

Motivations and Choice of Channel for Remittances: A Dynamic
Numerical Approximation Using Evidence from Costa Rica-
Nicaragua Flows.

Jose Pablo Barquero-Romero
Academia de Centroamerica
Diciembre 10, 2008

Trabajo en proceso.
No citar

Motivation

- Remittances exceed FDI in Latin America
- Most North-South but significant amount South-South
- Important share through financial system but not all
- Who remits? Why do they remit? How do they remit?
- Previous literature focused on single decision maker

The problem

- Do migrants and households of origin remit for altruistic or profit-oriented motivations?
- How does access to different sets of channels to remit affect the decision to remit and the amount remitted?

Why is this important?

- Country perspective:
 - Important source of purchasing power (GNP)
 - Returns on human capital investment
 - Positive externality
- Household perspective
 - Anti-cyclical if altruism/insurance
 - Non-covariant source of income
 - Pro-cyclical when profit-oriented

Literature

- Migration
 - Todaro (1969): Migrant decision based on probability of finding a job
 - Hoddinott (1994): Migrant and household maximize joint utility
- Remit
 - Lucas and Stark (1985): Motivations to remit
 - Paulson and Osili (2005): Access to formal finance by migrants

Literature

Motives:

- Lopez-Cordoba and Olmedo (2006)
 - Motives to remit: altruism, exchange, insurance, investment, and inheritance
- Altruism:
 - Bouhga-Hagbe (2004): negative elasticity between remittances and real wages at the home country (weak argument, also insurance)
- Investment:
 - Lucas and Stark (1985): more income the household has => better investment opportunities. Migrant would like to benefit

Literature

- Inheritance:
 - Hoddinott (1992), De la Briere et al. (2002): Sons' remittances respond to their parents' inheritable assets, daughters do not. More pronounced effect when more than one migrant
 - Rapoport and Docquier (2004): Parents will allocate bequests according to the relative attention they receive, including remittances
- Insurance:
 - Paulson (2000): Migrants who come from areas without financial institutions will weigh the insurance characteristics of potential destinations particularly heavily in choosing where to move

Literature

Decision to migrate:

- Hoddinott (1994): Approaches to the problem of migration and remittances oversimplification: they exclude the role of the prospective migrant.
- Stark's (1980): Migration is a consequence of household utility maximization.
- Todaro's (1969): Migration is the result of individual utility maximization process

Literature

Access to formal financial institutions and remittances

- Aggarwal et al. (2006): Remittance allow the banks to know and reach out unbanked households=> recipient households gain access to other financial products and services
- Paulson and Osili (2005): Size of the ethnic network has a significant negative impact on financial market participation
- De Luna Martinez (2005): Government can promote use of the banking system as the channel to remit, by increasing financial literacy

Literature

Modeling the decision to migrate and to remit

- Todaro (1969): Labor market model solves for the decision to migrate as probability of job in urban area
- Stark (1980): Optimization of the individual utility of wealth function
- Hoddinott (1994): Migrant and his parents derive utility from their own consumption. They agree to maximize a joint utility function
- De la Briere et al. (2002): Dynamic optimization model migrant remits as a contribution to investment in household assets later to be inherited

Literature

Data analysis

- Most recent studies have followed Hoddinnot's (1994)
 - Estimated a remittance function using a probit regression. Controls for selection bias using Heckman procedure

Methods and Tools for Theoretical Model

- Theoretical Model:
 - Models household's and migrant's risk and returns sharing dynamics using a dynamic optimization, stochastic, non-cooperative game
 - Bellman Equation, Nash Equilibrium

In regular words

- Migrant and HH have 4 different uses for their wealth: consumption, altruistic transfers, investment own activities, investment other activities.
- How to allocate money?
 - When:
 - Migrants
 - Shocks
 - Restricted access to financial services

The Channel

- Tool use to send the money
- Formal and Informal channels available
- Availability depends on access (distance, costs)
- Information Informal hard to get
- Formal: divide two groups
 - Banks
 - Non-Banks
- Costa Rica's Minister of Economy Surveyed 13 most used formal channels
- 3 Banks
- 12 Non-Banks

Channel

Channel	Average Cost	Higher	Lower
Banks	6.5%	10.0%	2.0%
Non-Banks	4.7%	10%	2.0%

Channel

- Banks are more expensive in average
 - Same range of costs for banks and non-banks
 - Use empirical data to test for decision to remit through banks
 - Literature mentions advantages of using banks to remit (Aggarwal, et al. 2006)
 - So, is there a need to know about these advantages in order to be willing to pay more?
- => Financial exposure

Theoretical Model

- Agents: Migrant and Household
- Reward function: Utility from consumption
- Constraints: Income constraint and altruism constraint
- State Variable: Wealth
- State Transition: Investment on own activities and other party's activities -affected by survival rate-
- Action: Investment
- Game: Each one makes decision taking into account other part's optimal decision
- Achieve the maximum attainable sum of current and expected utility

Theoretical Model:

$$V_j(s_j, s_i) = \text{Max}_{0 \leq x_j \leq s_j} \left\{ \begin{array}{l} U_j \left[s_j - (k_j)(s_j - s_i) - x_j \right] \\ + \delta E_{\varepsilon_i \varepsilon_j} V_j \left[\begin{array}{l} f_i(\alpha \gamma_j x_j) \varepsilon_i + \phi x_j + f_j((1 - \alpha)x_j) \varepsilon_j; \\ f_j(\alpha \gamma_i x_i) \varepsilon_j + \phi x_i + f_i((1 - \alpha)x_i) \varepsilon_i \end{array} \right] \end{array} \right\}$$

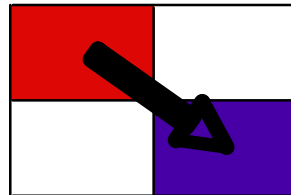
$$V_j(s_j, s_i) = \text{Max}_{0 \leq x_j \leq s_j} \left\{ \begin{array}{l} \frac{\left[s_j - (k_j)(s_j - s_i) - x_j \right]^{1 - \tau}}{1 - \tau} \\ + \delta E_{\varepsilon_i \varepsilon_j} V_j \left[\begin{array}{l} (\alpha \gamma_j x_j)^{\beta_i} \varepsilon_i + \phi x_j + ((1 - \alpha)x_j)^{\beta_j} \varepsilon_j; \\ (\alpha \gamma_i x_i)^{\beta_j} \varepsilon_j + \phi x_i + ((1 - \alpha)x_i)^{\beta_i} \varepsilon_i \end{array} \right] \end{array} \right\}$$

Theoretical Model:

$$x_j^* = \left\{ \frac{\left[\frac{1 - \phi\delta(1 - k_j)}{\delta(1 - k_j)} \right] \left(\frac{1}{\beta} \right)}{\left[(\alpha\gamma_j)^\beta + (1 - \alpha)^\beta \right]} \right\}^{\frac{1}{\beta-1}}$$

Simulations

- How model reacts when changes in key parameters
 - New optimal choices and optimal paths (MonteCarlo)
- Transaction costs in access to channels will change optimal decisions -switches in N.E.-



Hypotheses and Proxy Variables

- Remittances will increase with the HHs productive opportunities
- Remittances will decrease with length of stay in host country
- Remittances will increase with financial exposure
- Investment will increase with income

Estimations

- Migrant:

decision to remit = f(proxyes of motivations to remit, control variables)

remit through banks = f(financial exposure)

- Household

Δ remittances = f(Δ productive opportunities, effort)

Methods and Tools for Estimations

- Data Analysis
 - Migrant behavior: Cross sectional data (2006)*
 - Probit for motivations to remit, LM test for omitted variables
 - Heckman sample selection for choice of channel
 - Household behavior: Panel data (1998-2001)**
 - First differences model (OLS tests available)
 - Fixed effects for type of household effort (Wu)
 - IV for endogeneity problem
 - Heckman if sample selection problem is found

* Data provided by BID/ Banco Nacional de Costa Rica / FOMIN

** Data provided by World Bank LSMS

Data Analysis

$$\textit{Decision to Remit} = \alpha + \gamma X_i + \psi Y_i + \varepsilon_i$$

X = Control variables: Age, Time, Gender, SkillOccupation, Return, LegalStatus

*Y = Profit oriented variables: MoreFamily, Entrepreneurship, Gender*Morefamily, Decision*

MoreFamily: Inheritance

Entrepreneurship: Investment

Decision: Insurance

Table 2

Determinants of remittances		
Variables	Logit	Linear Prob
	Coefficients	Coefficients
Intercept	0.0298 (0.44)	0.464 *** (0.08)
Gender (Male)	0.2837 (0.26)	0.06219 (0.05)
Age	-0.00466 (0.01)	-0.00029429 (0.00)
Time	-0.0715 *** (0.02)	-0.0102 *** (0.00)
Decision	0.3318 (0.25)	0.06098 (0.05)
MoreFamily	1.037 ** (0.53)	0.23436 ** (0.11)
LowSkillOccupation	0.0338 (0.26)	0.00605 (0.05)
Entrepreneurship	1.0175 *** (0.26)	0.20505 *** (0.05)
Return	-0.693 *** (0.25)	-0.14483 *** (0.05)
LegalStatus	0.0682 (0.32)	-0.02014 (0.06)
Gender*MoreFamily	0.8564 (0.85)	0.12902 (0.15)
Observations	361	361
Likelihood Ratio	80.08	8.53
Percentage Concordance	76	85 /1
/1 F-Value		

Note: Standard errors are in parenthesis

*** Significance at 1% level.

** Significance at 5% level.

* Significance at 10% level.

Table 3

Determinants of remittances

Variables	Logit Odds Ratios
Gender (Male)	1.328
Age	0.995
Time	0.931 ***
Decision	1.394
MoreFamily	2.821 **
LowSkillOccupation	1.034
Entrepreneurship	2.766 ***
Return	0.500 ***
LegalStatus	1.071
Gender*MoreFamily	2.355

*** Significance at 1% level.

** Significance at 5% level.

* Significance at 10% level.

Data Analysis

- Main implication is that return oriented variables positively influenced the decision to remit (More Family, Entrepreneurship)
- Variables related to less links with the household negatively influenced the decision to remit
- Migrant cares about her well-being at the time of return

Data Analysis

- Decision to remit through banks:
 - Logit Model
 - Heckman sample selection bias model
 - Decision to remit through a given channel is related to the decision to remit. Estimate the channel selection decision without taking into account the relationship with the original decision to remit => estimators will be biased

Data Analysis

Decision to remit through banks:

$$E[\textit{Decision to Remit through Banks} | \textit{Decision to Remit} = 1] = \alpha + \gamma X_i + \psi Y_i + \varepsilon_i$$

X = Control variables: Legal Status, Education

Y = Financial Exposure Variables: Bank Account Costa Rica, Bank Account Nicaragua, Credit

Table 4

Determinants of remitting through banks

Variables	Heckman Coefficients
Intercept	0.14228 (0.12)
BankAccount Costa Rica	-0.06135 (0.07)
BankAccount Nicaragua	-0.20236 (0.21)
Education	0.00255 (0.01)
Credit	0.83429 ** (0.42)
Legal Status	0.07689 (0.08)
Lambda	0.00478 (0.10)
Observations	137
Likelihood Ratio	1.39

Percentage Concordance

Note: Standard errors are in parenthesis

*** Significance at 1% level.

** Significance at 5% level.

* Significance at 10% level.

Data Analysis

- These results show that what matters on the selection of a certain channel is a deeper financial exposure
- Migrant values the relationship with the banks and knows about its advantages
- Knowledge link to current gains derived from relation with banks

Conclusions

- Migrant decides to remit to affect her future... at the home country
- Competition with relatives for future rewards positively affects decision to remit
- Financial exposure needed to influences choice of channel is not superficial
- Working research related to HH side of the problem

Conclusions

- Shows the substitutability between sending remittances in goods and in monetary form through banks
- Takes a step in the direction of modeling the migrant's and household's optimization process when it comes to decide if to remit or not.
- Explains the selection process for the channel used to remit, accounting in the estimations for the two-stage process involved in the decision of how to remit.