Remittances and Savings from International Migration:

Theory and Evidence Using a Matched Sample

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Abstract

A central question is how remittance flows will impact origin households in sending regions. This paper represents the first attempt to address this question using a matched sample of international migrants and their origin families. I investigate two types of remittances: transfers to the origin family and savings in the country of origin. Empirical evidence provides support for the altruistic model of transfer behavior, in that richer origin families tend to receive lower transfers, other things being equal. However, remittances sent to finance origin investments are positively associated with origin household income. The estimation strategy addresses common problems that arise in investigating remittance behavior.

I. INTRODUCTION

Remittances from international migration may have a substantial impact on households and economies in developing regions. Over the past decade, remittances to developing countries have grown, reaching $80 billion and surpassing official development assistance (World Bank, 2003).[1] Migrants' remittances are currently ranked as the second largest source of external inflows to developing countries after foreign direct investment (FDI). Despite their economic magnitude, transfers between international migrants and their households of origin remain a relatively understudied aspect of international resource flows.

A central question is how remittance flows will impact origin households in sending regions. Much of the early work on migrants' remittances suggests that transfers are mainly sent towards the consumption needs of the origin household, or to provide economic support during periods of income shocks. However, recent evidence also points to the significant economic potential of remittances when they are invested in the origin environment. In particular, migrants' remittances may finance investments in the country of origin in the form of land and housing acquisition, financial assets, and microenterprises (Dustmann and Kirchkamp, 2002; Mesnard, 2004; Woodruff and Zentino, 2001). Because migrants' savings can contribute significantly to capital accumulation in the country of origin, both origin and host country governments have begun to show interest in this aspect of international remittances.

This paper contributes to the existing literature by jointly examining the migrant's decisions to save and to transfer resources to the origin household. I extend the seminal model (Galor and Stark, 1991) to study the migrant's savings allocation decision. The key insight in the model is that migrants can choose to save in the origin country and the host country. I also recognize that migrant's remittances include transfers to the origin household. Distinguishing between migrants' savings and their family transfers is crucial because they have different implications for economic development in the origin country. The model provides testable predictions for how migrant and origin household characteristics will impact savings in the origin and host countries and transfers to origin families.[2]

[1] Most estimates of remittances are based on balance of payments statistics reported to the IMF by central banks and often represent an underestimate of migrant remittances since remittance flows also occur through informal channels (World Bank, 2003). For low-income countries, remittances are 213.5 percent of FDI inflows and 120.6 percent of all official flows.

This paper uses a new matched sample of both international migrants and their origin households to investigate remittance flows. The U.S.-Nigeria Migration Study is the first dataset to provide a comprehensive picture of international migrants and their origin families. This unique dataset also contains information on migrants' savings in the origin and host country, as well as migrants' transfers to family members in the country of origin. Economic theory makes clear that data on both sending and receiving households are required in order to understand the motivations for migrants' remittances to the country of origin. However, most existing studies rely on data from the migrant, or data solely obtained from the origin family.

Empirical results in this paper provide support for the theoretical model. In particular, I find that the migrants' motives for sending transfers to the origin family may differ in significant ways from saving their motives for saving in the origin environment. Migrants' transfers to the origin family are consistent with altruistic motives, in that poorer origin families tend to receive larger transfers, other things being equal. However, remittances sent to finance investments in the country of origin (origin savings) are positively associated with origin household resources. Migrant and origin family characteristics also have different implications for origin savings compared to savings in the host country. The empirical work addresses two common problems that arise in investigating remittance behavior: omitted variable bias and the measurement of origin household resources. First, by using independent measures of the economic circumstances of both the migrant and the origin household, it is possible to improve upon studies that rely on data obtained from one side of the migrant-origin family transaction. Second, measures of origin household wealth may be an endogenous variable or may even be contaminated if they include assets that are owned by absentee family members.

The rest of the paper is organized as follows: Section II outlines the theoretical model used in this paper. Section III presents the data sources. Section IV discusses results. In Section V, I present conclusions.

II. A MODEL OF MIGRANTS' SAVINGS AND TRANSFERS

The goal of the next section of the paper is to present a conceptual framework for the migrant's

transfers to the origin family and savings decisions. Based on direct observations from field work and data collection, migrants send remittances mainly to provide economic support to the household of origin as well to accumulate savings in the origin country such as land, housing, microenterprises, and financial assets.[3]

The migrant's objective function is given below as a strictly concave, time separable utility function defined over first and second period consumption and origin family utility in period 1. Migrants live for two periods while the origin family only lives for one period:[4]

$$W(c_1, c_2, \psi(c_f)) = U_1(c_1) + BE[U_2(c_2)] + \alpha\,\psi(c^f) \qquad (1)$$

In the above equation (1), the utility of the migrant depends on the consumption of the migrant in period 1, the consumption of the migrant in period 2, and the utility of the origin or home family, $\psi(.)$. The expectations operator, E, captures uncertainty, and prices are normalized to 1. B represents the discount rate on the migrant's second period utility, and is defined to be greater than zero. The importance of the origin family in the migrant's utility function is represented above by the weight α, that the origin family occupies in the migrant's utility function. This weight, α, may provide an important source of unobserved heterogeneity across migrants ($0<\alpha<1$).

The origin family's utility, $\psi(.)$ is a function of origin family consumption, c^f in period 1. Origin household consumption, (c^f), depends on the origin family income generated in the origin country, y^f, and remittances from the migrant, r, in period 1. I assume that the origin family's utility function, $\psi(.)$ is concave and twice continuously differentiable.

Migrants save in order to finance second period consumption. The savings behavior of migrants has often been linked to the probability of return migration to the country of origin (Galor and Stark, 1990; 1991; Dustman, 1994). Migrants face some probability of return migration and save in order to

[3] Information costs, capital restrictions, borrowing constraints, or utility from investing in the origin assets may also affect the origin investment decision.

[4] The migrant transfers, r, to the origin family in the first period only, given that the origin family does not survive to the second period. The justification here is that migrant's family members often consist of elderly parents.

smooth their consumption across locations. In the event that return migration takes place, migrants earn a lower wage in the origin country. To capture this possibility, I introduce an exogenous parameter, *p,* to measure the probability that the migrant returns to the origin country in period 2, where *p* lies between 0 and 1.[5] The migrant's second period consumption is c_2^h if return migration takes place, and c_2^m if the migrant remains in the host country:

$$(\mathrm{U}(c_1, c_2, \psi\ (c^f)) = U_1(c_1^m) + B[p\ V_2(c_2^h) + (1-p)\ V_2(c_2^m)] + \alpha\ \psi\ (c^f) \quad (2)$$

The migrant maximizes utility subject to the budget constraints. In the migrant's first period budget constraint, c_1^m refers to the migrant's consumption in period 1, y_1^m represents the migrant's income in period 1, *r* is the migrant's transfer to the origin family in period 1, *s* represents migrants' savings[6] and consists of migrant's assets in the country of origin, s^h , and assets in the host country, s^m :

$$c_1^m = y_1^m - r - s^h - s^m \quad (3)$$

$$s = s^h + s^m \quad (4)$$

Migrants may choose to accumulate assets in the origin and host country where the expected returns to saving differ across locations. The migrant can invest in a "safe" asset (a savings account in the host country) or a "risky" asset in the origin country. While host country assets (for example, a U.S. savings account) earn a constant return, *R*, which is known, origin country assets (Nigeria) are considered to be "risky" because migrants incur costs in monitoring these assets (such as housing, land, or microenterprises) while they reside abroad.[7] In the event that the migrant returns to the country of origin, the net returns to origin assets, R_h, are relatively high due to the lower costs of monitoring. However, if

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[5] The parameter, *p,* is meant to capture exogenous events such as deportation, death, or illness of a family member in Nigeria that may induce the migrant to undertake return migration (see Dustmann, (1997) for a model in which the probability of return may be considered as an endogenous parameter).

[6] I ignore the costs of moving savings across locations (i.e., between the origin country and the host country).

[7] Origin country assets may be also riskier due to weak investor protections and unstable macroeconomic conditions.

the migrant remains in the host country (U.S.), then the monitoring costs for the origin assets will be relatively high, and the net returns to investing in the origin country asset, R_m will be low. I assume that R, R_m and R_h are exogenous and $0< R_m<R<R_h$.

The migrant's second period origin country income, y_2^h, represents income in the event of return migration, while y_2^m is the migrant's income in the case that the migrant remains in the host country where $y_2^h < y_2^m$.

Thus, the migrant's budget constraint in period 2 is given below:

$$\begin{aligned} c_2^h &= y_2^h + Rs^m + R_h s^h \quad \text{with probability } p \\ c_2^m &= y_2^m + Rs^m + R_m s^h \quad \text{with probability } (1-p) \end{aligned} \tag{5}$$

Substituting constraints (3)-(5), the migrant's problem can be written as follows:

$$max\{ U_1 (y_1^m - r - s) + BE[pV_2 (y_2^h + Rs^m + R_h s^h) + (1-p)V_2 (y_2^m + Rs^m + R_m s^h)] + \alpha \psi (y^f + r)\} \tag{6}$$

Assuming interior solutions for remittances and savings,[8] the migrant's first order conditions are shown below:

with respect to r :

$$r: \quad -U'_1 (c_1) + \alpha \psi' (c^f) = 0 \tag{7}$$

with respect to s^m:

$$s^m: \quad -U'_1(c_1) + BR\{[pV'_2 (c_2^h) + (1-p)V'_2 (c_2^m)]\} = 0 \tag{8}$$

with respect to s^h:

$$s^h: \quad -U'_1(c_1) + B\{[R_m pV'_2 (c_2^h) + (1-p) R_h V'_2 (c_2^m)]\} = 0 \tag{9}$$

This implies:

$$U'_1 (c_1) = \alpha \psi' (c^f) \tag{10}$$

$$(1-p) (R - R_m)[V'_2 (c_2^m)] = p (R_h - R) [V'_2 (c_2^h)] \tag{11}$$

$$U'_1(c_1) = BR\{[pV'_2 (c_2^h) + (1-p)V'_2 (c_2^m)]\} \tag{12}$$

From the first order condition (7) above, at the margin, a decrease in the migrant's utility resulting from a transfer to the origin family is offset by an increase in utility to the origin household from

the migrant's transfer. The migrant's first order condition (8) with respect to savings, *s,* also yields some insights. Equation (8) states that the migrant's marginal utility in period 1 is equal to the expected discounted marginal utility of consumption in period 2. At the margin, a decrease in utility in period 1, resulting from an increase in the migrant's savings in period 1 is offset by an increase in the migrant's utility in period 2 that results from higher migrant savings in period 1. From equation (11), the migrant will equate marginal utility of consumption in period 2 across states.

The theoretical model above develops predictions for how migrant and origin family characteristics will affect the migrant's decision to send transfers to the family of origin. First, transfers to the origin family are predicted to increase with the income of the migrant, y_1^m, and decrease with the income of the origin family, y^f.

Second, the model provides predictions for migrant savings in the origin country. In particular, migrants will increase their origin savings as the current income of the migrant and origin household increases. Thus, migrants from high-income origin households are expected to have relatively high levels of origin savings, but will have relatively low levels of transfers to their origin households.

Finally, the model predicts that the migrant's contingent second period income in the event of return to the origin country, y_2^h, will have different implications for transfers, r, and origin savings, s^h. In particular, migrant's origin savings will fall as the migrant's second period income y_2^h, in the event of return migration increases. Therefore, migrants with higher expected future incomes in the event of return migration are expected to be sending relatively large transfers to the origin families but will have relatively low levels of origin savings. Intuitively, this is because an increase in second period return migration income, y_2^h, reduces the migrant's "need" to save towards second period consumption. In addition, an increase in the migrant's contingent second period income, y_2^h, will increase migrants' savings in the host country.

The main results that obtain from the model are summarized below: [9]

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[8] I assume that an interior solution exists as most migrants in my sample report sending transfers. This can also be justified because monetary transfers tend to flow from the migrant to the origin family, and not vice versa.

[9] Comparative statics are detailed in an appendix, which is available from the author.

(R1): Normality of choice variables: $\frac{dr}{dy_1^m} > 0, \frac{ds^h}{dy_1^m} > 0, \frac{ds}{dy_1^m} > 0, \frac{ds^m}{dy_1^m} > 0$

(R2): Standard altruism responses: $\frac{dr}{dy^f} < 0, \frac{ds^h}{dy^f} > 0, \frac{ds}{dy^f} > 0, \frac{ds^m}{dy^f} > 0$

(R3): Migrant's future income in event of return[10]: $\frac{dr}{dy_2^h} > 0, \frac{ds^h}{dy_2^h} < 0, \frac{ds}{dy_2^h} < 0, \frac{ds^m}{dy_2^h} > 0$

The model provides predictions for how migrants and origin family characteristics will affect the migrant's decision to send transfers to the relatives and to save in the origin country, and these are summarized below.

Variable	Transfers to Origin Family, r	Savings in Origin Country, s^h	Savings in Host Country, s^m
Migrant's first period income, y^m	Positive	Positive	Positive
Migrant's contingent second period origin income, y_2^h	Positive	Negative	Positive
Origin Household's resources, y^f	Negative	Positive	Positive

From the above, the comparative statics results depend on migrant and origin family characteristics. Transfers to the origin family, *r,* and savings, *s,* can be modelled as a function of the migrant and origin household's income, y^m and y^f, respectively.

III. DATA AND EMPIRICAL SPECIFICATION

The study of transfers and savings within the context of international migration requires high quality data on migrants and their origin families. I use a matched sample of Nigerian immigrants in Chicago and their origin families in Nigeria to closely examine the transfer of resources among locationally distant family members.

i. Empirical Specification

From the theoretical model presented in Section III, the transfer to the origin family, *r,* sent by the migrant household (or received by the origin household) can be modelled as a function of the migrant and

origin household's income, and the migrant's contingent second period income, y^m , w^f, and y_2^h respectively. The reduced form expression for r also includes the migrant's weight on the origin household's utility function, which is unobserved, represented by a vector of variables Z. The error term is captured by $\varepsilon_{li.}$

$$r_i = \mu_r + B_1 y_1^m + B_2 w^f + B_3 y_2^h + B_4 Z + \varepsilon_{li} \qquad (12)$$

The parameters of interests in the above equation (12) are as follows: B_1, B_2, and B_3 represent the coefficients on migrant's current income, origin family income, and migrant's contingent future (origin country) income respectively. The theoretical model predicts that lower income origin families should receive larger remittances from the migrant, other things being equal (or that the sign on B_2 is negative).[11] In addition, the model predicts that remittances and migrant's current and future income (measured by the sign of B_1 and B_3) are positively related. This means that migrants with higher current incomes will send larger transfers, holding other variables constant. In addition, an increase in the migrant's contingent second period income (in the event of return migration) will lead to larger transfers to the origin family.

The reduced form expressions for the migrants' savings in the origin country total savings, s^h ,and host country savings, s^m are shown below.

$$S^h = \mu_h + \delta_{1h} y_1^m + \delta_{2h} y^f + \delta_{3h} y_2^h + \delta_{4h} Z + \varepsilon_{2i} \qquad (13)$$

$$S^m = \mu_s + \delta_1 y_1^m + \delta_2 y^f + \delta_3 y_2^h + \delta_4 Z + \varepsilon_{3i} \qquad (14)$$

The origin savings measure, s^h, is defined as the sum of all investment-related remittances sent by the migrant to finance own investments in origin assets in the survey year. The host country savings, s^m , variable is measured as a residual (computed as annual migrant household income less annual expenses on food and housing, transfers, and origin savings). Total savings, s, is the sum of origin savings, s^h, and host country savings, s^m.

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[10] The comparative statics results with respect to future income in the event of return migration are obtained using a specific functional form (log preferences).

[11] Ravallion and Dearden (1988), Cox and Jimenez (1990) and Hoddinott (1994) report a positive coefficient on recipient's income. Other studies report a negative relationship between remittances and the income of the recipient .(Kauffman and Lindauer, 1986; Ravallion and Dearden, 1988)

From (13) and (14) above, it is possible to investigate the relationship between migrants' orign and host country savings, and migrant and origin family variables. The theoretical model predicts that origin savings will rise as both migrant and origin family income increase. In addition, origin savings will decrease as the migrant's second period income (in the event of return migration) increases. Intuitively, this result obtains because an increase in the migrant's second period income in the event of return migration reduces the "need" to save towards future consumption. In contrast, host country savings will increase as migrant's second period income (in the event of return migration) increases.

ii. Econometric Issues

A unique strength of the data used in this paper is a matched sample of migrants and origin families, which is used to overcome problems that arise in existing empirical work. First, it is possible to control for both the characteristics of the migrant and the origin household, which reduces concerns about omitted variable bias.[12] Second, it is possible to deal with the concern that current origin household income may be affected by past migrant transfers. For example, transfers from family migrants may lead to higher incomes among receiving households.

In addition, the matched sample makes it possible to identify assets owned by the origin family as distinct from assets belonging to family migrants. The accurate measurement of origin family wealth is of considerable importance. In particular, measures of origin family wealth may be contaminated if they include assets, which are wholly or jointly owned by the migrant. Data based on the migrant or the origin family report may lead to the inaccurate measurement of assets because the origin family may be responsible for managing migrants' assets (land, farm, or housing assets) while migrants reside abroad.

The U.S.-Nigeria migration survey collected detailed information on the migrant and origin household. In addition, the survey identified migrants' savings in the origin country, as distinct from transfers to the origin family. The data collection occurred in two stages. The first stage involved conducting interviews among a random sample of migrant households in Chicago. In order to identify a

[12] Recent studies on parent-child transfers have used matched panel data that contain data on both donor and recipient income (Altonji, Hayashi and Kotlikoff, 1997; Rosenzweig and Wolpin, 1993).

random sample of migrant households, I used Chicago area telephone listings, selecting distinctly Nigerian names.[13] In the second stage, interviews were conducted in Nigeria among origin households, using the contact information provided by the migrant households.[14]

In Table 2, I compare the migrant sample and the matched sample across several dimensions. The origin household sample consists of 61 families.[15] The demographic characteristics of the migrant household appear very similar in the two samples. Self-reported data on the origin or home household is also presented in Table 2. Since migrants often send remittances to multiple recipients or family members, it is important to note that transfers sent by the migrant may not be equal to the transfer received by a given origin respondent. A given origin respondent receives only a portion of the total transfer sent by the family migrant in Chicago during the past year.[16]

V. RESULTS AND DISCUSSION

The results presented in this section draw on the strength of the migrant-origin family data, in order to control directly for the economic position of the migrant and origin household and their impact on transfers, and savings in the origin and host countries. In the empirical results below, I investigate both transfers to the origin family and origin savings.

5.1 Understanding Transfers to the Origin Family

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[13] The migrant sample was restricted to include only the Igbo of South Eastern Nigeria. This sub-sample of the Nigerian population was chosen to ensure relative ease in locating origin families in Nigeria. To draw a simple random sample from a telephone book, I identified 500 Nigerian family names from the Chicago telephone phonebook. These family names were numbered sequentially. A computer generated 120 numbers randomly from 1 to 500.

[14] A copy of the survey instrument is available on request.

[15] The yield from the initial sample can be explained by the difficulties associated with locating origin families given the information provided by the migrant and the availability of the origin respondent at the time of the interview. There are few reliable national surveys of Nigerian households with detailed asset and income data that could be used to assess the representativeness of the origin household sample.

[16] It is important to note that the survey design does not allow us to control for the selectivity of migration decision. An alternative survey design that would involve selecting a random sample of origin family respondents and then

Table 3 presents the OLS estimation results. Column 1 presents results based on transfers sent by the migrant to the origin family as the dependent variable and is measured in U.S. dollars (migrant's report). Transfers sent refer to total remittances sent by a migrant to all family members in the origin country and these could be sent to multiple recipients, including the specific origin family respondent.

Column 2 presents results on transfers received by a given origin family respondent (origin family's report). Transfers received by the origin family refer to remittances received in the past year by the origin family member and are also measured in U.S. dollars. Because migrants send transfers to a complex web of family members in the origin country, estimates based on transfers sent by the migrant and transfers received by a given origin family are likely to be comparable, but may not be identical.

The effect of migrant characteristics

One of the central questions is how migrant characteristics affect transfers to the origin family. In the theoretical model, migrants' current and future resources play an important role in determining transfers to the origin family.

The results on migrant characteristics confirm the predictions of the theoretical model in that transfers rise with migrants' current resources. From Column 1, the coefficient on the migrant household's current income is positive and statistically significant. These results are consistent with existing work on remittances. Lucas and Stark (1985) report a positive relationship between the predicted wage of the migrant and the amount remitted. In their study of Pakistani emigration, Ilahi and Jafarey (1999) find that the amount remitted increases with the educational attainment and skill level of the emigrant. It is important to note that the migrant household income in the survey year may not provide an adequate measure of the migrant's economic position. To address this issue, I use the migrant's wealth and annual expenditure as alternate measures of migrant's economic resources in the analysis and obtain similar results.[17]

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tracking their family migrants would be very costly and difficult to implement within the context of international migration.

[17] I acknowledge the contributions of an anonymous referee in that migrant's income is potentially endogenous in savings/transfer model if unobserved characteristics of the migrant household that affect income also affect savings

From Column 1, skilled migrants send larger transfers to the origin families, holding other variables constant. A change in the head of household's occupational status (from the unskilled to the skilled) category increases the amount transferred by about $2000. In the theoretical model, transfers to the origin family will rise with migrant's income in period 2 (in the event of return migration). Skilled migrants are likely to earn higher second period incomes in the event of return migration. The migrant's educational attainment is positively associated with transfers to the origin family, although not statistically significant. It is also interesting to note that the number of children in the migrant household is negatively associated with the level of transfers to the origin family and statistically significant across all specifications. Results based on transfers received by the origin family (Column 2) are comparable.

The effect of origin household characteristics

From the theoretical model, transfers to the origin family are predicted to decrease with origin family resources. Two asset measures capture the origin household's permanent income (size of landholdings measured in hectares and the number of buildings owned). Of the two asset measures used, land holdings may represent a relatively exogenous measure of the origin household's economic position.[18] The regressions also include controls for the size of the origin household (measured by number of siblings in Nigeria) and the location of the origin household (urban versus rural).

Column 1 presents results based on transfers sent and the measures of origin family economic status (obtained from the migrant's report). A negative coefficient on origin household assets, controlling for other variables, can be interpreted as evidence in support of the altruism hypothesis. I find that there is support for the standard altruism prediction: notably, origin families with lower levels of asset holdings receive larger transfers than origin households with higher levels of asset holdings, holding all other variables constant. The coefficient on the number of buildings owned by the origin household is

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decisions. Instrumenting for migrant income using the total number of checks the household wrote in the past month does not change previous results.

[18] In many parts of Southeastern Nigeria, landholdings are more likely to be inherited than housing assets and thus can be considered a relatively exogenous measure of origin household wealth.

negative and statistically significant in the migrant sample.[19]

Results based on transfers received by the origin household are broadly comparable (Column 2). Here, the coefficients on the origin asset variables: the size of origin household's land holdings (measured in hectares) and the number of buildings owned by the origin family are both negative. Two other origin family variables deserve close attention. Transfers are often sent to a complex web of family and non-family members. To capture this effect, the number of siblings in Nigeria (reported by head of the migrant household) is included in the estimation. Transfers sent are positively and significantly associated with home household size (Column 1). Migrant households appear to send larger transfers to their origin families when there are a greater number of potential recipients to receive these transfers.

The location of the origin household may influence the migrant's transfer decision since whether the household resides in an urban or rural area can affect the cost of sending transfers, as well as the economic opportunities available to the origin family. For example, it may be more costly to send remittances to rural areas. The coefficient on the location of the origin household (rural=1) is negative across all specifications, although it is not statistically significant.

Using Self-Reported data on the Origin Family

A significant advantage of the data used in this study is the ability to directly control for the migrant and origin household characteristics. Results in Table 3 also use self-reported measures of origin household assets, which may represent less noisy estimates of the origin household's economic position.

Taken together, the results in Table 3 appear consistent with the predictions of the theoretical model for origin household variables. Remittances received by the origin family fall as the origin family's asset holdings increase. The size of the origin family network in Nigeria (captured by the number of siblings in Nigeria) is positively associated with the amount transferred. When the U.S. migrant household is the origin household's child (own child=1), remittances received are larger, other things being equal. This provides support for an altruism model of transfer behavior. I also find that

[19] The findings on origin household assets could also be interpreted as support for an insurance model of transfer behavior (de la Briere et al, 2003).

transfers are increasing in the age of the origin household head (although this effect is not statistically significant). Finally, as discussed above, rural status is negatively associated with the amount received by the origin family.

Using Detailed Measures of Origin Household Wealth

In the next stage of estimation, I use detailed information obtained from the origin household. The goal here is to deal with potential endogeneity bias and contamination in the measurement of origin household resources that were discussed in the data section. It is important to accurately capture the origin household's economic position because the tests of the motivation for migrants' transfers emphasize the relationship between the origin household's economic resources,

Table 4 presents estimates**.** The dependent variable used in Columns 1-3 is the transfer sent by the migrant, while Columns 4-6 presents results on transfers received by the origin household. Results based on transfers received present a further robustness check on the effects of origin household resources on transfers.

In Column 1, I present estimates based on origin household wealth, which is defined as the market value of all assets owned by the origin household in U.S. dollars. The coefficient on origin household wealth is negative although not statistically significant. It is important to note that current origin household wealth (defined as the market value of origin family's assets) may be endogenous within a model of transfer behavior. In particular, past transfers from the migrant may affect the origin household's current asset holdings. An ideal measure of origin household wealth would be unaffected by past transfers.

To address this concern, I use a measure of origin household wealth that is less likely to be influenced by past transfers. I construct this relatively exogenous measure of origin household wealth by taking into account the year of acquisition of all origin household assets. This measure includes only the market value of origin family assets acquired prior to the year in which the U.S. migrant left the country of origin. From Column 2, the coefficient on origin household wealth becomes more negative as this relatively exogenous measure of origin household wealth is introduced, (the coefficient on origin

household wealth goes from -0.007 to -0.014). The coefficient on the relatively more exogenous measure of origin household's wealth is more negative, although not statistically significant. This suggests that the endogeneity of origin household wealth may lead to a slight upward bias in the coefficient.

In Column 3, I introduce an additional measure of origin household wealth. The goal here is to show the impact of contaminated measures of origin household wealth on transfer behavior. It is possible to construct this contaminated measure because both the migrant's assets in the origin environment and the origin household's assets are observed. The third measure of origin household wealth used here can be defined as the sum of the market value of the migrant's portfolio in the origin environment, plus the market value of the origin household's asset holdings.

The inclusion of the contaminated measure of the origin household's wealth yields some important results. In particular, the sign on this measure of origin household wealth (the sum of migrant and origin assets) is no longer negative but actually positive and statistically significant. Thus, using a contaminated measure of origin household wealth also leads to an upward bias in the effect of origin household income. The sensitivity of results to the definition of origin household wealth means that the careful measurement of origin household wealth is an important issue. A positive sign on origin household wealth could be erroneously interpreted as a rejection of altruistic motives for transfers to the origin family, and may result from using a contaminated measure of origin household wealth.[20]

In Columns 4-6, I analyze remittances received by the origin family. The results are comparable to earlier results, but origin. Notably, the effect of origin household wealth becomes positive (rather than negative) and statistically significant when a contaminated measure of origin household wealth, which includes migrants' assets in the origin country is used (Column 6).

Table 4 also includes the following controls for the migrant's characteristics: age, number of children in the U.S, income, years of education, occupational status (skilled=1), and migrant household income. The results on migrant characteristics are consistent with theoretical predictions. Origin family

variables used here (other than migrant and non-migrant related wealth valued in U.S. dollars) include the origin household head's age, a dummy variable that captures the relationship of the migrant to the origin household (own child=1), and a location variable (rural=1). The dummy variable that captures the relationship between the migrant and the head of the origin household (own child=1) has a large and significant effect on the amount received by the origin family. Again, this result can also be interpreted as support for a model of altruism between migrants and their origin families.

5.2 Country of Origin Savings

In addition to providing key predictions about transfer decisions, the theoretical model also provides new insights to understanding migrants' savings decisions. The model predicts that savings in the country of origin will be positively related to both migrant's current income and origin household income. The empirical analysis here emphasizes two measures of origin savings: (i) an indicator variable that takes on the value of 1 if the migrant has sent a transfer towards origin country investments in the survey year, and zero otherwise, and (ii) the size of the investment transfer, a continuous variable, which is defined as the amount transferred by the migrant to finance savings in the country of origin in the survey year. In Table 6, I present results the migrant's origin savings rate and the total savings rate.

The Effect of Migrant Variables on Country of Origin Savings

The theoretical model predicts a positive association between origin savings and migrant's income in period 1. Empirical results confirm this prediction for both the migrant and the matched sample. From Table 5, I find that the probability of origin savings rises with the migrant's current income. The level of origin savings is also positively associated with the migrant's current income.

Theory predicts that migrants with higher second period incomes (in the event of return migration) will have less of a "need" to accumulate origin savings (precautionary motive). From the results, skilled migrants and more educated migrants are less likely to accumulate origin savings and have

[20] Lucas and Stark (1985) report a positive coefficient on origin household assets. However, their conclusion may be affected by the endogenous measure of origin household assets and contaminated measures of wealth. As I have shown above, adding migrant assets to the origin household assets yields a positive sign on origin household wealth.

lower levels of origin savings. Although the migrant's income in the event of return migration is unobserved, skilled migrants will tend to earn higher incomes in the event of return migration and this group of migrants is shown to have lower levels of origin savings. This contrasts with transfer results where skilled and highly educated migrants had larger transfers to their origin families, other things being equal.

The specification presented in Table 5 also controls for migrant variables that may affect the decision to accumulate origin savings. These migrant variables include pre-migration work experience in Nigeria, the migrant's year of migration to the U.S., and the ownership of inherited land in the country of origin. It is important to note that both pre-migration work experience and ownership of inherited land in Nigeria both have a positive and statistically significant effect on origin savings. Work experience in the origin country and ownership of inherited land can affect origin savings by reducing the costs associated with investing in the origin country. Pre-migration work experience may also reflect knowledge of investment opportunities in country of origin.

The Effect of Origin Family Variables on Origin Savings

The theoretical model also predicts that origin household's economic position is positively related with the migrant's origin savings. The empirical results provide some support for this prediction although these results are less robust. From Table 5, the coefficient on origin family assets (measured by number of buildings) is positive and statistically significant from Columns 1-4. However, the results on landholdings are less comparable across the migrant and matched sample. In particular, landholdings are positively associated with origin savings only for the matched sample (and statistically significant in Column 3).

Origin savings are also decreasing in the size of the migrants' origin family network (measured by the number of siblings in Nigeria). This result contrasts sharply with our findings on transfers to family members, where transfers were found to be increasing in the size of the origin family network in Nigeria. I find that the rural status of the origin household is positively associated with origin savings. This result is robust across migrant and matched samples. The positive coefficient on the rural dummy

variable may reflect lower costs and risks of investing in a rural area (relative to an urban area). In the earlier results on transfers to the origin family, rural status was shown to be negatively associated with transfers to the origin family.

5.3 Origin Country Savings, Host Country Savings, and Total Savings rates

In Table 6, I examine the migrant's origin, host, and total savings rates. The results here provide an opportunity to examine distinctions between origin and host country savings. The dependent variable used here captures the share of savings in migrant household's income. The origin savings rate is the share of total household income that is invested in the origin country in the survey year. The total savings rate is defined to include both savings in the origin country asset, s^h, and savings in the host country asset, country, s^m, (and is measured as a residual). The measure of total savings used here is a relatively noisy measure, when compared to the origin savings rate. All results are based on Tobit estimation.

The results for both the matched and migrant sample appear fairly consistent with the theoretical predictions. Columns 1 and 4 show the Tobit estimation for the origin savings rate using the migrant and matched sample. Migrant's current income is positively associated with all three types of savings. Migrant households with more children also have lower savings rates for all three savings measures.

Again, I find that the unskilled migrants and less-educated migrants have higher origin savings rates. This result appears to confirm theoretical predictions that migrants with lower contingent future incomes are more likely to save in the origin country (and also have higher levels of origin savings). In contrast, skilled migrants have significantly higher host country and total saving rates. I also examine the effect of the migrant's year of migration on total savings. Recent migration (arrived in the U.S. after 1990) is positively associated with origin savings rate (however, this effect is not statistically significant). In contrast, recent migration has a negative and significant effect on host country and total savings rates (Columns 2 and 3).[21]

[21] The use of cross-sectional data makes it difficult to separate the impact of cumulative U.S. experience (the duration effect) from the cohort or year of arrival effect. If return migration is a further choice variable, the initial migration decision could be viewed as part of optimal life-cycle plan to accumulate assets, and migrants who remain in the U.S. may belong to a low savings group.

The results from Table 6 also provide some evidence that origin household variables impact the savings behavior of migrants. In general, the results for the matched sample appear comparable (columns 4-6). The size of the origin family (measured by siblings in Nigeria) has a negative effect on all three savings measures. From Columns 1-3, migrants with rural origin families also have higher savings rates (although this is only significant for origin savings). Origin household assets are positively related to the migrant's origin savings rate, as predicted by the model. The number of buildings owned by the origin family is positive, and statistically significant in Columns 1 and 3 (origin savings rate specification). The coefficient on the origin family's land holdings is positive, but not statistically significant in Columns 1 and 3. However, the results on the origin household's asset measures for host country and total savings rates are somewhat mixed. Results from total savings rate specification (Columns 2 and 3) show that the number of buildings owned by the origin family is positive, but not statistically significant. The results on land holdings are less robust for the migrant and matched sample.[22]

V. CONCLUSIONS

This paper investigates remittances from international migration, using a matched sample of migrants and their origin families. Policy makers in developed and developing countries have shown a growing interest in the role that remittances from international migration can play as savings in the origin environment. Because migrants' savings in the origin country have the potential to increase capital accumulation in labor-exporting countries, this aspect of migrant remittances deserves attention.

The evidence from the U.S-Nigeria Migration Study suggests that transfers to the origin family are motivated by altruistic considerations, with poorer origin family members in Nigeria receiving larger transfers. Unlike transfers to the origin family, savings in the country of origin are positively associated with origin household resources. Interestingly, skilled migrants (who have higher future expected incomes in the event of return migration) are less likely to be investing in origin assets due to a lower precautionary motive for saving, but they also send larger transfers to their origin families. Origin

[22] A potential explanation here is that the size of landholdings may be measured with error when compared to the number of buildings owned.

savings are also more likely to flow to rural areas, perhaps reflecting the lower costs of investing in rural areas and where the number of non-migrants in the origin family is smaller, other things being equal.

Can remittances play a role in economic development in the country of origin? These findings suggest that remittances can contribute to economic development by reducing poverty and providing savings for capital accumulation in the country of origin. Overall, the eventual impact of remittances of development in the origin country will depend on the end use of remittance flows, as well as the size of the out-migrant population and the position of origin households within the origin country income distribution.

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TABLE 1
Descriptive Statistics

	Migrant Sample (N=112)		Matched Sample (N=61)	
	Mean	Standard Deviation	Mean	Standard Deviation
Migrant Characteristics				
Age at First Migration to the US	25.42	6.71	25.28	6.57
Head's age (at the time of survey)	38.71	7.22	38.49	6.64
Head is male (=1)	0.92		0.93	
Year first arrived in U.S.	1982.71	6.91	1983.31	6.60
Household size	3.43	2.03	3.28	2.10
No of Children in Household	1.66	1.79	1.47	1.76
Head's Occupation (skilled=1)	0.51		0.61	
Head's Years of Schooling	16.46	1.50	16.64	1.16
Household Income (in US $)	70928.52	932017.93	74547.46	84746.62
Migrant worked in Nigeria prior to migration	0.67		0.66	
Migrant owns inherited land	0.18		0.35	
Origin Family Characteristics				
Migrant Report on Origin Household				
Migrant's father surviving	0.40		0.43	
Rural (=1)	0.69		0.73	
No of Siblings in Nigeria	4.56	2.99	4.17	2.20
Head's Years of schooling	8.22	5.21	9.89	5.80
Migrant's Father's Landholdings (in hectares)	2.25	4.26	1.82	1.81
No of buildings owned by migrant's father	2.58	3.30	2.31	2.67
No of cars owned by migrant's father	0.88	1.01	0.86	1.08
Origin Family's Self Reports				
Head's age			62.67	14.67
Migrant is the child of the head (ownchild=1)			0.56	0.50
Household resides in rural area (=1)			0.38	0.49
Head is Male (Male=1)			0.66	0.48
Household Size			5.74	2.68
Landholdings (in hectares)			0.60	0.75
No of buildings owned			1.92	1.54
No of cars owned			1.02	1.19
(In US $)				
Market value of Origin Family's assets			53025.4	95950.11
Market value of Origin Family's assets (pre-migration assets only)			21906.96	36580.98
Origin Family's assets plus migrant's assets in Origin environment			79436.98	130547.3

TABLE 2
Remittances from International Migration

	U.S. Migrants *(Migrant Sample)*		U.S. Migrants & Origin Households *(Matched Sample)*	
	Mean	Standard Deviation	Mean	Standard Deviation
Variable				
Sent remittance in the past yr	0.93		0.93	
Received remittance in the past year			0.87	
Migrant Sent Transfer to Origin Family	0.85		0.86	
Migrant Sent Transfer towards Investment	0.35		0.40	
Total amount sent in past yr (in US $)	5807.43	10653.92	6018.52	7961.14
Transfer Sent to Origin Family (in US $)	3018.60	3797.58	3489.72	4317.56
Transfer Received by Origin Family (in US $)			2220.25	3970.48
Origin Investments or Savings (in US $)	2706.95	8737.84	2400.07	5352.08
Other transfers (in US $)	277.69	1216.65	128.73	467.28

Note: For the survey period $1=86naira
Transfers sent refer to total remittances sent by a migrant to ALL family members in the origin country and is based on the migrant's report.
Transfers received by the origin family refer to remittances received by a specific origin family member from a given U.S. migrant and is based on the origin family's report.
Origin Investments refer to total remittances sent by a migrant towards savings/investments in the origin country and is based on the migrant's report.

TABLE 3
Transfers to the Home Family

Dependent Variable	*Transfer to home family ($)* (1)	*Transfer to home family ($)* (2)	*Transfer received ($)* (3)	*Transfer received ($)* (4)
	Migrant Report		Home Family Report	
Migrant Variables				
Migrant's Age	-25.14	-59.78	14.68	-3.38
(at the time of the survey)	(64.03)	(98.23)	(106.22)	(162.22)
No of Children in Household	-487.14 *	-886.21 *	-839.62 **	-1038.02 *
	(281.49)	(490.32)	(424.20)	(559.35)
Years of Schooling	39.41	432.89	632.33	867.40
	(250.01)	(560.91)	403.916	556.4596
Migrant's Occupation (Skilled=1)	1984.26 **	2173.23	958.22	1345.42
	(883.31)	(1187.24)	(1161.23)	(1391.05)
Household Income (X 10^3)	0.02 *	0.01	0.02 **	0.02 *
	(0.01)	(0.01)	(0.01)	(0.01)
Home Family Variables				
(Migrant Report)				
Home Family Size	272.06 ***	649.93 ***	293.18	347.05
	(75.33)	(247.79)	(231.22)	(342.29)
Rural	-699.78	-949.05	-1457.97	-1338.50
	(893.54)	(1525.46)	(1391.86)	(1705.26)
Landholdings (in hectares)	-68.61	-68.44		
	(46.00)	(307.74)		
No of Buildings	-188.59 ***	-137.41		
	(59.34)	(144.08)		
(Home Family Reports)				
Landholdings (in hectares)				-1013.85 **
				(455.22)
No of Buildings			-118.34	
			(330.49)	
Age of the Head			39.20	84.47
			(46.76)	(68.32)
Ownchild (Migrant is Child of Respondent=1)			1310.16	934.78
			(996.57)	(1481.23)
Constant	37.32	-7988.78	-13001.20 *	-18489.58 *
	(4652.70)	(9718.84)	(7541.10)	(10473.47)
No of Observations	100	57	55	41
Adjusted R-squared	0.27	0.43	0.48	0.57
SAMPLE	Migrant	Matched	Matched	Matched

Robust standard errors are shown in parentheses. * represents 10% level of significance,**5% level of significance, *** 1% level of significance

Transfers sent refer to total remittances sent by a migrant to ALL family members in the origin country and is based on the migrant's report.

Transfers received by the origin family refer to remittances received by a specific origin family member from a given U.S. migrant and is based on the origin family's report.

TABLE 4
Transfers to the Origin Family
(Using Self-Reported Data on Origin Family Assets)

	(1)	(2)	(3)	(4)	(5)	(6)
	Transfer Sent by Migrant (in U.S. $)			Transfer Received by Origin Family(in U.S. $)		
Remittances Sent	(Migrant Report)			(Origin household Report)		
Migrant Variables						
Migrant's Age	40.72	33.19	-29.27	-19.40	-13.21	-12.11
(at the time of the survey)	(99.08)	(102.12)	(95.92)	(103.28)	(104.76)	(102.98)
No of Children in Household	-900.47 **	-876.69 **	-959.19 **	-855.12 **	-836.47 **	-838.46 **
	(452.28)	(453.09)	-(457.45)	(400.26)	(397.93)	(407.20)
Years of Schooling	-671.27	-615.22	9.96	746.60 *	702.38 *	448.64
	(556.34)	(558.93)	(548.46)	(419.84)	(403.93)	(400.74)
Migrant's Occupation (Skilled=1)	2491.65 *	2404.23 *	2454.54 *	1313.35	1241.88	1249.24
	(1384.63)	(1397.73)	(1373.64)	(1289.29)	(1293.38)	(1354.97)
Household Income (X 10^3)	0.01	0.01	0.005	0.02 *	0.02 *	0.02 *
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Origin Family Variables						
(Origin Family Report)						
Origin Family Size	791.72 ***	784.87 ***	775.42 ***	344.02	338.75	325.35 ***
	(276.38)	(285.22)	(285.38)	(261.40)	(260.31)	(272.19)
Head's Age	34.74	39.66	25.92	38.78	42.98	33.94
	(38.73)	(38.71)	(34.93)	(41.33)	(43.06)	(40.34)
Rural	-1556.58	-1589.47	-304.67	-1655.39	-1686.05	-1153.20
	(1438.25)	(1466.80)	(1369.46)	(1193.64)	(1207.74)	(1094.83)
Ownchild (=1)	1650.24	1424.11	1339.46	2383.28 **	2192.78 *	2302.60
	(1243.45)	(1247.26)	(1158.58)	(1184.16)	(1227.21)	(1192.70)
Origin Family Wealth 1	-0.007			-0.006 **		
(Mkt Value of Origin Family's assets)	(0.004)			(0.003)		
Origin Family Wealth 2		-0.014			-0.012 *	
*Excludes assets acquired since migration		(0.010)			(0.007)	
Origin Family Wealth 3			0.012 ***			0.004 ***
(includes migrants' assets)			(0.005)			(0.005)
Constant	-15464.39	-14438.40	-4524.78	-16151.49 **	-15338.71 *	-11179.61
	(10326.30)	(10394.39)	(9845.24)	(8299.39)	(7957.66)	(6898.91)
Number of Observations	58	58	58	58	58	58
R-squared	0.31	0.30	0.36	0.50	0.50	0.50

Robust standard errors are shown in parentheses. * represents 10% level of significance,**5% level of significance, *** 1% level of significance
Transfers sent refer to total remittances sent by a migrant to ALL family members in the origin country is based on the migrant's report.
Transfers received by the origin family refer to remittances received by a specific origin family member from a given U.S. migrant and is based on the origin family's report.

TABLE 5
Origin Savings

	Origin Savings	Investment Transfer in US$	Origin Savings	Investment Transfer in US$
	Migrant Sample		Matched Sample	
	Probit	Tobit	Probit	Tobit
	(1)	(2)	(3)	(4)
Migrant Variables				
Migrant's Age	-0.045 *	-526.73	-0.03	-276.66
(at the time of the survey)	(0.02)	(393.66)	(0.04)	(295.60)
No of Children in Household	-0.04	-111.14	-0.06	-625.46
	(0.11)	(1409.80)	(0.15)	(1088.22)
Years of Schooling	-0.06	-652.29	-0.59 ***	-1910.56
	(0.10)	(1493.60)	(0.22)	(1570.80)
Migrant's Occupation (Skilled=1)	-0.30	-552.91	-0.52	802.35
	(0.34)	(5185.15)	(0.52)	(3721.53)
Household Income (X 10^3)	0.01 ***	84.90 ***	0.01 ***	56.46 **
	(0.002)	(29.14)	(0.004)	(20.20)
Migrant Worked in Nigeria (=1)	0.98 **	12976.66 **	2.03 ***	9840.98 **
prior to migration	(0.42)	(5394.17)	(0.63)	(4478.44)
Owns inherited land in Nigeria (=1)	0.78 **	6466.04 **	1.07 **	6053.48 *
	(0.35)	(4691.65)	(0.51)	(3483.04)
Origin Family Variables				
(Migrant Report)				
Origin Family Size	-0.10 *	-770.23	-0.22 **	-798.75
	(0.06)	(891.19)	(0.10)	(807.40)
Rural	0.97 **	12540.35 **	1.65 ***	9604.71 ***
	(0.42)	(5393.30)	(0.56)	(4134.26)
Landholdings (in hectares)	-0.01	-81.17	0.26 **	598.32
	(0.03)	(564.14)	(0.12)	(873.99)
No of Buildings	0.08	1096.89 *	0.26 ***	1249.76 **
	(0.05)	(628.76)	(0.07)	(587.06)
Number of Observations	100	100	57	57
Pseudo R^2/Adjusted R^2	0.16	0.03	0.49	0.06

Robust standard errors are shown in parentheses. * denotes 10% level of significance,**5% level of significance, ***1% level of significance.

Origin Savings is an indicator variable that captures whether the migrant sent a transfer towards savings/investments in the origin country in the survey year.

Investment transfer refers to total remittances sent by a migrant towards savings/investments in the origin country in the survey year.

TABLE 6
Savings Rate (includes both Origin Savings and Host Country Savings)

Tobit

	Migrant Sample			Matched Sample		
	Origin Savings Rate	Host Savings Rate	Total Savings Rate	Origin Savings Rate	Host Savings Rate	Total Savings Rate
	(1)	(2)	(3)	(4)	(5)	(4)
Migrant Variables						
Migrant's Age	-0.004	-.003	-0.003	-0.001	-0.005	-0.01
(at the time of the survey)	(0.004)	(0.004)	(0.003)	(0.003)	(0.005)	(0.01)
No of Children in Household	-0.005	-0.006	-0.008	-0.01	-0.005	0.02
	(0.016)	(0.013)	(0.012)	(0.01)	(0.017)	(0.04)
Years of Schooling	-0.010	-0.026 *	-0.029 *	-0.04 **	-0.039	-0.10 *
	(0.016)	(0.014)	(0.013)	(0.02)	(0.027)	(0.05)
Migrant's Occupation	-0.038	0.112 **	0.102 *	-0.01	0.105 *	0.20 *
(Skilled=1)	(0.059)	(0.048)	(0.043)	(0.04)	(0.061)	(0.11)
Household Income (X 10^3)	0.001 **	0.001 ***	0.001 ***	0.0005 **	0.0009 **	0.001 **
	(0.0033)	(0.0003)	(0.0003)	(0.0002)	(0.0004)	(0.0007)
Head is Recent Migrant	0.038	-0.110 **	-0.076 *	0.05	-0.202	-0.25
(Year 1990>=1)	(0.061)	(0.054)	(0.049)	(0.04)	(0.067) **	(0.17)
Head Worked in Nigeria	0.145 **	0.117 **	0.152 ***	0.12 **	0.088	0.21
	(0.060)	(0.046)	(0.041)	(0.05)	(0.057)	(0.16)
Owns inherited land in Nigeria	0.081	0.060	0.071 *	0.09 **	0.031	0.17
	(0.052)	(0.045)	(0.040)	(0.04)	(0.054)	(0.12)
Origin Family Variables (Migrant Report)						
Origin Family Size	-0.010	-0.005	-0.001	-0.013	0.000	-0.04
	(0.010)	(0.02)	(0.006)	(0.009)	(0.012)	(0.04)
Rural	0.154 **	0.07	0.041	0.12 ***	-0.040	-0.04
	(0.061)	(0.10)	(0.042)	(0.05)	(0.061)	(0.14)
Landholdings (in hectares)	0.0002	-0.002	0.001	0.01	-0.027 *	-0.04
	(0.006)	(0.01)	(0.004)	(0.01)	(0.015)	(0.04)
No of Buildings	0.015 **	0.012	0.005	0.02 ***	-0.004	0.01
	(0.007)	(0.008)	(0.006)	(0.01)	(0.010)	(0.02)
Number of Observations	98	98	98	56	57	56
Chi-Squared Statistic(df=13)	18.50	37.49	48.88	33.88	34.05	30.59
Prob > chi2	0.101	0.00	0.00	0.00	0.00	0.00

Robust standard errors are shown in parentheses. * represents 10% level of Significance,**5% level of significance, ***1% level of significance

The origin (host country) savings rate is the fraction of migrant income that is invested in the origin (host country) in the survey year.

The total savings rate is the fraction of migrant income that is saved in both the origin and host country in the survey year.

TABLE A1

NOT INTENDED FOR PUBLICATION

NIGERIANS IN THE UNITED STATES, 1990 CENSUS

Comparing the U.S. Census microdata sample to the Chicago Field research sample

	Chicago Sample Field Research 1997 N=112		Microdata Sample 1990 Census: Nigerians in US N=2262	
VARIABLE	Mean	Std Dev	Mean	Std Dev
Head of Household Characteristics				
Head's Age	38.94	7.32	34.41	6.68
Male=1	0.92		0.88	
Citizenship (citizen=1)	0.44		0.22	
Marital Status (married=1)	0.6		0.61	
Years of Schooling	14.7	4.96	13.64	2.02
Bachelor's degree	0.85		0.70	
Year of Immigration	Percent		Percent	
>=1990	22.30			
1985-1990	10.70		15.7	
1980-1984	36.60		44.6	
1975-1979	22.10		22.7	
<=1974	0.90		17	
Occupational Categories (using census catgories)				
Variable	Percent		Mean	
Managerial & Professional	0.46		0.39	
Technical, Sales & Admin. Support	0.22		0.24	
Service	0.06		0.16	
Farming, Forestry and Fishing	0.04		0.00	
Precision Product, Craft&Repair	0.02		0.03	
Operators, Fabricators & Laborers	0.19		0.14	
Household Characteristics				
Household Size	3.42	2.03	3.60	1.97
Own at least one car	0.84		0.87	
Owner-occupied US house	0.36		0.24	
Rented for cash	0.63		0.74	
HH resides in a house	0.35		0.31	
HH resides in apartment	0.63		0.65	
HH resides in other residence	0.02		0.04	

0.1 SUPPLEMENTARY MATHEMATICAL NOTES

$$W(c_{_1}, c_{_2}, c_f) = U_1(c_1) + B[V_2(c_2)] + \Psi(c^f) \tag{1}$$

The migrant maximizes the W, the intertemporal utility function:

$$E_1\{W\} = U_1(c_1) + B[pV_2(c_2^h) + (1-p)V_2(c_2^m)] + \Psi(c^f) \tag{2}$$

Subject to the following constraints:

$$c = y_1^m - r - s^h - s^m \tag{3}$$

$$s = s^h + s^m \tag{4}$$

$$c^f = y^f + r \tag{5}$$

where y_1^m represents the migrant's income in period 1, r is the migrant's transfer to the origin family. Migrants can invest in a risky asset in the migrant's country of origin, s^h , and a safe asset in the host country, s^m. The origin family's utility, $\Psi(.)$ is a function of origin family resources, which is defined as the sum of the origin family income generated in the origin country, (y^f) and remittances from the migrant, r in period 1. I assume that the origin family's indirect utility function, $V(.)$ is concave and twice continuously differentiable. The importance of the origin family in the migrant's utility function is represented above by the weight, α. In period 2, I allow for possibility of return migration. The migrant's origin country income, y_2^h is assumed to be strictly less than host country income, y_2^m.

Origin country assets are risky because migrants incur higher costs of monitoring these assets while migrants reside in the host country. Specifically, the migrant's savings in the ("risky") origin or home country asset, s^h yield a random rate of return R_h, if the migrant remains in the host country, and R_m if the migrant returns to the host country while savings in the host country asset yield a constant return, R which is known. I assume that R_h, R_m, and R are exogenously given (where $R_m < R < R_h$).

Thus, the migrant's budget constraint in period 2 is given below:

$$c_2^h = y_2^h + Rs^m + R_h s^h \quad \textit{with probability } p \tag{6}$$
$$c_2^m = y_2^m + Rs^m + R_m s^h \quad \textit{with probability } (1-p) \tag{7}$$

where $y_2^h < y_2^m$

The migrant maximizes the objective function (8), subject to the constraints, (9)-(12), the Lagrangean is given below:

$$U_m = U(c_m, V(c_f)) = U_1(c_1^m) + B[pV^h(c_2^h) + (1-p)V^m(c_2^m)] + \Psi(c^f) \tag{8}$$

Subject to the following constraints:

$$c_1^m = y_1^m - r - s^m - s^h \tag{9}$$
$$c^f = y^f + r \tag{10}$$

$$c_2^m = y_1^m + Rs^m + R_m s^h \tag{11}$$

$$c_2^h = y_2^h + Rs^m + R_h s^h \tag{12}$$

$0 < \alpha < 1$; $\beta > 0$; $0 < p < 1$; $y_2^m < y_2^h < 0, R > 1$; $0 < R_m < R < R_h$

First order conditions:

$$r : -U'(c_1^m) + a\Psi(c^f) \tag{13}$$

$$s : -U'(c_1) + BR[pV'(c_2^h) + (1-p)V^{'}(c_2^m)] \tag{14}$$

$$s^h : -U'(c_1) + B[pR_h V'(c_2^h) + (1-p)R_m V'(c_2^m)] \tag{15}$$

Simplifying:

$$r : U'(c_1^m) = a\Psi(c^f)$$
$$s : U'(c_1) = BR[pV'(c_2^h) + (1-p)V^{'}(c_2^m)]$$

$$s^h : U'(c_1) = B[pR_hV'(c_2^h) + (1-p)R_mV'(c_2^m)]$$

which implies:

$$U'(c_1^m) = a\Psi(c^f)$$

$$R[pV'(c_2^h) + (1-p)V^{'}(c_2^m)] = [pR_hV'(c_2^h) + (1-p)R_mV'(c_2^m)]$$

$$U'(c_1) = BR[pV'(c_2^h) + (1-p)V^{'}(c_2^m)]$$

Thus, equations (1.10)-(1.12) can be rearranged as follows:

$$U'(c_{_1}^m) = aV_1(y^f)$$

$$p(R_h - R)[V'^h(c_2^h) = (1-p)(R - R_m)V'^m(c_2^m)]$$

$$U'(c_{_1}^m) = BR[\theta V'(c_2^h) + (1-p)V^{'}(c_2^m)]$$

Example 1 *Consider a numerical example:*

1 Suppose we assume that $U(c) = ln\ c$

$$U(c) = ln\ c$$

From the first order conditions above:

$$c^f = \alpha c_{_1}^m \tag{16}$$

$$c_2^h = \frac{c_2^m}{\frac{(1-p)}{p}\frac{(R-R_m)}{(R_h-R)}} \tag{17}$$

$$c_2^m = B((1-p)R\frac{R_h - R_m}{R_h - R}c_1 \tag{18}$$

Recall: Migrant's first period consumption $c_1^m = y_1^m - r - s^h - s^m$; Also $c^f = y^f + r$;
For migrant's second period consumption: $c_2^m = y_2^m + Rs^m + R_m s^h$
$c_2^h = y_2^h + Rs^m + R_h s^h$
Therefore,

$$y^f + r = \alpha(y_1^m - r - s^h - s^m) \tag{19}$$

$$y_2^h + Rs^m + R_h s^h = \frac{p}{1-p}\frac{(R_h - R)}{(R - R_m)}(y_2^m + Rs^m + R_m s^h) \tag{20}$$

$$y_2^m + Rs^m + R_m s^h = B(1-p)R\frac{R_h - R_m}{R_h - R}(y_1^m - r - s^h - s^m) \tag{21}$$

To simplify: Define the following terms:

$$\theta \equiv \frac{p}{1-p}\frac{(R_h - R)}{(R - R_m)} \tag{22}$$

$$\Phi \equiv B((1-p)R\frac{R_h - R_m}{R_h - R} \tag{23}$$

Using (19) Solve for r

$$r = \alpha(y_1^m - r - s^h - s^m) - y^f \tag{24}$$

$$r = \frac{\alpha(y_1^m - r - s^h - s^m) - y^f}{1 + \alpha}$$

From (20) and (22): Solve for s^h
$y_2^h + Rs^m + R_h s^h = \theta(y_2^m + Rs^m + R_m s^h)$

$$s^h = \frac{(\theta y_2^m - y_2^h) + R(\theta - 1)s^m}{R_h - \theta R_m} \tag{25}$$

Assumption 1 (A1):

I assume that $\theta > 1$

$$\theta \equiv \frac{p}{1-p}\frac{(R_h - R)}{(R - R_m)} > 1 \tag{26}$$

and this is equivalent to

$$R_m(1-p) + pR_h > R \tag{27}$$

Assumption 1 (A1) implies that the expected return on the risky origin asset must exceed the safe return on the host country asset. This assumption is required in order to obtain an interior solution for origin savings, otherwise we can no longer gurantee that $s^h > 0$.

Assumption 2 (A2):

$$R_h > \theta R_m \tag{28}$$

Combining (A1) and (A2) imply that

$$\frac{(R - R_m)}{(R_h - R_m)} < p < \frac{R_h}{R}\frac{(R - R_m)}{(R_h - R_m)} \tag{29}$$

Assumption 2 provides an upper bound on p. Without (A2), there is no upper bound on p, other than that the probability of return migration lies between 0 and 1. Assumption 2 also rules out "very small" values of p. For example, suppose that $R_m = 1; R_h = 2 \; and \; R = 1.25$ then p would lie between 0.25 and 0.40.

Demand functions: Solving for transfers to the origin family r, savings in the host country s^m, savings in the country of origin s^h

From equation (23) above

$$y_2^m + Rs^m + R_m s^h = \Phi(y_1^m - r - s^h - s^m) \tag{30}$$

$$(R + \Phi)s^m + (R_m + \Phi)s^h + \Phi r = \Phi y_1^m - y_2^m \tag{31}$$

$$y_2^m + (R+\Phi)s^m + (R_m+\Phi)s^h + \Phi\frac{\alpha(y_1^m - r - s^h - s^m) - y^f)}{1+\alpha} = \Phi y_1^m - y_2^m \tag{32}$$

$$y_2^m + (R + \Phi)s^m + (R_m + \Phi)s^h + \Phi\frac{\alpha(y_1^m - r - s^h - s^m) - y^f)}{1+\alpha} = \Phi y_1^m - y_2^m$$

Substituting in for s^h from equation (25) above
Recall $s^h = \frac{(\theta y_2^m - y_2^h) + R(\theta-1)s^m}{R_h - \theta R_m}$

$$(R+\Phi)s^m + (R_m+\Phi)\frac{(\theta y_2^m - y_2^h) + R(\theta-1)s^m}{R_h - \theta R_m} + \Phi\frac{\alpha(y_1^m - r - \frac{(\theta y_2^m - y_2^h)+R(\theta-1)s^m}{R_h-\theta R_m} - s^m) - y^f)}{1+\alpha} = \Phi y_1^m - y_2^m$$

$$(R+\Phi)s^m + (R_m+\Phi)\frac{(\theta y_2^m - y_2^h) + R(\theta-1)s^m}{R_h - \theta R_m} + \Phi\frac{\alpha(y_1^m - \frac{(\theta y_2^m - y_2^h)+R(\theta-1)s^m}{R_h-\theta R_m} - s^m) - y^f)}{1+\alpha} = \Phi y_1^m - y_2^m$$

$$\{(R+\Phi) + (R_m+\Phi)\frac{R(\theta-1)}{(R_h-\theta R_m)} - \Phi\frac{\alpha}{1+\alpha}\frac{(1+R(\theta-1))}{(R_h-\theta R_m)}\}s^m$$
$$= (R_m+\Phi)\frac{(y_2^h - \theta y_2^m)}{R_h-\theta R_m} + \Phi y_1^m - y_2^m + \Phi\frac{(y^f - \alpha y_1^m)}{1+\alpha} - \Phi\frac{\alpha}{1+\alpha}\frac{(\theta y_2^m - y_2^h)}{R_h-\theta R_m} \quad (33)$$

$$\{(R+\frac{\Phi}{1+\alpha})\frac{R(\theta-1)}{(R_h-\theta R_m)} + (R_m+\frac{\Phi}{1+\alpha}\frac{(R(\theta-1))}{(R_h-\theta R_m)}\}s^m$$
$$= (R_m+\Phi)\frac{(y_2^h - \theta y_2^m)}{R_h-\theta R_m} + \Phi y_1^m - y_2^m + \Phi\frac{(y^f - \alpha y_1^m)}{1+\alpha} - \Phi\frac{\alpha}{1+\alpha}\frac{(\theta y_2^m - y_2^h)}{R_h-\theta R_m}$$

$$\{(R+\frac{\Phi}{1+\alpha})\frac{R(\theta-1)}{(R_h-\theta R_m)} + (R_m+\frac{\Phi}{1+\alpha}\frac{(R(\theta-1))}{(R_h-\theta R_m)}\}s^m$$
$$= \Phi\frac{(y^f - \alpha y_1^m)}{1+\alpha} - y_2^m + \Phi y_1^m + (R_m+\Phi)\frac{(y_2^h - \theta y_2^m)}{R_h-\theta R_m} - \Phi\frac{\alpha}{1+\alpha}\frac{(\theta y_2^m - y_2^h)}{R_h-\theta R_m}$$

$$\{(R+\frac{\Phi}{1+\alpha}) + (R_m+\frac{\Phi}{1+\alpha}\frac{(R(\theta-1))}{(R_h-\theta R_m)}\}s^m$$
$$= \Phi\frac{(y^f + y_1^m)}{1+\alpha} - y_2^m - (R_m+\frac{\Phi}{1+\alpha})\frac{(\theta y_2^m - y_2^h)}{R_h-\theta R_m}$$

Now Solve for s^m

$$s^m = \frac{\Phi\frac{(y^f+y_1^m)}{1+\alpha} - y_2^m - (R_m + \frac{\Phi}{1+\alpha})\frac{(\theta y_2^m - y_2^h)}{R_h - \theta R_m}}{(R + \frac{\Phi}{1+\alpha}) + (R_m + \frac{\Phi}{1+\alpha}\frac{(R(\theta-1))}{(R_h - \theta R_m)}} \tag{34}$$

Simplifying

$$s^m = \frac{(R_h - \theta R_m)(\Phi\frac{(y^f+y_1^m)}{1+\alpha} - y_2^h) - (R_m + \frac{\Phi}{1+\alpha})(\theta y_2^m - y_2^h)}{(R_h - \theta R_m)(R + \frac{\Phi}{1+\alpha}) + (R_m + \frac{\Phi}{1+\alpha})(R(\theta - 1)}$$

$$s^m = \frac{(R_h - \theta R_m)\Phi\frac{(y^f+y_1^m)}{1+\alpha} - (R_h y_2^m - R_m y_2^h) - \frac{\Phi}{1+\alpha}(\theta y_2^m - y_2^h)}{R(R_h - R_{m1}) + \frac{\Phi}{1+\alpha}[R_h - R + \theta(R - R_m)]} \tag{35}$$

Now Solve for s^h $where$

$$s^h = \frac{(\theta y_2^m - y_2^h) + R(\theta - 1)s^m}{R_h - \theta R_m} \tag{36}$$

$$s^h = \frac{(\theta y_2^m - y_2^h)}{R_h - \theta R_m} + \frac{R(\theta-1)\frac{(R_h - \theta R_m)(\Phi\frac{(y^f+y_1^m)}{1+\alpha} - y_2^h) - (R_m + \frac{\Phi}{1+\alpha})(\theta y_2^m - y_2^h)}{(R_h - \theta R_m)(R + \frac{\Phi}{1+\alpha}) + (R_m + \frac{\Phi}{1+\alpha})(R(\theta-1)}}{R_h - \theta R_m}$$

$$s^h = \frac{(\theta y_2^m - y_2^h)}{R_h - \theta R_m} + \frac{R(\theta-1)(\Phi\frac{(y^f+y_1^m)}{1+\alpha} - y_2^h)}{(R_h - \theta R_m)(R + \frac{\Phi}{1+\alpha}) + (R_m + \frac{\Phi}{1+\alpha})(R(\theta-1)} - \frac{R(\theta-1)(R_m + \frac{\Phi}{1+\alpha})(\theta y_2^m - y_2^h)}{(R_h - \theta R_m)[(R_h - \theta R_m)(R + \frac{\Phi}{1+\alpha}) + (R_m + \frac{\Phi}{1+\alpha})(R(\theta-1)]}$$

Multiply and divide by $R_h - \theta R_m$

$$s^h = \frac{(\theta y_2^m - y_2^h)}{R_h - \theta R_m} + \frac{\frac{R(\theta-1)}{(R_h - \theta R_m)}(\Phi\frac{(y^f+y_1^m)}{1+\alpha} - y_2^h)}{R + \frac{\Phi}{1+\alpha}) + (R_m + \frac{\Phi}{1+\alpha})(R(\theta-1)} - \frac{\frac{R(\theta-1)}{(R_h - \theta R_m)}(R_m + \frac{\Phi}{1+\alpha})(\theta y_2^m - y_2^h)}{(R + \frac{\Phi}{1+\alpha}) + (R_m + \frac{\Phi}{1+\alpha})(\frac{R(\theta-1)}{(R_h - \theta R_m)})}$$

$$= \frac{\frac{(\theta y_2^m - y_2^h)}{R_h - \theta R_m}\{(R + \frac{\Phi}{1+\alpha}) + (R_m + \frac{\Phi}{1+\alpha})(R(\theta-1)\}}{(R + \frac{\Phi}{1+\alpha}) + (R_m + \frac{\Phi}{1+\alpha})(R(\theta-1)} + \frac{\frac{R(\theta-1)}{(R_h - \theta R_m)}(\Phi\frac{(y^f+y_1^m)}{1+\alpha} - y_2^h) - \frac{R(\theta-1)}{(R_h - \theta R_m)}(R_m + \frac{\Phi}{1+\alpha})(\theta y_2^m - y_2^h)}{(R + \frac{\Phi}{1+\alpha}) + (R_m + \frac{\Phi}{1+\alpha})(R(\theta-1)}$$

$$= \frac{\frac{R(\theta-1)}{(R_h-\theta R_m)}(\Phi\frac{(y^f+y_1^m)}{1+\alpha} - y_2^h) + \frac{(\theta y_2^m - y_2^h)}{(R_h-\theta R_m)}(R+\frac{\Phi}{1+\alpha})}{(R+\frac{\Phi}{1+\alpha}) + (R_m+\frac{\Phi}{1+\alpha})(R(\theta-1)}$$

$$= \frac{R(\theta-1)(\Phi\frac{(y^f+y_1^m)}{1+\alpha} - y_2^h) + (\theta y_2^m - y_2^h)(R+\frac{\Phi}{1+\alpha})}{(R_h-\theta R_m)(R+\frac{\Phi}{1+\alpha}) + (R_m+\frac{\Phi}{1+\alpha})(R(\theta-1)}$$

$$= \frac{R(\theta-1)(\Phi\frac{(y^f+y_1^m)}{1+\alpha} - y_2^h) + (\theta y_2^m - y_2^h)(R+\frac{\Phi}{1+\alpha})}{(R_h-\theta R_m)(R+\frac{\Phi}{1+\alpha}) + (R_m+\frac{\Phi}{1+\alpha})(R(\theta-1)}$$

$$s^h = \frac{R(\theta-1)(\Phi\frac{(y^f+y_1^m)}{1+\alpha} - y_2^h) + R(y_2^m - y_2^h) + \frac{\Phi}{1+\alpha}(\theta y_2^m - y_2^h)}{(R_h-\theta R_m)(R+\frac{\Phi}{1+\alpha}) + (R_m+\frac{\Phi}{1+\alpha})(R(\theta-1)}$$

We then solve for total savings $s = s^h + s^m$

$$s = \frac{(R_h-\theta R_m)\Phi\frac{(y^f+y_1^m)}{1+\alpha} - (R_h y_2^m - R_m y_2^h) + \frac{\Phi}{1+\alpha}(\theta y_2^m - y_2^h)}{R(R_h-R_m) + \frac{\Phi}{1+\alpha}[R_h - R + \theta(R-R_m)]}$$
$$+ \frac{R(\theta-1)(\Phi\frac{(y^f+y_1^m)}{1+\alpha}) + R(y_2^m - y_2^h) - \frac{\Phi}{1+\alpha}(\theta y_2^m - y_2^h)}{R(R_h-R_m) + \frac{\Phi}{1+\alpha}(R_h - R + \theta(R-R_m)} \quad (37)$$

$$= \frac{(R_h-\theta R_m)\Phi\frac{(y^f+y_1^m)}{1+\alpha} - (R_h y_2^m - R_m y_2^h)}{R(R_h-R_m) + \frac{\Phi}{1+\alpha}[R_h - R + \theta(R-R_m)]} +$$
$$\frac{\frac{\Phi}{1+\alpha}(\theta y_2^m - y_2^h) + R(\theta-1)(\Phi\frac{(y^f+y_1^m)}{1+\alpha}) + R(y_2^m - y_2^h) - \frac{\Phi}{1+\alpha}(\theta y_2^m - y_2^h)}{R(R_h-R_m) + \frac{\Phi}{1+\alpha}[R_h - R + \theta(R-R_m)]} \quad (38)$$

$$s = \frac{[(R_h-R) + \theta(R-R_m)]\Phi\frac{(y^f+y_1^m)}{1+\alpha} - [(R_h-R)y_2^m + (R-R_m)y_2^h]}{R(R_h-R_m) + \frac{\Phi}{1+\alpha}[R_h - R + \theta(R-R_m)]} \quad (39)$$

Our assumption (1) guarantees that s is positive. Given that assumptions (A1) and (A2) hold, then it is possible to choose values of $y_2^m$and y_2^h such that $s^m > 0$

Given the value of s, we can solve for r, the migrant's transfer to the origin family.

$$r = \frac{\alpha(y_1^m - s) - y^f}{1+\alpha}$$

First, I solve for $y_1^m - s$

$$\begin{aligned} & y_1^m - s \\ = \quad & y_1^m - \frac{[(R_h - R) + \theta(R - R_m)]\Phi\frac{(y^f + y_1^m)}{1+\alpha} - [(R_h - R)y_2^m + (R - R_m)y_2^h]}{R(R_h - R_m) + \frac{\Phi}{1+\alpha}[R_h - R + \theta(R - R_m)]} \end{aligned} \tag{40}$$

$$\begin{aligned} y_1^m - s = & \frac{y_1^m[R(R_h - R_m)}{R(R_h - R_m) + \frac{\Phi}{1+\alpha}[R_h - R + \theta(R - R_m)]} \\ & + \frac{\frac{\Phi}{1+\alpha}[R_h - R + \theta(R - R_m)] - [(R_h - R) + \theta(R - R_m)]\Phi\frac{(y^f + y_1^m)}{1+\alpha}}{R(R_h - R_m) + \frac{\Phi}{1+\alpha}[R_h - R + \theta(R - R_m)]} \end{aligned}$$

$$\begin{aligned} y_1^m - s = & \frac{[R(R_h - R_m)]y_1^m - [(R_h - R)}{R(R_h - R_m) + \frac{\Phi}{1+\alpha}[R_h - R + \theta(R - R_m)]} \\ & + \frac{\theta(R - R_m)]\Phi\frac{y^f}{1+\alpha} + [(R_h - R)y_2^m + (R - R_m)y_2^h]}{R(R_h - R_m) + \frac{\Phi}{1+\alpha}[R_h - R + \theta(R - R_m)]} \end{aligned} \tag{41}$$

Thus, $\alpha(y_1^m - s) - y^f =$

$$\begin{aligned} = \alpha & \frac{[R(R_h - R_m)]y_1^m - [(R_h - R) + \theta(R - R_m)]\Phi\frac{y^f}{1+\alpha}}{R(R_h - R_m) + \frac{\Phi}{1+\alpha}[R_h - R + \theta(R - R_m)]} \\ & + \frac{[(R_h - R)y_2^m + (R - R_m)y_2^h]}{R(R_h - R_m) + \frac{\Phi}{1+\alpha}[R_h - R + \theta(R - R_m)]} - \\ & y^f \frac{R(R_h - R_m) + \frac{\Phi}{1+\alpha}[R_h - R + \theta(R - R_m)]}{R(R_h - R_m) + \frac{\Phi}{1+\alpha}[R_h - R + \theta(R - R_m)]} \end{aligned}$$

$$\begin{aligned} = & \frac{[R(R_h - R_m)](\alpha y_1^m - y^f) - \Phi[(R_h - R) + \theta(R - R_m)]y^f}{R(R_h - R_{m1}) + \frac{\Phi}{1+\alpha}[R_h - R + \theta(R - R_m)]} \\ & + \frac{\alpha[(R_h - R)y_2^m + (R - R_m)y_2^h]}{R(R_h - R_m) + \frac{\Phi}{1+\alpha}[R_h - R + \theta(R - R_m)} \end{aligned}$$

$$
\begin{aligned}
r &= (\frac{1}{1+\alpha})\frac{[R(R_h-R_m)](\alpha y_1^m - y^f) - \Phi[(R_h-R)+\theta(R-R_m)]y^f}{R(R_h-R_m)+\frac{\Phi}{1+\alpha}[R_h-R+\theta(R-R_m)]} \\
&\quad +(\frac{1}{1+\alpha})\frac{\alpha[(R_h-R)y_2^m+(R-R_m)y_2^h]}{R(R_h-R_m)+\frac{\Phi}{1+\alpha}[R_h-R+\theta(R-R_m)]} \qquad (42)
\end{aligned}
$$

Comparative Statics:
For r, transfer to the origin family

$$\frac{\delta r}{\delta y_1^m} = (\frac{1}{1+\alpha})\frac{[R(R_h-R_m)]}{R(R_h-R_m)+\frac{\Phi}{1+\alpha}[R_h-R+\theta(R-R_m)]} > 0$$

$$\frac{\delta r}{\delta y^f} = -(\frac{1}{1+\alpha})\frac{[R(R_h-R_m)]+\Phi[(R_h-R)+\theta(R-R_m)]}{R(R_h-R_m)+\frac{\Phi}{1+\alpha}[R_h-R+\theta(R-R_m)]} < 0$$

$$\frac{\delta r}{\delta y_2^h} = (\frac{\alpha}{1+\alpha})\frac{(R-R_m)}{R(R_h-R_m)+\frac{\Phi}{1+\alpha}[R_h-R+\theta(R-R_m)]} > 0$$

For s, total savings

$$\frac{\delta s}{\delta y_1^m} = \frac{[(R_h-R)+\theta(R-R_m)]\frac{\Phi}{1+\alpha}}{R(R_h-R_m)+\frac{\Phi}{1+\alpha}[R_h-R+\theta(R-R_m)]} > 0$$

$$\frac{\delta s}{\delta y^f} = \frac{[(R_h-R)+\theta(R-R_m)]\frac{\Phi}{1+\alpha}}{R(R_h-R_m)+\frac{\Phi}{1+\alpha}[R_h-R+\theta(R-R_m)]} > 0$$

$$\frac{\delta s}{\delta y_2^h} = -\frac{(R-R_m)}{R(R_h-R_m)+\frac{\Phi}{1+\alpha}[R_h-R+\theta(R-R_m)]} < 0$$

For s^h, savings in the country of origin

$$\frac{\delta s^h}{\delta y_1^m} = \frac{R(\theta-1)\frac{\Phi}{1+\alpha}}{R(R_h-R_m)+\frac{\Phi}{1+\alpha}[R_h-R+\theta(R-R_m)]} > 0$$

$$\frac{\delta s^h}{\delta y^f} = \frac{R-\frac{\Phi}{1+\alpha}}{R(R_h-R_m)+\frac{\Phi}{1+\alpha}[R_h-R+\theta(R-R_m)]} > 0$$

$$\frac{\delta s^h}{\delta y_2^h} = -\frac{(R+\frac{\Phi}{1+\alpha})}{R(R_h-R_m)+\frac{\Phi}{1+\alpha}[R_h-R+\theta(R-R_m)]} < 0$$

For s^m, savings in the host country

$$\frac{\delta s^m}{\delta y_1^m} = \frac{(R_h-\theta R_m)\frac{\Phi}{1+\alpha}}{R(R_h-R_m)+\frac{\Phi}{1+\alpha}[R_h-R+\theta(R-R_m)]} > 0$$

$$\frac{\delta s^m}{\delta y^f} = \frac{(R_h - \theta R_m)\frac{\Phi}{1+\alpha}}{R(R_h - R_m) + \frac{\Phi}{1+\alpha}[R_h - R + \theta(R - R_m)]} > 0$$

$$\frac{\delta s^m}{\delta y_2^h} = \frac{(R_m + \frac{\Phi}{1+\alpha})}{R(R_h - R_m) + \frac{\Phi}{1+\alpha}[R_h - R + \theta(R - R_m)]} > 0$$

The comparative statics results are summarized below:

Variable	Transfer to Family r	Savings in the Country of Origin s^h	Savings in t
Migrant's current income y_1^m	Positive	Positive	Positive
Migrant's future income y_2^h	Positive	Negative	Positive
Origin Family income y^f	Negative	Positive	Positive