858***
	(0.00854)		(0.00962)
PCA index		0.0105**	-0.0122**
		(0.00533)	(0.00566)
= 1 if household received cash remittances	0.0570***	0.0715***	0.0627***
	(0.0164)	(0.0168)	(0.0165)
Other variables	Yes	Yes	Yes
Regional dummies	Yes	Yes	Yes
N	1,856	1,856	1,856

Physical investments probit model with exogenous remittance continuous variable

Variables	I	II	III
Log of total household expenditure per capita	0.0782***		0.0858***
	(0.00853)		(0.00963)
PCA index		0.0127**	-0.00978*
		(0.00528)	(0.00561)
Total cash remittances received	4.32e-08*	6.86e-08***	4.62e-08**
	(2.26e-08)	(2.58e-08)	(2.32e-08)
Other variables	Yes	Yes	Yes
Regional dummies	Yes	Yes	Yes
N	1,856	1,856	1,856

Notes to the table:
(i) ***, ** and * denote statistical significance from zero at the 0.01, 0.05 and 0.10 level respectively using two-tailed tests.
(ii) Robust standard errors are reported in parentheses.
(iii) The regression model also includes other explanatory variables that are not shown here in order to conserve space (see text for details).

Given the finding that the remittance binary variable is endogenous in the physical investments model, we report the estimates for the bivariate probit model in Table 7.6. Conditional marginal/impact effects[12] are reported in the table (see Greene 1998 and 2003, Park 2010). These effects are the sum of the direct effects for purchasing physical investments and the indirect effects for receiving remittances. We see that combining direct and indirect effects, for a one per cent increase in total expenditure per capita, the probability of purchasing physical investments

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[12] However, the impact effect for the remittance receipt binary variable is an unconditional effect since the receipt of remittances is already conditioned for in estimating the bivariate probit model.

conditional on receiving remittances will increase by 0.14 percentage points holding other variables constant at their reference points.[13] The receipt of remittances has no statistically significant effect on the purchase of physical investments. This is probably because most of the effects are absorbed in the correlation of unobservables for the purchase of physical investments and the receipt of remittances. In addition, we also note the very marginal result in regard to ϱ, which raises questions about whether the bivariate model is fully appropriate here.

Table 7.6: Bivariate probit model for physical investments (conditional marginal/impact effects)

Variables	dy/dx (phy_prob=1|rec_rem=1)
Log of total household expenditure per capita	0.1413***
	(0.0186)
= 1 if household received cash remittances	-0.0111
	(0.0753)
ϱ	0.205*
	(0.122)
Other variables	Yes
Regional dummies	Yes
N	1856

Notes to the table:
(i)   ***, ** and * denote statistical significance from zero at the 0.01, 0.05 and 0.10 level respectively using two-tailed tests.
(ii) Robust standard errors are reported in parentheses.
(iii) The regression model also includes other explanatory variables that are not shown here in order to conserve space (see text for details).

7.6   Summary and conclusions

In this chapter we analysed discrete household decisions in terms of purchasing physical investments and durable goods while treating the binary and continuous remittances variables endogenously. However, we obtain evidence that both remittance variables are exogenous in the case of the durable goods category. For the physical investments category, only the continuous remittance variable is found to be exogenous. Thus, we treat remittances exogenously in the univariate probit models corresponding to these cases. The findings reveal that the receipt of remittances increases the probability of purchasing durable goods and physical investments. The

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[13] We compute these effects at the mean for continuous variables and at zero for all binary variables expect the variable for the receipt of remittances which is set to one.

binary remittance variable is found to be endogenous for the physical investments category. No statistically significant effect on the purchase of physical investments is obtained in the bivariate probit model where remittances are treated endogenously.

Overall, the empirical findings in this chapter reveal that remittances have a significant effect on the purchase of physical investments and durable goods and are in comport with findings obtained in the preceding chapter. The permanent income hypothesis postulates that if remittances represent permanent income, households are more likely to spend them on commodities requiring additional and recurrent purchases in the future (e.g., utilities, food and non-food purchases such as clothing). Hence, the evidence obtained here appears to support the view that remittances are not considered to be permanent income, and thus are used to acquire those commodities that yield utility over time. This may imply that households view remittances as windfall or transitory income. This is especially so in the case of durable goods where remittances are found to be exogenous. The possible interpretation for the exogeneity of remittances is that migrants specifically channel the remittances they send towards the acquisition of durable goods, not that the purchase of durable goods induces the receipt of remittances. This explanation seems to be consistent with the findings in the preceding chapter where we determined that sibling remitters have more bargaining power towards the use of remittances for purchasing durable goods. Thus, it seems to be the case that it is the (sibling) remitter who dictates that remittances be spent on purchasing durable goods as opposed to the household purchasing durable goods and then having migrants send remittances. If this is the case, it seems reasonable that households would not consider remittances to be part of their permanent budget, since their receipt is determined by the remitter and not necessarily the receiving household itself. The fact that remittances are not viewed as part of the household's permanent income is also revealed in the preceding chapter where we reject the unitary model of income pooling for the durable goods category.

On the other hand, the endogeneity of remittances in the case of physical investments may suggest that households view remittances as expected or predictable income for the purposes of acquiring physical investments. Thus, remittances are sent for the purpose of acquiring physical

investments and when households purchase physical investments, they in turn receive remittances. However, the endogeneity result here is extremely marginal.

The use of remittances for the acquisition of durable goods and physical investments is suggestive of the fact that remittances may potentially contribute towards poverty reduction at the household level and the enhancement of local economic development. For example, physical investments could be used to generate income thus contributing towards income source diversification and perhaps generating employment for household members. Alternatively, durable goods and physical investment goods could be sourced locally thus potentially boosting local businesses.

8 Conclusions, Policy Recommendations and Agenda for Future Research

This thesis conducted empirical analysis on migration and remittances using the 2009 Africa Migration Project household survey for Kenya. The survey is a single-round, cross-sectional survey that was jointly undertaken by the African Development Bank and World Bank between 24 October and 22 December 2009. No empirical work of the type reported in this thesis has been undertaken with these data to date.

Four sets of separate, though related, empirical analyses were undertaken in this thesis. In the first empirical chapter, the factors that determine the subsequent migration decisions of Kenyan siblings are investigated. We estimate a binary logit model to ascertain the effect of a preceding sibling migrant on the probability of migrating. A strong negative effect is obtained. This suggests that preceding sibling migrants deter subsequent sibling migration. Thus the migration of Kenyan siblings appears to be driven by a household income diversification strategy where some siblings migrate while others remain at home. We also find that there are no differential effects on the migration probability of a sibling according to whether the preceding migrant is a sibling or non-sibling member of the household. The impression of this finding is that migration is a household level decision involving all members, regardless of the type of relationship with the household.

A major concern we have with our findings is that the variable capturing the presence of a preceding sibling migrant is potentially endogenous. Attempts to employ an instrumental variables approach proved unsuccessful due to a lack of suitable instruments. The cross-sectional nature of the survey used also renders it difficult to obtain any meaningful instrumental variables. However, our main findings are invariant to a host of robustness checks that attempt to attenuate the potential endogeneity problem. Nevertheless, we defer from interpreting the results obtained as detecting pure causal effects of subsequent sibling migration. Rather, the findings explain the relationships between the preceding and subsequent migration decisions of Kenyan siblings.

We also model the subsequent migration decisions of Kenyan siblings using a discrete failure time approach. This allows us to control for any neglected heterogeneity at the household level. Findings from both random and fixed effects models reveal that neglected heterogeneity is statistically important and induces an upward bias on the coefficient for the preceding sibling migrant variable. The neglected heterogeneity possibly captures household common influences. If households with a preceding sibling migrant have common influences, this is expected to induce an upward bias on the coefficient for the preceding sibling migrant variable. However, it is acknowledged that the neglected heterogeneity probably captures other unobserved variables as well. Controlling for neglected heterogeneity, no overall effect is detected for the presence of a preceding sibling migrant on the probability of migrating. On the other hand, the presence of non-sibling migrants is found to decrease the probability of migrating externally and internally.

The second empirical chapter of the thesis investigated the remitting behaviour of Kenyan sibling migrants. A Heckman selection model is employed to determine the factors that motivate the remittances of sibling migrants. However, no evidence of selection in the decision to remit and the amount of remittances sent by migrants is detected. The two processes are therefore modelled separately using probability and linear regression models. Being a multiple (compared to a sole) sibling migrant is found to have a negative effect on the probability of remitting and no statistically significant effect on the amount sent. Thus, unlike previous findings in the literature, our findings preclude competition for inheritance purposes, pure altruism, or independent co-insurance as motivators of Kenyan sibling remitting behaviour. Rather, the evidence obtained reveals that multiple migrants appear to be motivated to remit by other factors that do not feature explicitly in the extant remittance literature. We suggest that a strategy involving a sharing of the remittance responsibilities could be a possible explanation for the findings we obtained. For the case of multiple migrants only, an instrumental variables approach is employed to determine the effect that the amount of remittances sent by other sibling migrants exerts on a sibling's own remittances. We find that the remittance levels of other siblings have no effect on the amount of remittances sent by a sibling. We suspect that this may be because multiple sibling migrants take turns to remit to the household with only a subset of siblings within the group assuming full responsibility for the

remittance needs of the household at a given time. Some caution, however, is exercised in interpreting these findings because the instruments employed are weak. Nonetheless, the findings are robust to tests for weak instrumentation and this somewhat abates our concerns in this regard. However, whether or not siblings take turns to remit is not something that can be detected with a cross-sectional dataset. This again highlights a limitation of the empirical work reported for this chapter.

In the third empirical chapter, an Almost Ideal Demand Systems (AIDS) model is used to determine whether there are differences in the allocation of budget shares according to whether or not migrant households receive remittances for seven categories of commodities (*viz.*, food, non-food, utilities, durable goods, physical investments, education and health). Migrant households that receive remittances are found to allocate a larger proportion of their budget shares towards durable goods at the margin, compared to non-receiving migrant households. The budget shares of migrant households are also found to be sensitive to the source of remittance. Specifically, the receipt of sibling and spouse remittances respectively increases the budget shares allocated to durable goods and physical investments. Thus, the bargaining powers of spouse and sibling remitters appear to impact these two categories of expenditure. Additional tests also reject the unitary model proposition with income out of remittances being shown to have a positive and significant effect on the budget shares of durable goods and physical investments. These results are invariant to the treatment of total expenditure as endogenous and when potential selection bias in the expenditure decision is accounted for.

We also investigate whether the way Kenyan households report remittance uses indicates the allocation of remittance income to expenditure categories is similar to the allocation out of general income. We find large differences between the reported uses of remittance as opposed to general income by Kenyan households. This calls into question the veracity of the reported uses by households of remittances.

In the fourth and final empirical chapter, we narrow the analysis to physical investments and durable goods and then explicitly treat the remittances endogenously. The censorship of these two

budget shares categories is also addressed, albeit somewhat crudely, through the use of recursive bivariate probit and IV probit models. However, remittances are found to be exogenous in the durable goods models and in one of the physical investments models. The exogeneity of remittances suggests that households interpret them as transitory income. Upon treating remittances as exogenous, we find remittances to have a positive and significant effect on the probability of purchasing physical investments and durable goods. Conversely, the endogeneity of remittances in the physical investments model suggests that remittances are predictable income. Thus, the receipt and use of remittances is planned for in the case of physical investment purchases. When we treat the remittance variable as endogenous, we obtain no statistically significant effect on the purchasing of physical investments. This is possibly because most of the remittance effects are absorbed in the correlation in the unobservables between the receipt of remittances and the purchase of physical investments. However, we note the very marginal rejection of exogeneity here.

A number of policy implications can be drawn from the various empirical investigations undertaken in this thesis. The evidence assembled indicates that the Kenyan labour market is quite flexible and responds to both internal and external opportunities. Individuals with higher levels of education are particularly more prone to migrate. The possession of university (compared to primary) education is shown to have a stronger effect on internal migration while secondary education has a positive effect on both internal and external migration. Thus, we obtain evidence that the direct benefit of investing in the higher education of Kenyans not only accrues to other countries when people migrate but also benefits Kenya due to the high prevalence of internal movements. This may be because some highly skilled individuals opt to remain within Kenya due to constraints on the accreditation of their qualifications in countries abroad. The responsiveness of highly educated Kenyans to opportunities both at home and abroad lessens the "brain drain" effect of migration since some individuals who possess high human capital levels are retained at home. In addition, we find that students are more likely to migrate externally. This demand for higher education abroad suggests that there is scope to expand the supply of higher education institutions in Kenya, though enhancing the quality of such educational provision is also clearly required and perhaps represents the bigger challenge.

The empirical findings presented in this thesis also reveal that Kenyan migrants have continued to maintain contact with and support their households of origin over time. For example, the proportion of migrant remitters in the current research is on par with that of Hoddinott (1992) who used a rather dated 1982 sample. Thus, remittances by migrants continue to contribute to the income sources of origin households. Moreover, the finding that remittances by Kenyan siblings do not displace those sent by other migrants is potentially generalizable to other areas such as the social transfers literature. One of the key debates in the social transfers literature concerns whether government transfers to elderly people displace financial support from family members. To the extent that remittances sent by others do not displace the remittances of Kenyan siblings, our findings are at odds with this assertion. The suggestion from our findings is that the receipt of social transfers may not necessarily displace remittances as remittances are not a direct response to the transfers received by the household *per se.* However, we refrain from deriving any conclusive policy recommendations since the analysis undertaken here did not include an explicit focus on social transfers given data constraints.

Our findings also challenge the view that remittances are not sustainable because recipients spend them on consumption goods. Instead, the allocation of remittances to physical investments and durable goods can potentially contribute towards local economic development through various multiplier effects. For instance, it may improve local businesses or create employment if households purchase these commodities locally. Policy makers can play a role, for example, by creating an enabling environment for the conduct of small businesses and other income generating activities in order to boost and sustain the activities that households embark upon when they invest in physical investments. They could also support local economies to manufacture commodities and meet the demand for durable goods and physical investments locally.

There has been some criticism of remittance-specific policies that focus on lowering transaction fees to enable remitters to transfer small amounts more frequently. The effectiveness of regular remittance flows in stimulating households to spend more towards productive investments has been questioned (see, e.g., Amuedo-Dorantes and Pozo 2014). However, the findings of this

thesis suggest that when remittances represent predictable income, they are used to acquire physical investments. We also find that even when remittances represent transitory income, they are still used to purchase physical investments and durable goods, rather than consumables. We therefore find no evidence of a contradiction in the use of remittances depending on whether or not they are predictable. Thus, policies that lower transaction costs for smaller amounts are unlikely to cause a shift in the uses of remittances by Kenyan households towards consumption goods. This implies that policy incentives that encourage small and frequent remittance transfers should be given equal precedence as those that promote more irregular or less frequent transfers.

In addition, the findings we obtain suggest that studies in the literature should be cautious when using data reporting the direct uses of remittances by households to draw inferences about the impact of remittances. Similar concerns have been raised by previous studies in the literature (see, e.g., Castaldo and Reilly 2007, Zarate-Hoyos 2008). The general view from this direct remittance use approach is that remittances are mainly used for current consumption rather than physical investments (Zarate-Hoyos *op. cit.*). The current thesis demonstrates empirically the inconsistencies between the reported and actual uses of remittances by households. This reveals that findings based on the reported direct uses of remittances are potentially misleading.

A number of issues that could be pursued as part of an agenda for future research arise from the investigations undertaken in this thesis. Firstly, the household survey used in the thesis is a huge improvement on previous surveys in Africa upon which migration and remittance research has been conducted. However, there is still scope for enhancing survey data in order to enable more robust empirical analysis to be conducted. In particular, surveys should not only be conducted on one end (i.e., the household of origin or migrants in the destination) but at both concurrently. Also, there needs to be an emphasis on multiple round surveys as opposed to cross-sectional ones. This would make it more feasible to obtain suitable instrumental variables for use in econometric models and thus enhance the analysis that can be undertaken. This would also allow for explicit insights into whether siblings are taking turns to remit or not. In addition, the panel dimension can be exploited in order to obtain instruments that induce random exogenous variation in the

endogenous regressors but are unrelated to the other determinants of migration. This will enable the estimation of more robust causal effects than was the case in this thesis.

Further, questions regarding wider migrant networks need to be incorporated in surveys. This will enhance the understanding of the role of networks in facilitating migration. As highlighted by Palloni *et al.* (2001), networks based on kinship are not necessarily the most salient in shaping migration decisions. Instead, networks based on much weaker ties of friendship or acquaintance may be equally or more important than kinship ties in determining migration. Thus, the role played by sibling and non-sibling networks in facilitating migration, as demonstrated in the current research, represents only one strand in a much broader framework of networks that potentially influence migration.

We also realise, owing to data limitations, that our empirical analysis on the reported uses of remittances is somewhat constrained given the small sample sizes used. The investigation of the veracity of remittance uses can be enhanced in the future through incorporating more questions on remittance uses in household surveys. This should enable greater insights on this important topic.

The changing patterns of remittance motivations should also be considered. Given the dynamic nature of migration, there are likely to have been shifts in the motivations of remittances from traditional motivators such as the inheritance or altruistic motives originally proposed by Lucas and Stark (1985). Thus, remittance motives that reflect more contemporary migration need to be developed. The remittance theory literature should also be expanded in order to account for the changing motivations of remittances. The current research has initiated this process by employing empirical-based methods to analyse migration and remittances using a recent dataset. We acknowledge that there are gaps in the theory relating to subsequent migration and multiple migrant remittance behaviour which are not adequately addressed here. The development of theory related to the topics discussed in this thesis represents a potential area for future research. For example, there is potential to develop remittances sending motives that involve a sharing of responsibilities as alluded to in this thesis. This kind of motive could potentially be fashioned after the sharing rule which currently features in the bargaining literature where it is modelled within an intra-household

framework (see, e.g. Chiappori 1992). An extension of this to incorporate an inter-household bargaining structure which incorporates members who are no longer resident in the nuclear family may also be feasible. In Kenya non-resident family members are shown to continue playing a significant role in contributing towards the welfare of the origin family even after establishing their own independent households. This is more so due to the absence of formal social welfare services and the existence of a culture where adult children are a source of financial support for their elderly parents. To further develop this, more detailed information relating to the relative bargaining powers of migrants is required. Specifically, the labour market characteristics of migrants, including their earnings, will provide variables that proxy the sharing of remittance responsibilities. The absence of these variables from the survey employed in the current thesis inhibits us from further distilling the mechanisms through which the sharing of responsibilities potentially operates. In addition, and reprising an earlier theme above, it is necessary to have panel data in order to investigate the remittance behaviour of multiple migrants more comprehensively. We propose that the findings we obtained may suggest that multiple sibling migrants take turns to remit. The robustness of the evidence for such a strategy can be enhanced if data from multiple periods are available.

A suggestion as to how the existing remittance theory could be extended to incorporate multiple migrants is to introduce altruistic weights relating to other migrants in the altruistic model developed by Lucas and Stark (*op. cit.*). In this model, altruistic weights are attached to various household of origin members based on per capita consumption. Information about the transfer of remittances between migrants or the per capita consumption of migrant households may inform on the amount of weight that is attached to the well-being of fellow migrants and how this relates to the remittances sent to the origin household. Given that our findings potentially provide support for an inter-household bargaining model, extending the theory to encompass a wider set of households can provide more insight into the motivations of remittances.

Finally, more can be done to investigate alternative drivers of migrant remitting behaviour. The theory relating to self-interest remittance motives could be extended by modelling it within a non-

cooperative framework in a manner akin to the prisoner's dilemma approach. This can inform, for example, on whether the remittance behaviour of multiple migrants exhibits competition or free-riding. However, for this to be feasible, the timing of remittances sent to the household needs to be known. That is, if migrants remit (or do not remit) in response to the remittances sent by others, it would be informative to know who remitted first and the timing of subsequent remittances by others. Overall, more empirical evidence on multiple migrant remittance behaviour and an expansion of the associated theories are necessary to enable more concrete policy conclusions to be drawn and recommendations to be made.

Bibliography

Ackello-Ogutu, Chris. "Unrecorded Cross-Border Trade Between Kenya and Uganda: Implications for Food Security." Amex International, Inc., 1997.

Acosta, Pablo. "School Attendance, Child Labour, and Remittances from International Migration in El Salvador." Journal of Development Studies 47, no. 6 (2011): 913-36.

Adams Jr, Richard H. "Remittances, Investment, and Rural Asset Accumulation in Pakistan." Economic Development and Cultural Change 47, no. 1 (1998): 155-73.

———. "The Economic Uses and Impact of International Remittances in Rural Egypt." Economic Development and Cultural Change 39, no. 4 (1991): 695-722.

———. Remittances, Household Expenditure and Investment in Guatemala. Vol. 3532: World Bank Publications, 2005.

Adams Jr, Richard H, and Alfredo Cuecuecha. "The Impact of Remittances on Investment and Poverty in Ghana." World Development 50 (2013): 24-40.

———. "Remittances, Household Expenditure and Investment in Guatemala." World Development 38, no. 11 (2010): 1626-41.

Adams Jr, Richard H, Alfredo Cuecuecha, and John Page. "The Impact of Remittances on Poverty and Inequality in Ghana." (2008).

Adams Jr, Richard H, and John Page. "Do International Migration and Remittances Reduce Poverty in Developing Countries?" World development 33, no. 10 (2005): 1645-69.

Aga, Gemechu Ayana, and Maria Soledad Martinez Peria. "International remittances and financial inclusion in Sub-Saharan Africa." World Bank Policy Research Working Paper 6991 (2014).

Agarwal, Reena, and Andrew W. Horowitz. "Are International Remittances Altruism or Insurance? Evidence from Guyana Using Multiple-Migrant Households." World Development 30, no. 11 (2002): 2033-44.

Agesa, Jacqueline, and Richard U Agesa. "Gender Differences in the Incidence of Rural to Urban Migration: Evidence from Kenya." The Journal of Development Studies 35, no. 6 (1999): 36-58.

Agesa, Richard U., and Sunwoong Kim. "Rural to Urban Migration as a Household Decision: Evidence from Kenya." Review of Development Economics 5, no. 1 (2001): 60-75.

Amemiya, Takeshi. Advanced Econometrics. Harvard University Press, 1985.

Amuedo-Dorantes, Catalina, and Susan Pozo. "Remittances as Insurance: Evidence from Mexican Immigrants." Journal of Population Economics 19, no. 2 (2006): 227-54.

———. "When Do Remittances Facilitate Asset Accumulation? The Importance of Remittance Income Uncertainty." IZA Discussion Paper, 2014.

Angrist, Joshua D. "Estimation of Limited Dependent Variable Models with Dummy Endogenous Regressors." Journal of Business & Economic Statistics 19, no. 1 (2001).

Angrist, Joshua D, Guido W Imbens, and Donald B Rubin. "Identification of Causal Effects Using Instrumental Variables." Journal of the American Statistical Association 91, no. 434 (1996): 444-55.

Antman, Francisca M. "Elderly Care and Intrafamily Resource Allocation When Children Migrate." Journal of Human Resources 47, no. 2 (2012): 331-63.

Anyanwu, John C, and Andrew EO Erhijakpor. "Do International Remittances Affect Poverty in Africa?" African Development Review 22, no. 1 (2010): 51-91.

Armer, Michael, and Marian Gewirtz. Sociocultural Change in Contemporary Africa. Africa. Indiana University Press, 1986.

Avato, Johanna. Migration Pressures and Immigration Policies: New Evidence on the Selection of Migrants. World Bank, 2009.

Azam, Jean-Paul, and Flore Gubert. "Migrants' Remittances and the Household in Africa: A Review of Evidence." Journal of African Economies 15, no. suppl 2 (2006): 426-62.

Baltagi, Badi. Econometric Analysis of Panel Data. John Wiley & Sons, 2008.

Banerjee, Biswajit. "The Probability, Size and Uses of Remittances from Urban to Rural Areas in India." Journal of Development Economics 16, no. 3 (1984): 293-311.

Becker, Gary S. "Altruism in the Family and Selfishness in the Market Place." Economica 48, no. 189 (1981): 1-15.

Beenstock, Michael. "The Acquisition of Language Skills by Immigrants: The Case of Hebrew in Israel." International Migration 34, no. 1 (1996): 3-30.

Bell, Martin, and Salut Muhidin. "Cross-National Comparison of Internal Migration." (2009).

Berg-Schlosser, Dirk. "African Political Systems Typology and Performance." Comparative Political Studies 17, no. 1 (1984): 121-51.

Bernheim, B Douglas, Andrei Shleifer, and Lawrence H Summers. "The Strategic Bequest Motive." The Journal of Political Economy 93, no. 6 (1985): 1045.

Bett, Lynne Jepchumba. "The Effect of Diaspora Remittances on Economic Growth in Kenya." University of Nairobi, 2013.

Bhattacharya, Jay, Dana Goldman, and Daniel McCaffrey. "Estimating Probit Models with Self-Selected Treatments." Statistics in Medicine 25, no. 3 (2006): 389-413.

Bigsten, Arne. "The Circular Migration of Smallholders in Kenya." Journal of African Economies 5, no. 1 (1996): 1-20.

Black, Richard, JS Crush, Sally Peberdy, and Savina Ammassari. Migration and Development in Africa: An Overview. Vol. 1: Institute for Democracy in South Africa, 2006.

Black, Richard, and Russell King. "Editorial Introduction: Migration, Return and Development in West Africa." Population, Space and Place 10, no. 2 (2004): 75-83.

Blundell, Richard, and Jean Marc Robin. "Estimation in Large and Disaggregated Demand Systems: An Estimator for Conditionally Linear Systems." Journal of Applied Econometrics 14, no. 3 (1999): 209-32.

Borjas, George J. "Economic Theory and International Migration." International Migration Review 23, no. 3 (1989): 457-85.

Bound, John, David A Jaeger, and Regina M Baker. "Problems with Instrumental Variables Estimation When the Correlation between the Instruments and the Endogenous Explanatory Variable Is Weak." Journal of the American Statistical Association 90, no. 430 (1995): 443-50.

Bourguignon, Francois, and Pierre-Andre Chiappori. "Collective Models of Household Behavior: An Introduction." European Economic Review 36, no. 2 (1992): 355-64.

Bras, Hilde, and Muriel Neven. "The Effects of Siblings on the Migration of Women in Two Rural Areas of Belgium and the Netherlands, 1829-1940." Population Studies 61, no. 1 (2007): 53-71.

Brockerhoff, Martin, and Hongsook Eu. "Demographic and Socioeconomic Determinants of Female Rural to Urban Migration in Sub-Saharan Africa." International Migration Review 27, no. 3 (1993): 557-77.

Brown, Richard P. C. "Estimating Remittance Functions for Pacific Island Migrants." World Development 25, no. 4 (1997): 613-26.

Brown, Richard P.C., and John Connell. "Occupation-Specific Analysis of Migration and Remittance Behaviour: Pacific Island Nurses in Australia and New Zealand." Asia Pacific Viewpoint 47, no. 1 (2006): 135-50.

Browning, Martin, Francois Bourguignon, Pierre-Andre Chiappori, and Valerie Lechene. "Income and Outcomes - a Structural Model of Intrahousehold Allocation." Journal of Political Economy 102, no. 6 (1994): 1067-96.

Buchmann, Claudia. "Family Structure, Parental Perceptions, and Child Labor in Kenya: What Factors Determine Who Is Enrolled in School?". Social Forces 78, no. 4 (2000): 1349-78.

Cahill, Larry, and James L McGaugh. "Mechanisms of Emotional Arousal and Lasting Declarative Memory." Trends in neurosciences 21, no. 7 (1998): 294-99.

Carling, Jørgen. "The Determinants of Migrant Remittances." Oxford Review of Economic Policy 24, no. 3 (September 21, 2008 2008): 581-98.

Case, Anne, and Angus Deaton. "Large Cash Transfers to the Elderly in South Africa." The Economic Journal 108, no. 450 (1998): 1330-61.

Castaldo, Adriana, and Barry Reilly. "Do Migrant Remittances Affect the Consumption Patterns of Albanian Households." South-Eastern Europe Journal of Economics 1 (2007): 25-54.

Cattaneo, Cristina. "Migrants' International Transfers and Educational Expenditure." Economics of Transition 20, no. 1 (2012): 163-93.

Central Bureau of Statistics. "Counting Our People for Development." In 1999 Kenya Population and Housing Census: Ministry of Finance and Planning, Republic of Kenya, 2002.

———. "Population Distribution by Age, Sex and Administrative Units" In 2009 Kenya Population and Housing Census: Ministry of Finance and Planning, Republic of Kenya, 2010.

Chami, Ralph, Dalia Hakura, and Peter Montiel. Remittances: An Automatic Output Stabilizer? Vol. 9: International Monetary Fund, 2009.

Chami, Ralph, Samir Jahjah, and Connel Fullenkamp. Are Immigrant Remittance Flows a Source of Capital for Development. International Monetary Fund, 2003.

Chiappori, Pierre-André. "Collective" Models of Household Behavior: The Sharing Rule Approach. DELTA, 1992.

Clemens, Michael. "Do Visas Kill? Health Effects of African Health Professional Emigration." Center for Global Development Working Paper, no. 114 (2007).

Clemens, Michael A, and David McKenzie. "Why Don't Remittances Appear to Affect Growth?". World Bank Policy Research Working Paper, no. 6856 (2014).

Collier, Paul, and Deepak Lal. "Why Poor People Get Rich: Kenya 1960–1979." World Development 12, no. 10 (1984): 1007-18.

Cox, Donald. "Motives for Private Income Transfers." Journal of Political Economy 95, no. 3 (1987): 508-46.

Cox, Donald, Zekeriya Eser, and Emmanuel Jimenez. "Motives for Private Transfers over the Life Cycle: An Analytical Framework and Evidence for Peru." Journal of Development Economics 55, no. 1 (1998): 57-80.

Cox, Donald, and Mark R Rank. "Inter-Vivos Transfers and Intergenerational Exchange." The Review of Economics and Statistics (1992): 305-14.

Crush, Jonathan, Bruce Frayne, and Miriam Grant. "Linking Migration, HIV/Aids and Urban Food Security in Southern and Eastern Africa." International Food Policy Research Institute (IFPRI), Southern Africa Migration Project (SAMP), The Regional Network on HIV/AIDS, Livelihoods and Food Security (RENEWAL) (2006).

Curran, Sara R, and Estela Rivero-Fuentes. "Engendering Migrant Networks: The Case of Mexican Migration." [In English]. Demography 40, no. 2 (2003): 289-307.

DaVanzo, Julie S., and Peter A. Morrison. "Return and Other Sequences of Migration in the United States." Demography 18, no. 1 (1981): 85-101.

De la Briere, Benedicte, Elisabeth Sadoulet, Alain De Janvry, and Sylvie Lambert. "The Roles of Destination, Gender, and Household Composition in Explaining Remittances: An Analysis for the Dominican Sierra." Journal of Development Economics 68, no. 2 (2002): 309-28.

de Laat, Joost. "Household Allocations and Endogenous Information: The Case of Split Migrants in Kenya." Journal of Development Economics 106 (2014): 108-17.

Deaton, Angus. The Analysis of Household Surveys: A Micro-econometric Approach to Development Policy. World Bank Publications, 1997.

Deaton, Angus, and John Muellbauer. "An Almost Ideal Demand System." The American economic review (1980): 312-26.

———. Economics and Consumer Behavior. Cambridge University Press, 1980.

———. "On Measuring Child Costs: With Applications to Poor Countries." The Journal of Political Economy (1986): 720-44.

Deaton, Angus, and Salman Zaidi. Guidelines for Constructing Consumption Aggregates for Welfare Analysis. World Bank Publications, 2002.

Dow Jr, Thomas E, and Linda H Werner. "Prospects for Fertility Decline in Rural Kenya." Population and Development Review (1983): 77-97.

Edwards, Alejandra Cox, and Manuelita Ureta. "International Migration, Remittances, and Schooling: Evidence from El Salvador." Journal of Development Economics 72, no. 2 (2003): 429-61.

Filmer, Deon, and Lant H Pritchett. "Estimating Wealth Effects without Expenditure Data - or Tears: An Application to Educational Enrollments in States of India." Demography 38, no. 1 (2001): 115-32.

Francis, Elizabeth. "Gender, Migration and Multiple Livelihoods: Cases from Eastern and Southern Africa." Journal of Development Studies 38, no. 5 (2002): 167-90.

Frankel, Jeffrey. "Are Bilateral Remittances Countercyclical?". Open Economies Review 22, no. 1 (2011): 1-16.

Freedman, David A, and Jasjeet S Sekhon. "Endogeneity in Probit Response Models." Political Analysis 18, no. 2 (2010): 138-50.

Funkhouser, Edward. "Remittances from International Migration: A Comparison of El Salvador and Nicaragua." The Review of Economics and Statistics 77, no. 1 (1995): 137-46.

Ghai, Dharam P. Diasporas and Development: The Case of Kenya. Global Commission on International Migration (GCIM), Global Migration Perspectives, No. 10, available at: http://www.refworld.org/docid/42ce49c94.html [accessed 18 August 2014], 2004.

Göbel, Kristin. "Remittances, Expenditure Patterns, and Gender: Parametric and Semiparametric Evidence from Ecuador." IZA Journal of Migration 2, no. 1 (2013): 1-19.

Gomes, Melba. "Family Size and Educational Attainment in Kenya." Population and Development Review (1984): 647-60.

Greene, William H. Econometric Analysis. Pearson Education India, 2003.

———. Gender Economics Courses in Liberal Arts Colleges, Comment. New York University, Leonard N. Stern School of Business, 1998.

Gubert, Flore. "Do Migrants Insure Those Who Stay Behind? Evidence from the Kayes Area (Western Mali)." Oxford Development Studies 30, no. 3 (2002/10/01 2002): 267-87.

Gupta, Sanjeev, Catherine A Pattillo, and Smita Wagh. "Effect of Remittances on Poverty and Financial Development in Sub-Saharan Africa." World Development 37, no. 1 (2009): 104-15.

Guzman, Juan Carlos, Andrew R Morrison, and Mirja Sjöblom. "The Impact of Remittances and Gender on Household Expenditure Patterns: Evidence from Ghana." The International Migration of Women (2008): 125-52.

Hagen-Zanker, Jessica, and Melissa Siegel. "The Determinants of Remittances: A Review of the Literature." SSRN eLibrary (2007).

Harris, John R., and Michael P. Todaro. "Migration, Unemployment and Development: A Two-Sector Analysis." The American Economic Review 60, no. 1 (1970): 126-42.

Heckman, James J. "Sample Selection Bias as a Specification Error." Econometrica: Journal of the Econometric Society (1979): 153-61.

Henn, Jeanne Koopman. "Feeding the Cities and Feeding the Peasants: What Role for Africa's Women Farmers?". World Development 11, no. 12 (1983): 1043-55.

Hines, Annie. "Migration, Remittances and Human Capital Investment in Kenya." Colgate University, New York (2014).

Hoddinott, John. "A Model of Migration and Remittances Applied to Western Kenya." Oxford Economic Papers 46, no. 3 (1994): 459-76.

———. "Modelling Remittance Flows in Kenya." Journal of African Economies 1, no. 2 (August 1, 1992 1992): 206-32.

International Monetary Fund (IMF), "Kenya: Poverty Reduction Strategy Paper." IMF Country Report No. 10/224 (2010).

Irving, Jacqueline, Sanket Mohapatra, and Dilip Ratha. Migrant Remittance Flows: Findings from a Global Survey of Central Banks. Vol. 194: World Bank Publications, 2010.

Jack, William, and Tavneet Suri. "Mobile Money: The Economics of M-Pesa." National Bureau of Economic Research, 2011.

Jenkins, Stephen P. "Survival Analysis." Unpublished manuscript, Institute for Social and Economic Research, University of Essex, Colchester, UK (2005).

Johnson, G. E., and W. E. Whitelaw. "Urban-Rural Income Transfers in Kenya: An Estimated-Remittances Function." Economic Development and Cultural Change 22, no. 3 (1974): 473-79.

Kagochi, John M, and Maina Kiambigi. "Remittances' Influence on Housing Construction Demand in Sub-Saharan Africa: The Case of Kenya." African Development Review 24, no. 3 (2012): 255-65.

Kakwani, N, H Sun, and R Hinz. "Poverty, Old-Age and Social Pensions in Kenya." International Poverty Center, Working Paper, no. 24 (2006).

Kan, Kamhon. "Expected and Unexpected Residential Mobility." Journal of Urban Economics 45, no. 1 (1999): 72-96.

Kanyangoga, John Bosco "Integrating Migration with Development in EAC: Policy Challenges and Recommendations." CUTS Geneva Resource Centre (2010).

Katz, Eliakim, and Oded Stark. "Labor Migration and Risk Aversion in Less Developed Countries." Journal of Labor Economics 4, no. 1 (1986): 134-49.

Kensinger, Elizabeth A, and Suzanne Corkin. "Two Routes to Emotional Memory: Distinct Neural Processes for Valence and Arousal." Proceedings of the National Academy of Sciences of the United States of America 101, no. 9 (2004): 3310-15.

Kesztenbaum, Lionel. "Cooperation and Coordination among Siblings: Brothers' Migration in France, 1870–1940." The History of the Family 13, no. 1 (2008/01/01 2008): 85-104.

Kiiru, Joy M. "Remittances and Poverty in Kenya." OIDA International Journal of Sustainable Development 1, no. 8 (2010): 33-41.

Kinuthia, Bethuel Kinyanjui, and Akinyinka Akinyoade. "Diaspora and Development in Kenya: What Do We Know?", Migration Policy Practice no. April-May 2012 (2012).

Kiteme, Kamuti. "The Socioeconomic Impact of the African Market Women Trade in Rural Kenya." Journal of Black Studies (1992): 135-51.

Knowles, James C., and Richard Anker. "An Analysis of Income Transfers in a Developing Country: The Case of Kenya." Journal of Development Economics 8, no. 2 (1981): 205-26.

Knowles, James C, and Richard Anker. "Determinants of Internal Migration in Kenya; a District Level Analysis." International Labour Organization, 1977.

Lacroix, Thomas. "Migration, Rural Development, Poverty and Food Security: A Comparative Perspective." (2011).

Lauby, Jennifer, and Oded Stark. "Individual Migration as a Family Strategy: Young Women in the Philippines." Population Studies 42, no. 3 (1988): 473-86.

Leser, Conrad Emanuel Victor. "Forms of Engel Functions." Econometrica: Journal of the Econometric Society (1963): 694-703.

Lin, Tsai-Fen, and Peter Schmidt. "A Test of the Tobit Specification against an Alternative Suggested by Cragg." Review of Economics and Statistics 66 (1984): 174-77.

Liu, Qiming, and Barry Reilly. "Income Transfers of Chinese Rural Migrants: Some Empirical Evidence from Jinan." Applied Economics 36, no. 12 (2004): 1295-313.

Lopez-Ekra, Sylvia, Christine Aghazarm, Henriette Kötter, and Blandine Mollard. "The Impact of Remittances on Gender Roles and Opportunities for Children in Recipient Families: Research from the International Organization for Migration." Gender & Development 19, no. 1 (2011): 69-80.

Lucas, Robert EB. "Migration and Economic Development in Africa: A Review of Evidence." Journal of African Economies 15, no. suppl 2 (2006): 337-95.

———. "Migration and Rural Development." Electronic Journal of Agricultural and Development Economics 4, no. 1 (2007): 99-122.

Lucas, Robert E. B., and Oded Stark. "Motivations to Remit: Evidence from Botswana." Journal of Political Economy 93, no. 5 (1985): 901-18.

Macharia, Kinuthia. "Migration in Kenya and Its Impact on the Labor Market." Paper presented at the Conference on African Migration in Comparative Perspective, Johannesburg, South Africa, 2003.

———. Social and Political Dynamics of the Informal Economy in African Cities: Nairobi and Harare. University Press of America Lanham, MD, 1997.

Maddala, Gangadharrao S. Limited-Dependent and Qualitative Variables in Econometrics. Cambridge University Press, 1986.

Maimbo, Samuel Munzele, and Dilip Ratha. Remittances: Development Impact and Future Prospects. World Bank Publications, 2005.

Maitra, Pushkar, and Ranjan Ray. "The Effect of Transfers on Household Expenditure Patterns and Poverty in South Africa." Journal of Development Economics 71, no. 1 (2003): 23-49.

Manski, Charles F. "Identification of Endogenous Social Effects: The Reflection Problem." The Review of Economic Studies 60, no. 3 (July 1, 1993 1993): 531-42.

Markova, Eugenia, and Barry Reilly. "Bulgarian Migrant Remittances and Legal Status: Some Micro-Level Evidence from Madrid." South-Eastern Europe Journal of Economics 5, no. 1 (2007): 55-69.

Mas, Ignacio, and Dan Radcliffe. "Scaling Mobile Money." Journal of Payments Strategy & Systems 5, no. 3 (2011): 298-315.

Masinjila, Masheti, and United Nations. Economic Commission for Africa. African Trade Policy Centre. "Gender Dimensions of Cross-Border Trade in the East African Community–Kenya/Uganda and Rwanda/Burundi Border." African Trade Policy Centre, Work in Progress, no. 78 (2009).

Massey, Douglas S., Joaquin Arango, Graeme Hugo, Ali Kouaouci, Adela Pellegrino, and J. Edward Taylor. "An Evaluation of International Migration Theory: The North American Case." Population and Development Review 20, no. 4 (1994): 699-751.

Massey, Douglas S., and Kristin E. Espinosa. "What's Driving Mexico-U.S. Migration? A Theoretical, Empirical, and Policy Analysis." American Journal of Sociology 102, no. 4 (1997): 939-99.

McKenzie, David, and Hillel Rapoport. "Network Effects and the Dynamics of Migration and Inequality: Theory and Evidence from Mexico." Journal of Development Economics 84, no. 1 (2007): 1-24.

McKenzie, David, and Marcin Sasin. "Migration, Remittances, Poverty, and Human Capital: Conceptual and Empirical Challenges." World Bank Policy Research Working Paper, no. 4272 (2007).

Mikusheva, Anna, and Brian P Poi. "Tests and Confidence Sets with Correct Size When Instruments Are Potentially Weak." Stata Journal 6, no. 3 (2006): 335-47.

Mincer, Jacob. "Family Migration Decisions." Journal of Political Economy 86, no. 5 (1978): 749-73.

Mitullah, Winnie V. "State Policy and Urban Housing in Kenya: The Case of Low Income Housing in Nairobi." (2013).

Mohapatra, Sanket, George Joseph, and Dilip Ratha. "Remittances and natural disasters: ex-post response and contribution to ex-ante preparedness." Environment, Development and Sustainability 14.3 (2012): 365-387.

Moreira, Marcelo J. "A Conditional Likelihood Ratio Test for Structural Models." Econometrica 71, no. 4 (2003): 1027-48.

Moreira, Marcelo J, and Brian P Poi. "Implementing Tests with Correct Size in the Simultaneous Equation Model." Harvard Institute of Economic Research Working Paper, no. 1993 (2003).

Mukras, Mohamed S, John O Oucho, and Michael Bamberger. "Resource Mobilization and the Household Economy in Kenya." Canadian Journal of African Studies (1985): 409-21.

Mulder, Clara H., and Michael Wagner. "Migration and Marriage in the Life Course: A Method for Studying Synchronized Events." European Journal of Population/Revue européenne de Démographie 9, no. 1 (1993): 55-76.

Munshi, Kaivan. "Networks in the Modern Economy: Mexican Migrants in the US Labor Market." The Quarterly Journal of Economics 118, no. 2 (2003): 549-99.

Naiditch, Claire, and Radu Vranceanu. "Remittances as a Social Status Signaling Device." Research in Economics 65, no. 4 (2011): 305-18.

National Council for Population and Development (NCPD), 2011. http://ncpd-ke.org/. Accessed in August 2011.

Naufal, Georges Sami. "Remittances: Determinants, Motivations and Effects." Texas A&M University, 2007.

———. "Why Remit? The Case of Nicaragua." IZA Discussion Papers, 2008.

Naujoks, Daniel. "Emigration, Immigration, and Diaspora Relations in India." Migration Information Source (2009).

Neitzert, Monica. "A Woman's Place: Household Labour Allocation in Rural Kenya." Canadian Journal of Development Studies/Revue canadienne d'études du développement 15, no. 3 (1994): 401-27.

Ngugi, Rose W. "Kenya." In Remittance Markets in Africa, edited by Sanket Mohapatra and Dilip Ratha. Washington DC: The International Bank for Reconstruction and Development / The World Bank, 2011.

Nichols, Austin. "Weak Instruments: An Overview and New Techniques." Paper presented at the Stata 5th North American Meeting Presentation, 2006.

Niimi, Yoko, Thai Hung Pham, and Barry Reilly. "Determinants of Remittances: Recent Evidence Using Data on Internal Migrants in Vietnam." Asian Economic Journal 23, no. 1 (2009): 19-39.

Organisation for Economic Co-operation and Development (OECD). "OECD Migration Statistics - International Migration Database." edited by OECD.

Organisation for Economic Co-operation and Development and United Nations Department of Economic and Social Affairs (OECD-UNDESA). "World Migration in Figures." In A joint

contribution by UN-DESA and the OECD to the United Nations High-Level Dialogue on Migration and Development, 3-4 October 2013: OECD-UNDESA, 2013.

Okoth, Kenneth. "Kenya: What Role for Diaspora in Development?" Country Profiles, Migration Information Source, Migration Policy Institute, Washington, DC. http://www.migrationinformation.org/Profiles/display. cfm (2003).

Oniang'o, Ruth K. "The Impact of out-Migration on Household Livelihoods and the Management of Natural Resources: A Kenyan Case Study." IDS bulletin 26, no. 1 (1995): 54-60.

Otieno, Janet. "South Sudan's Growing Xenophobia to Kenyans Worrying." (2012). Published electronically 15 October 2012.

Özden, Çağlar, Christopher R Parsons, Maurice Schiff, and Terrie L Walmsley. "Where on Earth Is Everybody? The Evolution of Global Bilateral Migration 1960–2000." The World Bank Economic Review 25, no. 1 (2011): 12-56.

Page, John, and Sonia Plaza. "Migration Remittances and Development: A Review of Global Evidence." Journal of African Economies 15, no. suppl 2 (2006): 245-336.

Palloni, Alberto, Douglas S Massey, Miguel Ceballos, Kristin Espinosa, and Michael Spittel. "Social Capital and International Migration: A Test Using Information on Family Networks." American Journal of Sociology 106, no. 5 (2001): 1262-98.

Park, Hun Myoung. "Regression Models for Binary Dependent Variables Using Stata, SAS, R, Limdep, and SPSS." The University Information Technology Services (UITS) Center for Statistical and Mathematical Computing, Indiana University (2010).

Piotrowski, Martin. "Sibling Influences on Migrant Remittances, Evidence from Nang Rong, Thailand." [In English]. Journal of Population Ageing 1, no. 2-4 (2008/07/01 2008): 193-224.

Plaza, Sonia, Mario Navarrete, and Dilip Ratha. "Migration and Remittances Household Surveys in Sub-Saharan Africa—Methodological Aspects and Main Findings." World Bank, Washington, DC (2011).

Pleitez Chavez, Rafael Antonio. "Remittances as a Strategy to Cope with Systemic Risk: Panel Results from Rural Households in El Salvador." Ohio State University, 2004.

Ramanathan, Ramu. "Introductory Econometrics with Applications." (1998).

Randell, Heather F., and Leah K. VanWey. "Networks Versus Need: Drivers of Urban Out-Migration in the Brazilian Amazon." Population research and policy review 33.6 (2014): 915-936.

Ratha, Dilip. "Leveraging Remittances for Development." Paper presented at the Second Plenary Meeting of the Leading Group on Solidarity Levies to Fund Development, 2007.

———. "Workers' Remittances: An Important and Stable Source of External Finance for Developing Countries." Chapter 7 in Global Development Finance 2003: Striving for Stability in Development Finance, 157-75. Washington DC: The World Bank, 2003.

Ratha, D, C Eigen-Zucchi, S Plaza, H Wyss, and S Yi. "Migration and Remittance Flows: Recent Trends and Outlook, 2013–2016." Migration and Development Brief 21 (2013): 2.

Ratha, Dilip, Sanket Mohapatra, Caglar Özden, Sonia Plaza, William Shaw, and Abebe Shimeles. Leveraging Migration for Africa: Remittances, Skills, and Investments. World Bank Publications, 2011.

Rempel, Henry, and Richard A Lobdell. "The Role of Urban-to-Rural Remittances in Rural Development." The Journal of Development Studies 14, no. 3 (1978): 324-41.

Retirement Benefits Authority (RBA). "Individual Retirement Benefits Schemes in Kenya." In Research Reports. Kenya: Retirement Benefits Authority 2007.

Roberts, Kenneth D., and Michael D. S. Morris. "Fortune, Risk, and Remittances: An Application of Option Theory to Participation in Village-Based Migration Networks." International Migration Review 37, no. 4 (2003): 1252-81.

Robertson, Claire C. "Transitions in Kenyan Patriarchy: Attempts to Control Nairobi Area Traders, 1920-1963." Courtyards, Markets, City Streets: Urban Women in Africa (1996): 47-72.

Rosenzweig, Mark R. "Risk, Implicit Contracts and the Family in Rural Areas of Low-Income Countries." Economic Journal 98, no. 393 (1988): 1148-70.

Rosenzweig, Mark R., and Oded Stark. "Consumption Smoothing, Migration, and Marriage: Evidence from Rural India." Journal of Political Economy 97, no. 4 (1989): 905-26.

Ruiz, Isabel, and Carlos Vargas-Silva. "To Send, or Not to Send: That Is the Question - a Review of the Literature on Workers' Remittances." Journal of Business Strategies, Forthcoming (2009).

Simiyu, Christine Nanjala "Remittance and Household Expenditures in Kenya." Journal of Emerging Issues in Economics, Finance and Banking (JEIEFB) 2, no. 3 (2013).

Singh, Raju Jan, Markus Haacker, Kyung-woo Lee, and Maëlan Le Goff. "Determinants and Macroeconomic Impact of Remittances in Sub-Saharan Africa." Journal of African Economies 20, no. 2 (2011): 312-40.

Sjaastad, Larry A. "The Costs and Returns of Human Migration." Journal of Political Economy 70, no. 5 (1962): 80-93.

Staiger, Douglas O, and James H Stock. "Instrumental Variables Regression with Weak Instruments." National Bureau of Economic Research Cambridge, Massachusetts, USA, 1994.

Stark, Oded. The Migration of Labor. B. Blackwell, 1991.

———. "Rural-to-Urban Migration in LDCs: A Relative Deprivation Approach." Economic Development and Cultural Change (1984): 475-86.

Stark, Oded, and David E. Bloom. "The New Economics of Labor Migration." The American Economic Review 75, no. 2 (1985): 173-78.

Stark, Oded, and David Levhari. "On Migration and Risk in LDCs." Economic Development and Cultural Change 31, no. 1 (1982): 191-96.

Stark, Oded, and Robert E. B. Lucas. "Migration, Remittances, and the Family." Economic Development and Cultural Change 36, no. 3 (1988): 465-81.

Stark, Oded, and J Edward Taylor. "Migration Incentives, Migration Types: The Role of Relative Deprivation." The Economic Journal (1991): 1163-78.

Stecklov, Guy, Calogero Carletto, Carlo Azzarri, and Benjamin Davis. "Gender and Migration from Albania." Demography 47, no. 4 (2010): 935-61.

Stock, James H, Jonathan H Wright, and Motohiro Yogo. "A Survey of Weak Instruments and Weak Identification in Generalized Method of Moments." Journal of Business & Economic Statistics 20, no. 4 (2002).

Tabuga, Aubrey D. "International Remittances and Household Expenditures: The Philippine Case." Philippine Institute for Development Studies, 2007.

Tafere, Kibrom, Alemayehu Seyoum Taffesse, Seneshaw Tamiru, Nigussie Tefera, and Zelekawork Paulos. "Food Demand Elasticities in Ethiopia: Estimates Using Household Income Consumption Expenditure (HICE) Survey Data." ESSP II Discussion Paper 11. Addis Ababa: International Food Policy Research Institute/Ethiopia Strategy Support Program II, 2010.

Taylor, J. Edward. "Undocumented Mexico-U.S. Migration and the Returns to Households in Rural Mexico." American Journal of Agricultural Economics 69, no. 3 (1987): 626-38.

Taylor, J Edward, and Jorge Mora. Does Migration Reshape Expenditures in Rural Households?: Evidence from Mexico. Vol. 3842: World Bank Publications, 2006.

Tobin, James. "Estimation of Relationships for Limited Dependent Variables." Econometrica 26, no. 1 (1958): 24-36.

United Nations (UN). "UN/Migration Statistics." edited by United Nations: UNTV, 2013.

United Nations Children's Fund (UNICEF). "UNICEF Kenya Country Programme 2009-2013." Kenya: UNICEF, 2009.

United Nations Development Programme (UNDP). "Kenya's Youth Employment Challenge." In Discussion Paper. New York: United Nations Development Programme (UNDP), 2013.

United Nations Educational, Scientific and Cultural Organization (UNESCO) Institute for Statistics "UIS.Stat." edited by UNESCO, 2014.

Woodruff, Christopher, and Rene Zenteno. "Migration Networks and Microenterprises in Mexico." Journal of Development Economics 82, no. 2 (2007): 509-28.

———. "Remittances and Microenterprises in Mexico." UCSD, Graduate School of International Relations and Pacific Studies Working Paper (2001).

Wooldridge, Jeffrey M. Econometric Analysis of Cross Section and Panel Data. MIT press, 2010.

Working, Holbrook. "Statistical Laws of Family Expenditure." Journal of the American Statistical Association 38, no. 221 (1943): 43-56.

World Bank. "Kenya at the Tipping Point?" In Kenya Economic Update. Washington DC: The World Bank, 2010.

———. Migration and Remittances Factbook 2011. edited by World Bank. Second ed. Washington DC: World Bank 2011. doi:10.1596/978-0-8213-8218-9.

World Bank, Annual Remittances Data. "Annual Remittances Data." (2014).

World Bank, Development Data Group. World Development Indicators. 2014.

World Bank, Global Economic Prospects. "Economic Implications of Remittances and Migration." 2006.

Yang, Dean. "Coping with Disaster: The Impact of Hurricanes on International Financial Flows, 1970-2002." The BE Journal of Economic Analysis & Policy 8, no. 1 (2008).

Yang, Dean, and HwaJung Choi. "Are Remittances Insurance? Evidence from Rainfall Shocks in the Philippines." The World Bank Economic Review 21, no. 2 (2007): 219-48.

Zarate-Hoyos, German A. "Consumption and Remittances in Migrant Households: Toward a Productive Use of Remittances." Contemporary Economic Policy 22, no. 4 (2004): 555-65.