Examining Remittance Decay for Internal Migrants in Senegal

Lorayne Mercado and Saad Usmani

Abstract

The objective of this paper is to compare the patterns of international and internal migrant remitters over time. Remittances are important to study and there is evidence to suggest that they are a powerful tool in poverty mitigation. However, there is increasing concern regarding the sustainability of living standards for households highly dependent on remittances due to the remittance decay hypothesis. This paper uses data from the World Bank to examine this relationship for households in Senegal in 2009. We also test the impact of other demand, supply, and motivational factors that affect remittance behaviour. The results do not support the remittance decay hypothesis for international migrants but do provide significant evidence for remittance decay over time for internal migrants. Examination of the effect of remittance determinants reflects new findings as well as results both congruent and contradictory to those found in previous literature.

Introduction

The nature of migration and remittances are receiving increasing attention due to evidence illustrating its impact at mitigating poverty. Previous literature focuses primarily on international migrants, yet internal migration (individuals who emigrate within the country) and its impact on remittances, specifically in Senegal, is important to understand due to the country's rural and urban regional imbalances. Many rural areas in Senegal consist of unsustainable economic and environmental conditions that impact a household's ability to maintain the basic living necessities, thus heavily relying on remittances for support. For example, rural regions face large food shortages primarily attributed to climatic reasons such as inadequate rainfall or contaminated water.

Seeing that rural households heavily rely on remittances to sustain their everyday expenditures in areas such as food, health, education, and housing, it is important to study the sustainability of remittances over time. In African regions, remittances exceed official development assistance and foreign aid, and thus remittance patterns are inextricably linked to living standards within these regions. This speaks volumes of the implications of varying remittance patterns on living standards for remittance-receiving households. If remittance levels decrease over time, so will the living standards of these households, which is a concern for public policy.

This paper looks to examine changes and trends of internal migrant remittances to their origin households, relative to individuals who emigrated internationally, over time. We hypothesize that over time, relative to international migrants, there is decay in remittances from internal migrants. The intuition behind this is that both types of migrants relocate to seek better economic and job opportunities. Once they have relocated, their total income is sufficient enough to support themselves as well as send

money back home. Over time, international migrants, such as those who emigrate to Canada and the United States, receive better opportunities and higher income potentials compared to their internal counterparts and are able to send more money to their country of origin. On the other hand, we predict that because internal migrants have lower income potential, relative to international migrants, they plateau at a faster rate. Once they hit this plateau, their level of remittances decreases due to their need to sustain increasing costs such as rent, health care, and everyday consumption.

Furthermore, an alternative explanation for internal migrant remittance decay is that at some point in time, both types of migrants will choose to settle down and start a family. After this occurs, we predict an observable decrease in the absolute value of remittances sent home by the internal migrant. We postulate that international migrants would have better access to a higher amount of social services, including health care and education, compared to migrants in Africa. The lowered access to social and government assistance for internal migrants results in these individuals contributing a larger proportion of their income towards rearing dependents. To test for total amount of remittances sent to origin household through time, we use Tobit regression analysis using household survey data collected by the World Bank in 2009. To evaluate the motivation behind our hypothesis, we will look at the relationship of total remittances sent, whether the migrant is living alone and level of income. Furthermore, we look at other variables that might be a large determinant of total remittances sent home.

Although evidence illustrates the large impact of remittances on economic development, research on the topic is still fairly undeveloped. The main motivation of this paper is to add meaningful contributions to a topic that is significant but somewhat new to investigation. In addition, all previous literature regarding remittances over time focuses solely on international migrants. Taking things one step further, we aim to directly compare internal and international remittances and their trends through time.

The structure of the paper is as follows: first, we explain remittances, specifically focusing on their importance in Senegal and other parts of Africa. Next, we discuss related literature and how we plan to build further on previous research. We then delve into our data, methodology, and results. Finally, we explain our conclusion and limitations of our analysis.

Understanding Remittances

Remittances reflect household income from individuals who have moved, geographically, within or across national borders. Remitters are categorized as household members and non-household members. Household remitters are individuals who used to live in the household that they are remitting to; non-household remitters are individuals, such as a friend of the remittance-receiving household, who lived in a household different from the one they are remitting to. Remittances take the form of cash and noncash items that flow through formal channels, such as electronic wire transfers, or informal channels, like money or goods carried across borders. In 2013, recorded remittance flows across international borders into developing economies exceeded US $410 Billion (World Bank

2013). Furthermore, evidence illustrates that such flows are underreported and that remittances through informal channels could add at least 50 percent to the globally recorded flows (World Bank 2006).[1] Although volume growth can be partially attributed to better reporting, the World Bank states that remittance flows have exceeded private capital flows and other foreign assistance.

For centuries people have migrated across borders seeking better opportunities. According to the International Fund for Agricultural Development (2009), African migrants annually remit about US $40 billion across international borders back to their families and origin communities. For African regions, the total value of remittances sent across international borders exceeds official development assistance and foreign direct investment. In 2012, remittances became the largest source of foreign funding to Africa and represented 11 percent of recorded global remittances (African Economic Outlook 2013). Freund and Spatafora (2005) conclude that approximately 75 percent of total remittances sent across international borders to Africa are unrecorded. Remittances act as a stable support for African families, especially during a time when investment and aid flows are experiencing heavy market pressures.

Remittances in Senegal

Households in Senegal are highly dependent on both international and internal remittances to sustain their standard of living. Senegal is one of the top receivers of remittances in sub-Saharan Africa and is an important and increasing source of foreign financing for the country. According to the Development Research Centre on Migration (DRCM), there were approximately 480,000 Senegalese individuals who migrated to other countries in 2007. This represents about 4 percent of the country's total population. The World Bank (2010, 2011) estimates that international and internal remittances sent through formal channels tripled from 2001 to 2010. This is illustrated in Figures 1 and 2.

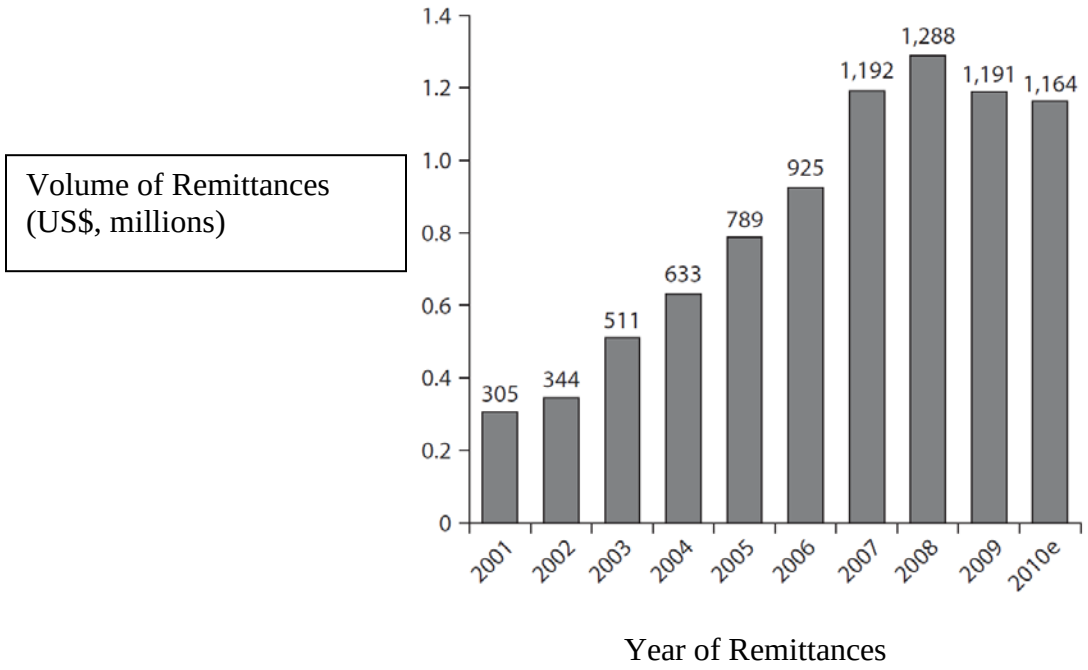
The true value of migrant remittances is difficult to calculate because a significant proportion is carried through informal channels, which is important for our research. Remitters likely use informal channels to decrease costs and avoid complexities. A 2007 survey conducted by the African Development Bank, collected information on both formal and informal remittance transfers. The survey provided the estimate that in 2005, inflows to Senegal totalled to CFA Francs 823 billion (19 percent of GDP).

Dynamics of the Remittances Transfer Marketplace in Senegal

The global remittances industry involves many money transfer intermediaries, known as remittance service providers (RSPs). RSPs consist of large and small businesses that can be licensed and unlicensed. The marketplace of RSPs is molded by various factors including the number of businesses actively involved, competition, government regulations and policies, the number of remittance services provided, and the demand for remittance services. RSPs fall under nonbank financial intermediaries (NBFI) (i.e. Western Union, Ria, and Moneygram), banks and credit unions, post offices, and

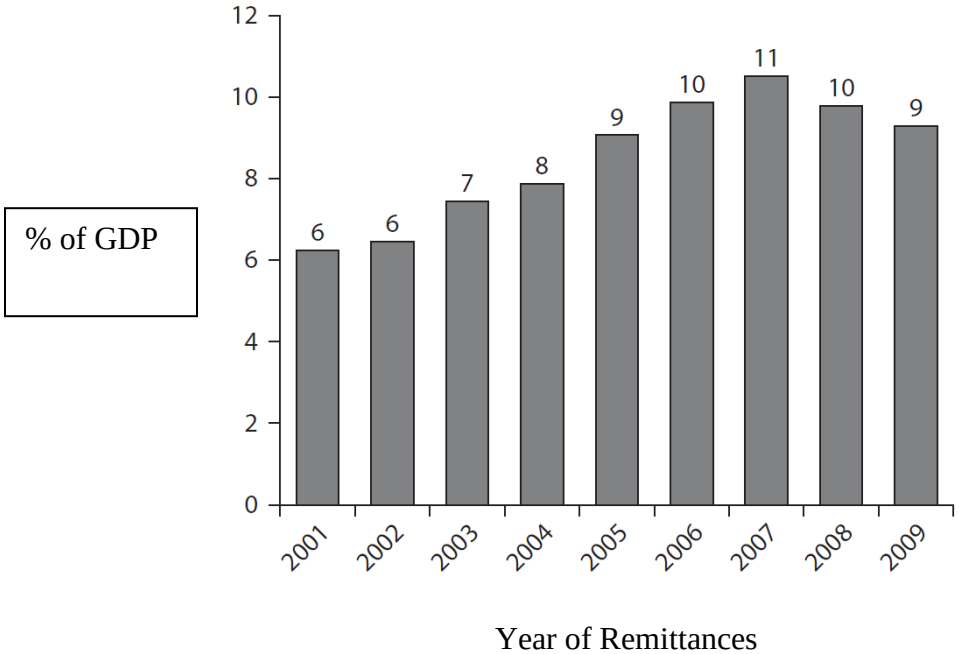
[1] The reporting of "small" remittances is not mandatory in most countries.

Figure 1: Volume of Migrant Workers' Remittances Sent to Senegal 2001-2010



Source: World Bank, 2010, 2011.
Note: Figures do not include remittances sent through informal channels

Figure 2: Migrant Workers' Remittances as a Share of GDP 2001-2009



Source: World Bank, 2010, 2011.
Note: Figures do not include remittances sent through informal channels.

informal intermediaries. Before the remittance is delivered to the receiving household, a number of participants become involved with the transaction. These participants include the RSP (a contracted agent who sells remittance transfers), the agent on the distribution side, and the financial institution used by the money transfer company to send the money. Remitters have the option to use any type of RSP, however, due to Senegal's money transfer and anti-laundering regulations, banks are the most popular institution to use.

Economic Significance of Remittances in Senegal

Remittances are the principal source for external financing to households in Senegal. Remittances received by households are mainly used for daily consumer expenditures and are followed by the expenditure of health, education, and rent. According to the World Bank (2011), 58.51 percent of remittances received by households are spent on everyday consumption. Table 1 illustrates the allocation of remittances for expenditures, according to the World Bank (2011).

Evidence shows that remittances have helped reduce poverty in Senegal. The second Senegalese Household survey by République du Sénégal, Ministère de l'Economie et des Finances (2004), illustrates how remittance transfers increased household expenditure by nearly 60 percent and reduced nationwide poverty by 31 percent. This survey also demonstrated that international migrants remitted higher volumes back to their home country when compared with national migrants. Moreover, migrants to Europe, The United States, and Canada are more likely to send remittances than individuals that emigrate within Africa and to other parts of the world. 81 percent of Senegalese migrants in Europe and 79 percent of Canadian and American migrants remit money back home. In comparison, only 60 percent West African Economic and Monetary Union members (UEMOA) and 65 percent of migrants in other African countries send money (Organisation internationale pour les migrations 2009).

Internal Migration and Remittances

Senegal currently faces interregional imbalances as many villagers from rural areas look to moving to urban centres such as Dakar, Diourbel, and Thies for economic development and employment opportunities. Certain conditions in rural areas such as food shortages and climactic factors such as inadequate rainfall also help to explain rural to urban migratory patterns in Senegal. Remittances are not enough to aid families in rural areas, and thus many individuals see migration to city centres as a solution to unsustainable living in rural areas. Therefore, the lack of a sustainable living environment and little financial assistance from migrant family members has increased migration to urban areas.

Related Research

The nature of remittances has only garnered significant attention recently, with most of the research focused on international remitters. This paper will build on previous, related literature to compare the patterns of international and internal migrant remitters

Table 1: Breakdown of Remittance Transfers Use, 2008 (% share of all transfers)

Use of Remittances	Number of Households Reporting (%)
Daily Consumption	58.51
Health	9.43
Education	3.59
Rent	12.57
Clothes	2.49
Car	0.15
Business	1.29
Others	11.98
Total	100

Source: World Bank, 2011.

over time. Gupta, Pattillo and Smita (2009) define remittances as a stable, private transfer where an individual is motivated to remit due to their altruism. They conclude that remittances have a direct poverty-mitigating effect in sub-Saharan Africa and promote financial investment. A shortcoming of this paper is that other pieces of economic literature, such as Brown's (1997a) paper conclude that there are other determinants for an individual to remit. Furthermore, Adams, Alfredo, and John (2008) study remittances, consumption, and investment in Ghana and also conclude that both internal (from Ghana) and international remittances (from Africa and other countries) decrease the level, depth, and severity of poverty in receiving households. The size reduction of poverty, however, is greater in households receiving international remittances. International remittance-receiving households saw a poverty reduction of 88.1 percent, while households receiving internal remittances experienced a 69.4 percent reduction in poverty. Evidence from this paper strengthens our intuition that, over time, international migrants exceed internal migrants' remittance levels, as higher levels of poverty reduction can be explained by larger volumes of financial aid (in the form of remittance).

Previous studies analyzing the behaviour of a remitter focus on the "remittance decay" hypothesis and their motives for remitting. The "remittance decay" hypothesis suggests that the amount of remittance sent by an individual declines as a migrant's length of absence increases and their ties to their origin country weaken. A study done by Brown (1997b) on the sustainability and determinants of remittances by Pacific Island migrants in Australia, conclude that time itself does not have a significant effect on migrants' remittance behaviour. Brown found that the percentage of migrants who remit decrease over time; however, the absolute remittance levels per remitter increase. Another study, by Simati and Gibson (1998) on migrants in New Zealand also found no evidence supporting the remittance decay hypothesis.

Some literature provides potential explanations of why remittances do not decay. Poirine (1997) suggests an idea of remittances as an implicit and informal loan agreement between family members and migrants (loan hypothesis). He hypothesizes that family members financially assist the individual to emigrate and this "loan" is paid back by the working migrant through remittances. In addition, Brown and Poirine (2005) theorize that remittances do not decline, due to a human-capital investment hypothesis. They argue that investment in the migrant's human capital is financed, as a loan would be, by the parents and later repaid by the working migrant through remittance. Once the loan is repaid, the migrant may become the source of financing for educational investment of the next generation of nonmigrants, implying that remittance decay would not occur. We will test these hypotheses to the case of Senegal by analyzing the effect of financial aid for emigration. We then will compare our findings as there is no additional research supporting these theories.

Brown's (1997b) paper will be the foundation of our research. The motivation of the study was the concern of sustainability of remittances and that economies dependent on remittances will experience declining living standards as migrant rates drop and if remittances decrease over time. Brown (1997b) uses survey data on Tongan and Western Samoan migrants in Sydney, Australia, and estimates remittance functions using Tobit regression analysis. He tests various determinants of remittances to analyze the validity of the remittance decay hypothesis and suggests that migrants are motivated by factors other than altruistic family support. Brown (1997b) uses a Tobit regression because the regression (remittances) in the sample include both remitters and nonremitters. Similarly, our dependent variable also includes both discrete (no remittances) and continuous (positive remittances) parts. Thus, we will also be using Tobit regression analysis to avoid the censored regression problem. Brown (1997b) explains that using the Tobit method yields consistent parameter estimates and each regressor has the same effect on the probability of whether or not a migrant remits and his remittance level.

Brown (1997b) categorizes motivations and determinants of remittances and classifies them as follows: demand-side pressures on a migrant from the receiving end (i.e. family ties); supply-side factors that affect a person's ability to remit (i.e. income); motivational characteristics that influence a migrant's decision to remit (i.e. altruism and self interest); and the duration of absence. We will be using these classifications to organize our chosen

variables for our analysis. These variables will be further discussed in the next section of the paper.

Data

The data set used in our analysis is the *Migration and Remittances Household Survey 2009*, which was collected by the World Bank in Senegal, Africa. The collection of these data spanned the time period October 2009 to November 2009. The dataset includes national representative information on three types of households: households without migrants, households with internal migrants, and households with international migrants.

The sampling procedure included two steps and distributed surveys to 2100 households. The first step was the selection of 100 districts with six sub strata–Dakar city high migration, Dakar city low migration, rural areas high migration, and rural areas low migration. Next, 21 households were selected in each sub sector—7 households without a migrant, 7 households with an internal migrant, and 7 households with an international migrant. Through this process, both household and individual level data were collected. For our analysis, we utilize the data file containing section 5 of the survey, *Internal and International Migration and Remittances from Former Household Members*, which excludes all observations from households without a migrant. This is because the aim of our analysis is to test the remittance decay hypothesis between internal and international migrants. Responses were structured according to unique household and person ID numbers. After removing observations that were missing variables necessary for our analysis, we were left with 1,266 total observations. A comprehensive list of the variables used is included in Table 2.

We use these data to analyze the determinants of the amount of remittances received by the household in the past year. Our dependent variable is the total amount (calculated in West African CFA Francs) of remittances sent by a migrant to their origin household within the past 12 months. Our first key independent variable used is the time (in years) a migrant has been living in their current location. In Brown's (1997a) study, he uses the length of absence since the individual's first migration to test for remittance decay. Unfortunately, our dataset does not include this information so we use *time spent in current location* as a proxy. We are limited in knowing the true length of time a migrant has been absent from their origin country because information about how many times a migrant has relocated, prior to their current residence, is unknown. To allow for non-linear decay, we also include a time-squared variable.

Our main objective is to analyze if remittance decay over time differs between internal migrants and international migrants. We therefore include a dummy variable to identify internal migrants. To specifically test for difference in time decay, we include interaction variables for internal migrants with both time and time squared. An important note for analysis is that during the time period June 2009 to September 2009, torrential seasonal rains in Senegal caused severe flooding in certain regions of the country (UN Office for

Table 2: Variables Used

Variable	Type	Definition
Dependent Variable:		
Remittances	Continuous	Total amount of remittances sent by migrant (internal/international) to HH in past 12months calculated in West African CFA francs
Independent Variables:		
Time	Continuous	Duration migrant has been living in current location calculated in years
Time_squared	Continuous	Time ^ 2
Internal_Migrant	Dummy	Equals 1 if Migrant migrated within Senegal; equals zero if international
Time*Internal	Continuous*Dummy (Interaction)	Time variable multiplied by the Internal Migrant variable
Time_sq*Internal	Continuous*Dummy (interaction)	Time squared variable multiplied by the Internal Migrant variable
Flood	Dummy	Equals 1 if the household in Senegal was in a region which experienced a flood during the year the survey was conducted
Internal*Flood	Dummy*Dummy (Interaction)	Internal Migrant variable multiplied by the Flood variable
Gender	Dummy	Equals 1 if Migrant is a female
Alone	Dummy	Equals 1 if Migrant lives alone in his current location
Employed	Dummy	Equals 1 if Migrant has full-time or part-time employment (including self employment); equals 0 if Migrant is a student, unemployed, retired, a housewife, sick or disabled, in military service or indicated a different status.
Migrant_a_spouse	Dummy	Equals 1 if Migrant is a spouse of the head of the household in Senegal
Migrant_a_child	Dummy	Equals 1 if Migrant is a child of the head of the household in Senegal
Fundedbymigrant	Dummy	Equals 1 if Migrant's first travel/migration was funded (even partially) by the migrant; equals 0 if he/she didn't fund their first travel/migration
Fundedbyparent	Dummy	Equals 1 if Migrant's first travel/migration was funded (even partially) by a parent; equals 0 if Migrant's parent(s) didn't do so
Support	Dummy	Equals 1 if Migrant received support from family/friends while residing in first migration location
Secondary	Dummy	Equals 1 if Migrant's highest schooling level completed before migration was either General Secondary Schooling or Technical/Vocational Secondary Schooling
Higherlevel	Dummy	Equals 1 if Migrant's highest schooling level completed before migration was Higher/University Level Schooling, Top-level Technical/Vocational Schooling, or Doctorate Level Schooling.

the Coordination of Humanitarian Affairs 2009).[2] Senegal typically experiences annual flooding, however, the severity and damages incurred in Senegal from the flood was of greater magnitude compared to previous trends. Over 600,000 people across West Africa were greatly affected, with Senegal being one of the hardest hit (United Nations 2009). Given that our data were collected from October to November 2009, we have to control for the impact of the flood on inflows of household remittances to Senegal. We add an additional control to test for the effect of the flood on internal migrants by using an interaction variable for internal migrants whose origin households are located in a flood-affected region. The reason we do this is because we assume that the flood may have also affected some internal migrants, thus influencing the total amount that they remit.

We also test Poirine's human capital hypothesis in the case of Senegal. In order to do this, we use dummy variables for an individual whose migration was self-funded (*fundedbymigrant*) or funded by a parent (*fundedbyparent*). To build on the notion of repaying some sort of social debt, we add a dummy variable for migrants who received any type of support from friends or family other than their parent (*support*). If the coefficient corresponding to the variable *fundedbyparent* is significant and positive, this implies that Poirine's theory holds. We incorporate the idea of supply and demand-side variables from Brown's (1997b) paper to help better explain remitting behaviours. For supply-side variables, we use the migrant's employment status and whether or not they live alone. Employment affects the degree to which a person is able to remit and having dependents living with the migrant in the host country decreases their propensity to remit. Demand-side factors that might impact remittances over time include a migrant's family ties to their household in Senegal, such as a spouse or parent. Moreover, we include a gender dummy variable as we hypothesize that being a female could negatively affect the amount of remittances sent. Finally, despite the lack of an income variable, we use *secondary* and *higherlevel* variables (indicating education level) as proxies. *Secondary* indicates whether or not the migrant's highest schooling level before migrating was secondary schooling (including general secondary schooling, as well as secondary technical/vocational schooling). *Higherlevel* signifies whether the migrant's highest schooling level, prior to emigrating, was a type of higher-level schooling such as university level education. Our intuition tells us that relative to other individuals, those with secondary level education will remit more back and those with higher-level schooling will remit even more. The summary statistics for these variables can be found in Table 3.

Methodology/Identification Strategy

Consistent with previous literature, we use the Tobit estimation model for our regression analysis. We use Tobit because of the large number of observations with values of zero for total remittances sent to household. The structural equation for the Tobit model is as follows:

$$y_i^* = X_i\beta + \epsilon_i$$

[2] Regions in sample unaffected by the flood: Diourbel, Louga, Tambacounda, Thies, Ziguinchor.

Here, the error term has a normal distribution with a mean at 0 and standard deviation of sigma-squared. The dependent variable is a latent variable that is censored for all values below zero but is defined and observed otherwise, thus the observed y is defined as (New York University n.d.):

$$y_i = \begin{cases} y^* & \text{if } y^* > \tau \\ \tau_y & \text{if } y^* \leq \tau \end{cases}$$

Our model is defined as:

$$\textit{Remittances}^* = \alpha + \beta_1 \text{Time}_i + B_2 \text{Time}_i^2 + B_3 \text{Flood}_i + B_4 \text{InternalMigrant}_i +$$

$$B_5 \text{Internal*Flood}_i + B_6 \text{Time*Internal}_i + B_7 \text{Time}^2\text{*Internal}_i + B_8 \text{Gender}_i + B_9 \text{Alone}_i +$$

$$B_{10} \text{Employed}_i + B_{11} \text{MigrantASpouse}_i + B_{12} \text{MigrantAChild}_i + B_{13} \text{FundedByMigrant}_i +$$

$$B_{14} \text{FundedByParent}_i + B_{15} \text{Support}_i + B_{16} \text{Secondary}_i + B_{17} \text{Higherlevel}_i$$

Where Remittances* is the latent variable in question and τ=0. The estimation of the Tobit model, in Stata, outputs coefficients that can be interpreted as the independent variables' (regressors) effect on the latent variable, Remittances*. Although estimates allow us to speak to the significance of the regressors, they only result in one unstandardized coefficient for independent variables, even though there are cases where the dependent variable is 0 and other cases where it is positive (Roncek 1992). Decomposing the Tobit results into estimates that compute the following coefficients for the various independent variables solves this problem:

1) The marginal effect on the probability that the dependent observation is positive;
2) The marginal effect on positive observations;
3) The marginal effect on the actual dependent variable (McDonald and Moffitt 1980) (Spermann 2009).

Results

The estimated results for the original Tobit coefficients, as well as the marginal results are found in Table 4. First we discuss the results for the main variables in question, specifically, the effects of time and placement of migration. Next, we detail the results of the demand, supply, and motivational control variables.

After controlling for multiple variables, our findings fail to support the remittance decay hypothesis in the case of international migrants with households in Senegal. This is in line with some of the previous literature, specifically, that of Brown (1997a). The coefficients for time, contrary to the decay hypothesis, illustrate a positive relationship between time spent in the migrants' current location and the marginal effects for the

Table 3: Summary Statistics

	Mean	Standard Deviation	Observations
Remittances	548889.8	783639.3	1266
Time	9.23	7.88	1266
Flood			756
Internal			515
International			751
Male			1085
Female			181
Alone			413
Not Alone			853
Employed			1084
Migrant a Spouse			170
Migrant a Child			652
Migration self-funded			804
Migration funded by parents			486
Support			902
Secondary level schooling			282
Higher level schooling			148

All Migrants

Time (years)	**Count**
[0-6)	505
[6-11)	418
[11-16)	124
[16-21)	113
[21-26)	44
[26-31)	31
[31-36)	14
[36-41)	12
[41-46)	1
[46-51)	2
[51-56)	0
[56-61)	2

International

Time (years)	**Count**
[0-6)	273
[6-11)	256
[11-16)	82
[16-21)	76
[21-26)	27
[26-31)	22
[31-36)	11
[36-41)	8
[41-46)	1
[46-51)	1
[51-56)	-
[56-61)	-

Internal

Time (years)	**Count**
[0-6)	232
[6-11)	162
[11-16)	42
[16-21)	37
[21-26)	17
[26-31)	9
[31-36)	3
[36-41)	4
[41-46)	0
[46-51)	1
[51-56)	0
[56-61)	2

Total	1266	757	509

probability of remitting and the amount remitted as a whole, but are insignificant at 0.10 level. The same is true for the non-linear time-squared relationship. We conclude that our model provides no evidence that remittances to households decrease over time for international migrants.

Our estimates show that the marginal effects on being an internal migrant are large negative values, and these coefficients are significant at the 0.05 level. An internal migrant is 26 percent less likely to remit compared to international migrants and, on average remits, 442,372 less West African CFA Francs. This observation is congruent with previous literature on remittances in other countries where international remittances are observed to reduce poverty at a much higher level than internal remittances. This could reflect higher earning potential abroad as opposed to opportunities within the country as other literature suggests. However, we are unable to prove this due to the absence of an income variable in the survey.

The model proves to be most interesting when analyzing the remittance decay effect for internal migrants relative to international migrants. By using an interaction variable between internal migrants and time, we find that, although the linear remittance decay effect is insignificant, a non-linear time-squared remittance decay effect appears to be significant at the 0.05 level. This supports our initial hypothesis that the remittance decay effect is present for internal migrants relative to international migrants. Figures 3 and 4 (created using averages from the raw data) display the relationship between remittances and time for both internal and international migrants and further support our findings. The average remittances from international migrants, while falling briefly for those in the 31-36 age group illustrates an overall positive trend over time. For the internal migrants however, the graph conveys a steep fall in remittances after the age of the migrant reaches 31.

While the mechanisms behind our intuition suggest that it is the difference in earning potential over time that could explain this variance, we are unable to justify this because of the lack of an income variable. Furthermore, our *alone* variable is insignificant at 0.10 level, thus our postulation that internal migrants have to contribute a greater share of their income towards raising their dependents prove to be inconclusive. We realize that the *alone* dummy variable does not specify if the individual is living with a dependent, in which case they would have to financially support them, or a non-dependent such as a roommate or friend. We conclude that our results reflect a relative decline for internal migrant remittances over time likely as a result of the difference in earning potential within Senegal versus other countries individuals migrate to.

The flood coefficients, while significant at the 0.05 level, had results contrary to our intuition. We postulated that the regions severely affected by the flood would receive a higher volume of remittances, but actually received considerably less from international

Table 4: Marginal Effects After Tobit

	Tobit Coefficients (P-Value)	Marginal effect for P(y>0|x) (P-Value)	Marginal effect for E(y|x,y>0) (P-Value)	Marginal effect for E(y|x) (P-Value)
Time	12744.08	0.0053987	7024.039	9786.471
	(0.201)	(0.201)	(0.201)	(0.201)
Time_squared	184.60	0.0000782	101.7427	141.7563
	(0.536)	(0.536)	(0.536)	(0.536)
Flood	-284367.5	-0.11645	-160235.1	-221503.2
	(0.000)**	(0.000)**	(0.000)**	(0.000)**
Internal_Migrant	-600279.5	-0.264297	-318330.6	-442372.2
	(0.000)**	(0.000)**	(0.000)**	(0.000)**
Internal*Flood	273695.4	0.1063601	159457.6	218411.8
	(0.001)**	(0.001)**	(0.003)**	(0.002)**
Time*Internal	15744.08	0.0066696	8677.524	12090.24
	(0.29)	(0.29)	(0.29)	(0.29)
Time_sq*Internal	-1001.73	-0.0004244	-552.1145	-769.2514
	(0.025)**	(0.025)**	(0.024)**	(0.024)**
Gender	-128559	-0.0569717	-68459.5	-96056.2
	(0.061)*	(0.073)*	(0.053)*	(0.054)*
Alone	-47382.57	-0.0202369	-25961.28	-36219.49
	(0.312)	(0.316)	(0.309)	(0.310)
Employed	200205.4	0.0907505	104561.8	147134.9
	(0.002)**	(0.004)**	(0.001)**	(0.001)**
Migrant_a_spouse	571398.4	0.1880867	363211	480001.7
	(0.000)**	(0.000)**	(0.000)**	(0.000)**
Migrant_a_child	52840.81	0.0224088	29099.89	40548.97
	(0.258)	(0.258)	(0.257)	(0.257)
Fundedbymigrant	120547.1	0.0519285	65616.52	91647.51
	(0.065)*	(0.069)*	(0.062)*	(0.062)*
Fundedbyparent	184983.9	0.0766274	103501.8	143528.8
	(0.003)**	(0.002)**	(0.003)**	(0.003)**
Support	-18493.65	-0.0078015	-10223.39	-14233.71
	(0.701)	(0.700)	(0.702)	(0.702)
Secondary	96214.16	0.0396419	54050.89	74929.61
	(0.071)*	(0.063)*	(0.076)*	(0.074)*
Higherlevel	197091.4	0.0768588	114626.1	157240.2
	(0.004)**	(0.002)**	(0.006)**	(0.005)**
	Pseudo R^2= 0.0079			
	N= 1249	**= significance level at the 0.05 level		*= significance level at the 0.10 level

Figure 3: International Migrants Average Remittance

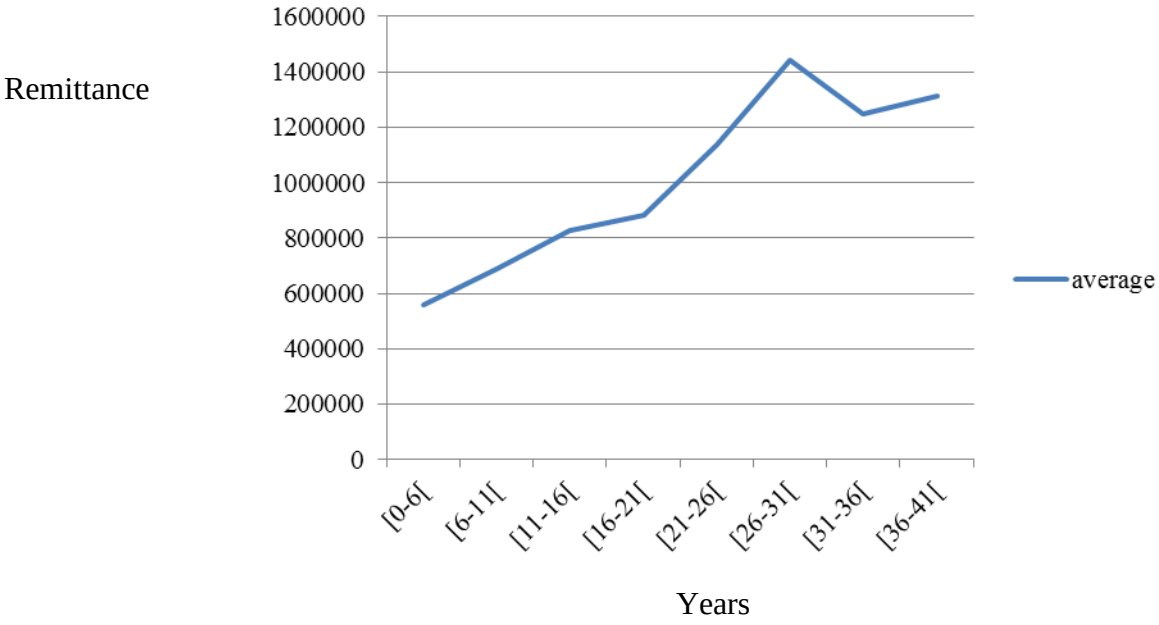
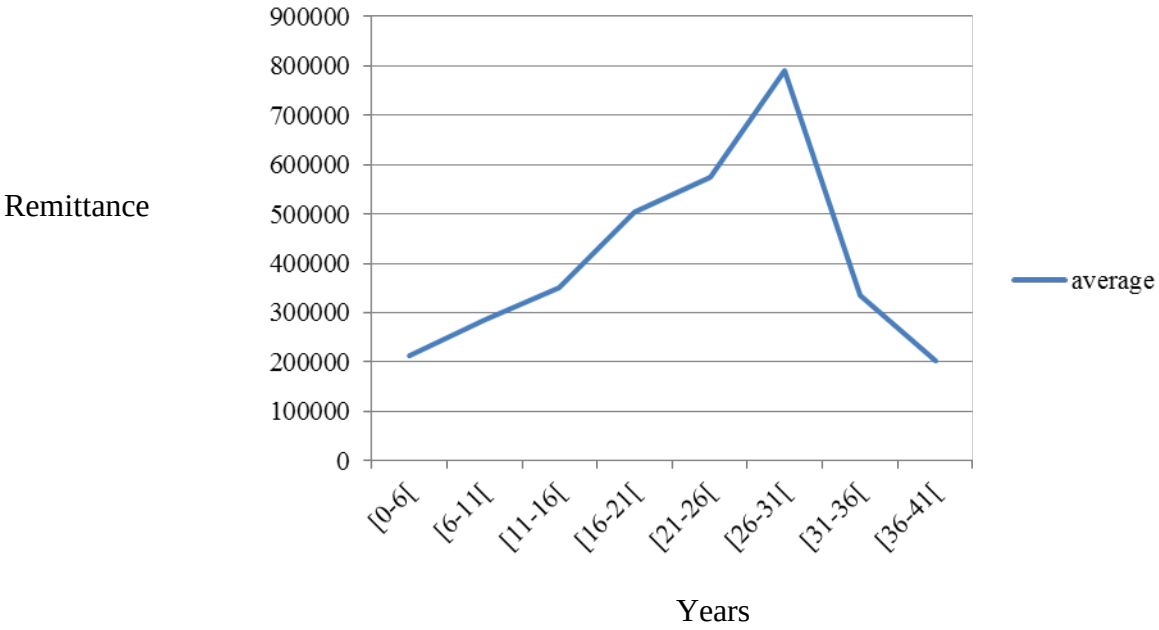


Figure 4: Internal Migrants Average Remittance



migrants compared to the amount sent to unaffected regions. An implication to why the affected regions received less remittances is that these areas might be wealthier and thus do not need as much financial support, in the form of remittances, in the event of a natural disaster. For example, Dakar city was greatly affected, however, as Senegal's capital, it may have had enough resources to repair damages without any help from international remitters. Furthermore, the affected regions may be areas that are most susceptible to flooding, regardless of the severity of the flood, thus already have disaster plans, support, and insurance already set in place and would not need as much additional help from remitters.

We also predicted that internal migrants would remit less than their international counterparts to these regions because of the possibility that the flood also affected them. Our results show that internal migrants remitted more compared to international migrants and were significant at the 0.05 level. This result suggests that internal migrants remit more during a natural disaster compared to their international counterparts. A possible explanation for this result is that internal migrants are more closely impacted by the disaster and thus are more willing to help their families. Ultimately, the results regarding the flood have left us with unanswered questions. We know that the regions of Dakar, Fatick, Kaolack, Kolda, Matam, and St-Louis were affected by the flood according to Red Cross reports (International Federation of Red Cross 2009), but due to the lack of granular data available in these regions, we are unable to test variables that are unique to the affected areas (or unaffected areas) that would produce this result.

We predicted that the *gender* variable would be significant and in our model we arrived at a result significant at the 0.10 level that illustrated that females have a lower probability to remit and on average remit less.

The demand, supply, and motivational regressors included in our model achieved mixed results. The employed regressor displayed coefficients that were statistically significant at the 0.05 level. According to the model, those with part-time or full-time jobs were roughly 9 percent more likely to remit and, over the whole sample, on average remitted 147,135 more West African CFA Francs than those with a differing employment status. Contrary to results from Brown's (1997b) paper, our estimates display inconclusive evidence that, on the margin, those with a parent in their origin country remit more. This could be as a result of the variable only considering the household head, as opposed to the existence of a parent back home in general. However, our model does provide statistically significant evidence that a migrant with a spouse back home remits more. These individuals on average are 19 percent more likely to remit and, in general, remit 480,002 Francs more than those individuals without this relationship. Further building on the results in Brown's (1997b) paper, we find that our analysis also provides evidence for indebtedness to the home community. Those migrants whose first migrations were funded by their parents, in Senegal, were on average 7.7 percent more likely to remit and remitted 143,529 Francs more. These coefficients are shown to be statistically significant at the 0.05 level in our model.

In addition, our initial intuition that those who self-funded their migration were likely to remit less proved to be incorrect according to our results, which were significant at the 0.10 level. Instead these migrants were 5.2 percent more likely to remit than other migrants and on average remitted 91,648 more. This could be because migrants who self-funded their migrations represent more responsible individuals who not only are relatively better at attending to their own needs but the needs of their family as well. Support provided by friends or family in first migration location proved to have insignificant meaning in our model.

Finally, the education variables used came out to be statistically significant in our results. Those with secondary level schooling on average remitted 74,930 more while those with higher-level schooling remitted 157,240 more. This closely aligns with our initial hypothesis.

Conclusion

In this paper our aim was to build on previous economic literature on remittances and specifically examine if the remittance decay hypothesis differs between internal and international migrants in Senegal. Our findings confirmed previous work done by Brown (1997a) as we failed to find statistically significant results that supported the remittance decay hypothesis. We did, however, find there to be a statistically significant non-linear remittance decay effect for internal migrants relative to international migrants. This may be explained by the difference in income earning potential between individuals within Senegal and those residing and working in countries outside of Senegal. We also found that internal migrants, on average, remit less than international migrants, likely for the same, aforementioned reasons. By testing the effect of the flood affected regions, that year, we arrived at the surprising results that flooded regions received less remittances from international migrants than unaffected regions and that internal migrants remitted more to these regions than their international counterparts. The lack of granular data available on the specific regions over time makes it difficult to fully understand the mechanisms behind these results. We believe that the first result could be explained by differences in wealth between the two groups of regions. The second conclusion is possibly the result of a closer social bond between the affected families and the internal migrants. Moreover, we saw that females, on average, remit lower amounts than men.

The demand, supply, and motivational regressors analysis adopted from previous research also proved to be useful in explaining remittance behaviour in Senegal. Full-time/part-time employment, for one, reflected a tendency to remit more. In contrast to Brown's (1997b) findings, we could not conclude that migrants with a parent back in Senegal remitted more, but it was the case that migrants with a spouse in Senegal did. Our results did, however, mirror Brown's when examining migrant indebtedness to the home community, as migrants whose parents funded their initial migration gave more back through remittances. The same applied to migrants who funded their own migration in any capacity. Given the lack of income data, education can potentially be seen as an avenue of building earning potential and our findings suggest that higher-level education is associated with larger amounts of remittances being sent back home.

Considerations

While our findings are intriguing and relatively new within the field of remittances, the lack of data raises further questions. We believe the most important variable currently missing for our analysis is income, which could provide great explanatory power to our regression. The surprising results from our flooded regions testing also led us to believe that granular data on the regional level would greatly benefit remittance analyses. Details about the differences in wealth, as well as differences in aid provided to these regions, could provide greater insight into the results. The final vital missing piece of information is the number of dependents for the migrant. While we tried to use the alone variable to control for this, we did not know the specifics behind this variable, only if the migrant lived alone or with another person. These limitations represent reasonable concerns towards the conclusiveness of our results.

References

Adams, Richard, Jr., Alfredo Cuecuecha, and John Page. 2008. "The Impact of Remittances on Poverty and Inequality in Ghana." Policy Research Working Paper 4732, World Bank, Washington, DC.

African Development Bank. 2007. "Migrant Remittances: A Development Challenge."

African Economic Outlook. 2013. "Remittances - African Economic Outlook." June 9. Accessed January 15, 2014. http://www.africaneconomicoutlook.org/en/outlook/financial_flows/remittances/

Brown, Richard, P.C. 1997a. "Do Migrants' Remittances Decline Over Time? Evidence from Tongans and Western Samoans in Australia." *The Contemporary Pacific* 10(1):107-151.

_____. 1997b. "Estimating Remittance Functions For Pacific Island Migrants." *World Development* vol. 25(4) January: 613-626.

Brown, Richard P.C., and Bernard Poirine. 2005. "A Model of Migrants' Remittances with Human Capital Investment and Intrafimilial Transfers." *International Migration Review* 39(2): 407-438.

Development Research Center on Migration, Globalisation and Poverty. 2007. “Global Migrant Origin Database.” Accessed February 23, 2014. http://www.migrationdrc.org

Freund, Caroline, and Nikola Spatafora. 2005. "Remittances: Transaction Costs, Determinants, and Informal Flows." Policy Research Working Paper 3704, World Bank, Washington, DC.

Gupta, Sanjeev, Catherine Pattillo, and Wagh Smita. 2009. "Effect of Remittances on Poverty and Financial Development in Sub-Saharan Africa." *World Development* 37(1): 104-115.

International Federation of Red Cross. 2009. "Operations Update: Senegal Flood." October 2. Accessed February 9, 2014. http://www.ifrc.org/docs/appeals/09/MDRSN00201.pdf

International Fund for Agricultural Development. 2009. "Sending Money Home to Africa." Accessed February 8, 2014. http://www.ifad.org/remittances/pub/money_africa.pdf

McDonald, John, F., and Robert A. Moffitt. 1980. "The Uses of Tobit Analysis." *Review of Economics and Statistics* 62 (2): 318-321.

New York University. "Tobit Models." Accessed February 8, 2014. https://files.nyu.edu/mrg217/public/tobit1.pdf

Organisation Internationale pour les Migrations. 2009. "Migration au Sénégal, Profil national 2009." http://publications.iom.int/bookstore/free/Senegal_Profile_2009.pdf

Poirine, Bernard. 1997. "A Theory of Remittances as an Implicit Family Loan." *World Development* 25 (4): 589-611.

République du Sénégal, Ministère de l'Economie et des Finances. 2004. "Enquête Sénégalaise Auprès des Ménages (ESAM II)". Rapport national., République du Sénégal, Ministère de l'Economie et des Finances.

Roncek, Dennis, W. 1992. "Learning More From Tobit Coefficients: Extending a Comparative Analysis of Political Protest." *American Sociological Review*: 503-507.

Simati, Aunese, Makoi, and John Gibson. 1998. "Do Remittances Decay?: Evidence from Tuvaluan Migrants in New Zealand." Thesis, University of Waikato.

Spermann, Alexander. 2009. "Tobit-Model." University of Freiburg.

UN Office for the Coordination of Humanitarian Affairs. 2009. "West Africa - Flood Affected Population June to September 2009." September 28. Accessed January 21, 2014. http://reliefweb.int/map/benin/west-africa-flood-affected-population-june-september-2009-24-sep-2009

United Nations. 2009. "Floods affect 600,000 people across West Africa, UN reports." September 8. Accessed Jaunary 25, 2014. http://www.un.org/apps/news/story.asp?NewsID=31978#.Uz2l28fHIyI

World Bank. 2006. "Global Economic Prospects: Economic Implications of Remittances and Migration." Washington, DC: World Bank.

_____. 2011. "Migration and Remittances Factbook." Accesssed February 12, 2014. http://go.worldbank.org/QGUCPJTOR0

_____. 2010. "World Development Indicators." Accssed February 12, 2014. http://data.worldbank.org/data-catalog/world-development-indicators/ wdi-2010

World Bank, The. 2013. "Developing Countries to Receive Over $410 Billion in Remittances in 2013." Press Release, Washington: The World Bank.