Intra-household Selection into Migration : Evidence from a Matched Sample of Migrants and Origin Households in Senegal

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Motivation

- Who migrates ? Migrant selection is most often modelled as resulting from an individual decision
  - Based on wage differentials between origin and destination countries
- But migration has been studied as a household strategy, especially in developing countries
  - Importance of remittances in the resources of the sending household
- Is migrant selection based on a household decision different from individual self-selection ?
  - Portfolio allocation : potential trade-off between migrants' expected gains at destination and the share of it that will come to the household through remittances

Objectives of the paper

- Extend the Roy model of selection to a household based migration decision (similar to portfolio allocation)
  - Roy (1951), Borjas (1987), extended to multiple locations by Dahl (2002), all consistent with individual location decisions (Harris and Todaro, 1970 ; Sjaastad, 1962)
- Address the issue of intra-household selection : who migrates within the household ?
  - In line with the New Economics of Migration : mobility choices as household decisions (Stark and Bloom, 1985)
- Empirical application using survey data on a matched sample of migrants and their origin households (MIDDAS)
  - Counterfactual income of migrants, *had they not migrated*, based on characteristics of non-migrant members of migrant households : account for unobservable characteristics at the household level

A household selection model for migration

- Intuition : the household is a portfolio of members, allocated depending on their return (expected income) and risk (of not remitting) at each location

- Household level additively separable utility function : with I potential migrant members within the household and J possible locations, the random utility of household h having a migrant i in country j writes :

$$U_{hij} = \alpha y_h + \beta(y_{ij} - r_{ij}) + \gamma r_{ij} + z'_{hi}\delta_j + \epsilon_{hij} \quad (1)$$

  - y_h : total log home earnings of remaining household members
  - y_{ij} : log earnings of migrant i in country j
  - r_{ij} : log amount of remittances to household h of migrant i in country j
  - z_{hi} : vector of individual and/or household characteristics

- Which component mostly drives allocation decision ? Estimation of weights α, β and γ

Allocation choice

- Household chooses among $I \times J$ alternatives the geographical allocation of its members that maximizes its collective utility

- Household h decides to locate member i in country j if :

$$U_{hij} = max(U_{h11}, ..., U_{h1J}, ..., U_{hI1}, ..., U_{hIJ})$$

- Household level selection equations :

$$M_{hij} = \begin{cases} 1 & \text{if} \quad U_{hij} > U_{hkl} \qquad \forall (k,l) \neq (i,j) \\ 0 & \text{otherwise} \end{cases}$$

- Interpretation : M_{hij} equals one if alternative $\{ij\}$ is chosen and observed

Estimation

- Objective : estimate the the set of structural parameters $(\alpha, \beta, \gamma, \delta_j)$ in equation 1 (different weights on incomes and remittances in the household utility function)

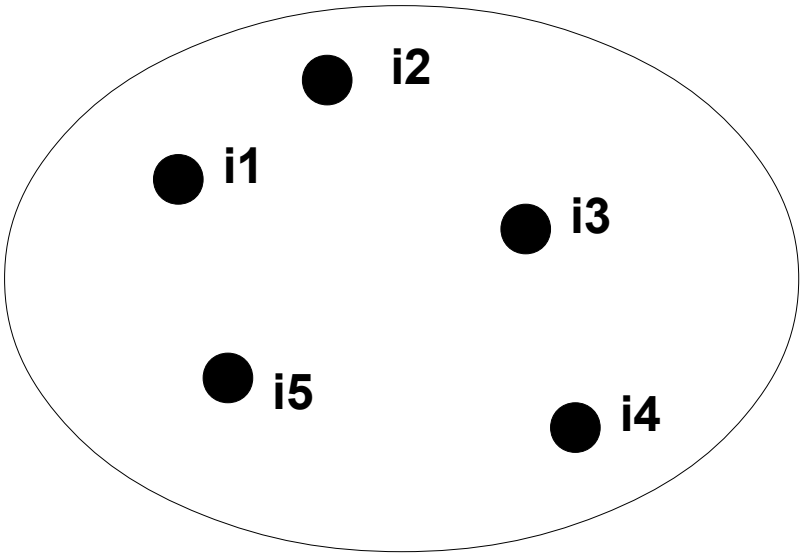
- Identification issues :
  - Earnings and remittances are only observed at one location for each household member
  - Households choosing a specific utility-maximizing geographical allocation are not a random subsample of the population

- Earnings and remittances in other locations must be imputed, accounting for observed and unobserved individual and household characteristics driving location choices

Econometric challenges

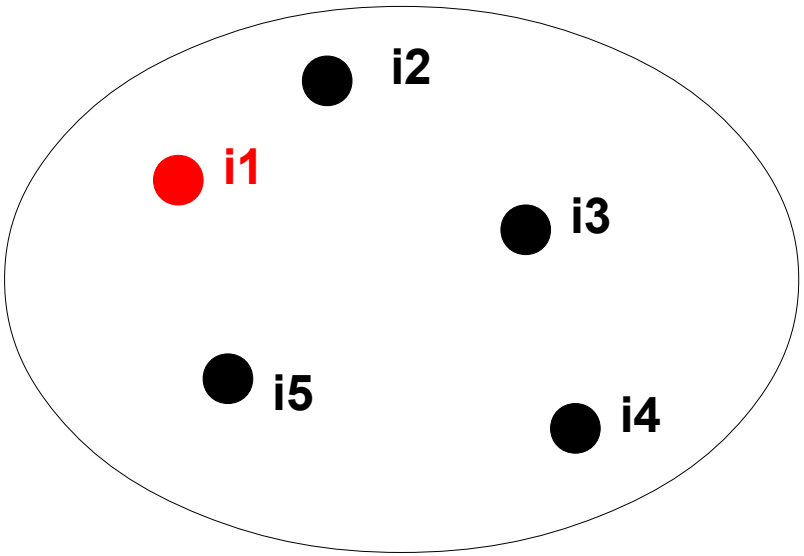
- Households are not of equal size : the pool of potential migrant members is not the same in all households
  - Number of allocation choices $I \times J$ varies across households
- Estimate a conditional logit model with a varying number of alternatives (clogitVNA) across observations
  - Marketing models : Berry, Levinsohn, and Pakes (2004) ; Allenby and Rossi (1998).
  - Elections : Yamamoto (2012)

Household selection : why a varying number of alternatives ?



- 5 possible allocation choices

Household selection : why a varying number of alternatives ?



- Alternative 1 : {i1 migrates, i2, i3, i4, i5 stay in Senegal}

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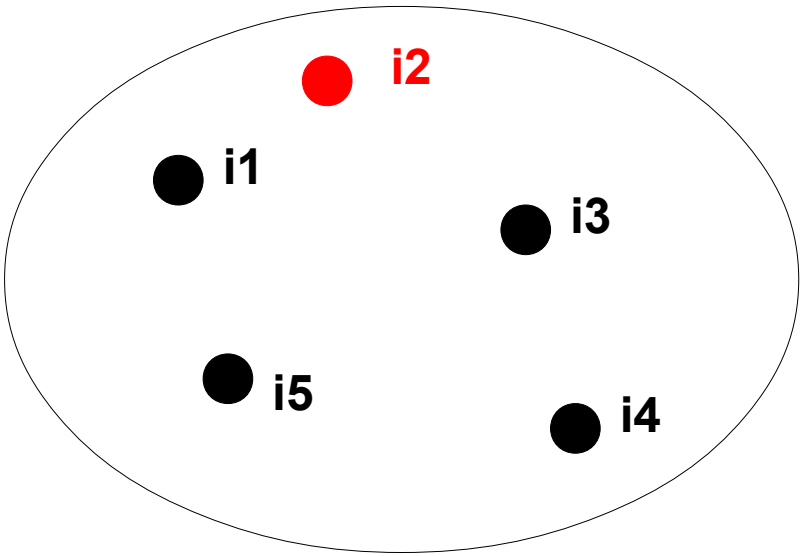

- Alternative 1 : {i1 migrates, i2, i3, i4, i5 stay in Senegal}
- Alternative 2 : {i2 migrates, i1, i3, i4, i5 stay in Senegal}

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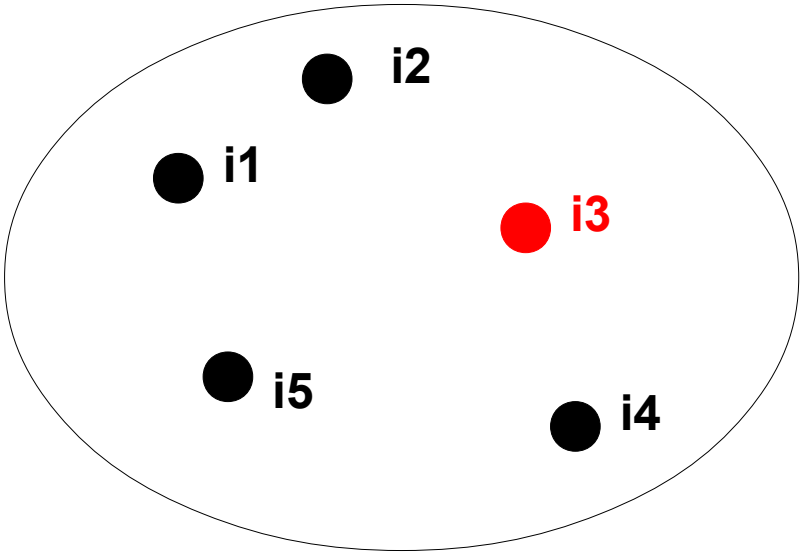

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- Alternative 3 : {i3 migrates, i1, i2, i4, i5 stay in Senegal}

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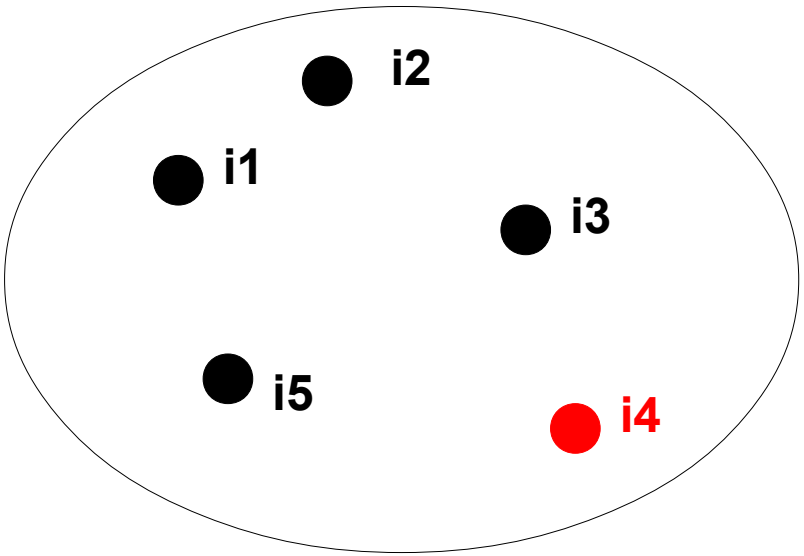

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- Alternative 4 : {i4 migrates, i1, i2, i3, i5 stay in Senegal}

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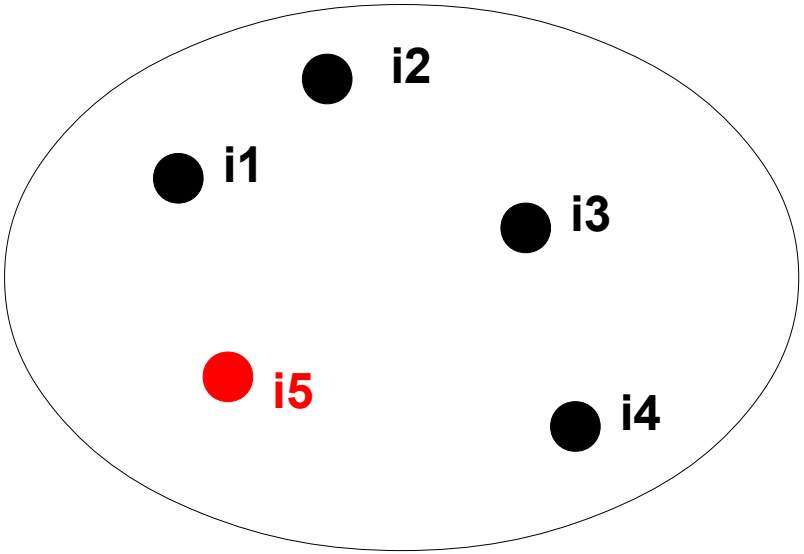

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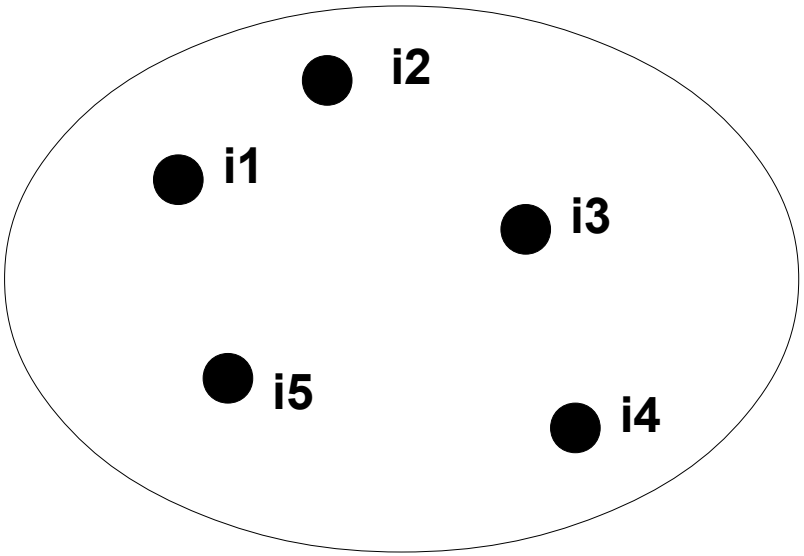
- Alternative 4 : {i4 migrates, i1, i2, i3, i5 stay in Senegal}
- Alternative 5 : {i5 migrates, i1, i2, i3, i4 stay in Senegal}

Household selection : why a varying number of alternatives ?



- 5 household members : 5 possible allocation choices
- N household members : N possible allocation choices
- The number of alternatives varies across households

3 steps

1. Estimate a conditional logit model with a varying number of alternatives (clogitVNA) for selection into locations at the household level
   - Reduced form selection equation

2. Use results from step 1 to correct for endogenous selection in individual earnings and remittances equations and compute unconditional average earnings and remittance predictions, for each individual at each possible location.
   - Individual Mincer-type earnings and remittances equations
   - Instruments : precipitations interacted with individual characteristics (gender, age, education)
   - Household home earnings = sum of individual earnings of remaining working members

3. Using results from step 2, estimate a structural conditional logit model to recover the set of parameters
   - Identification relies on instruments affecting earnings/remittances but not location choices.

Data

- MIDDAS : Surveys among Senegalese migrants in France, Italy, Mauritania, Côte d'Ivoire and their origin household in Senegal.
- Over 300 migrants surveyed in each destination country in 2009 and 2010
  - Use of census data to approach representativeness of migrant samples
- Origin households tracking in Senegal in 2009 and 2010 (except for Côte d'Ivoire)
  - 35,3% matching rate
  - 326 migrant-household pairs
- Rainfall data taken from the Climatic Research Unit of University of East Anglia
  - Gridded dataset : definition 0.5 degree
- Sample representativeness is assessed at three different stages

Descriptive statistics : Individual characteristics by location

	Senegal (1)	**France (2)**	**Italy (3)**	**Mauritania (4)**
Age	33.9	36.9	35.9	35.8
Gender (%)				
...Male	42.6	75.7	77.2	63.6
...Female	57.4	24.3	22.8	36.4
Schooling level (%)				
...No schooling	40.4	18.0	10.9	40.6
...Primary	28.4	18.0	12.3	29.4
...Middle School	14.2	16.3	25.2	16.7
...High School and more	17.0	47.7	51.7	13.3
Marital status (%)				
...Single	39.6	37.3	22.5	27.2
...Married	52.7	47.7	70.2	60.6
...Divorced	4.1	13.7	6.3	8.4
...Widowed	3.6	1.3	1.0	3.8
Labour status (%)				
...Unemployed/Non-working	48.1	25.7	29.5	17.0
...Working	51.9	74.3	70.5	83.0
Monthly earnings (XOF/euros/MRO)	66 552.8	1 281.4	1 163.2	52 531.8
Monthly earnings (PPP)	216.7	1 408.1	1 368.5	367.4
Monthly remittances (XOF)	(/)	125 209.9	130 637.0	36 928
Monthly remittances (PPP)	(/)	407.7	425.3	120.2
Observations	**1,929**	**300**	**302**	**324**

Estimation

- Step 1 : selection at the household level (who migrates within the household ?)
  - Conditional logit with a varying number of alternatives (clogitVNA) of location and member choice (*who migrates where ?*)
- Step 2 : counterfactual earnings and remittances (accounting for selection into migration)
  - Mincer-type equations for earnings in all 4 countries and remittances for the 3 destinations including correction terms from step 1
- Step 3 : recover structural parameters of the household utility function
  - Estimate coefficients on log-earnings/remittances in the structural household model of location choices.

Step 1 : Household selection equation (reduced form)

	clogit (1)	clogit (2)
Male	1.146***	1.266***
	(0.147)	(0.178)
Age	0.401***	0.456***
	(0.042)	(0.048)
Age squared	-0.005***	-0.005***
	(0.001)	(0.001)
Elementary school	0.320	0.319
	(0.211)	(0.216)
Middle school	1.107***	1.098***
	(0.240)	(0.250)
High school and more	1.660***	1.979***
	(0.250)	(0.295)
Rain zscore x male		0.353*
		(0.208)
Rain zscore x age		0.0478***
		(0.010)
Rain zscore x high school		0.687**
		(0.303)
Observations	2225	2159
Rain zscore variables joint significance (χ^2)		24.51***
		(0.000)

Estimation

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Step 2 : Earnings/Remittances equations

	Home earnings		Destination earnings		Remittances	
	Uncorrected	Corrected	Uncorrected	Corrected	Uncorrected	Corrected
Male	0.616***	0.620***	0.426***	0.479***	0.305*	0.420**
	(0.070)	(0.072)	(0.089)	(0.104)	(0.163)	(0.165)
Age	0.0872***	0.0887***	0.0571**	0.0768**	0.0313	0.0606
	(0.019)	(0.017)	(0.029)	(0.030)	(0.042)	(0.051)
Age squared	-0.001***	-0.001***	-0.001	-0.001**	-0.004	-0.003
	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)	(0.001)
Elementary school	0.115	0.111	0.266**	0.277***	0.144	0.154
	(0.086)	(0.107)	(0.104)	(0.105)	(0.206)	(0.210)
Middle school	0.521***	0.518***	0.263**	0.321***	-0.009	-0.021
	(0.120)	(0.107)	(0.112)	(0.123)	(0.205)	(0.221)
High school and more	1.095***	1.104***	0.421***	0.444***	0.177	0.180
	(0.131)	(0.119)	(0.114)	(0.115)	(0.193)	(0.201)
Capital/big cities	0.325***	0.336***	-0.069	-0.066	-0.001	-0.002
	(0.091)	(0.089)	(0.079)	(0.080)	(0.149)	(0.157)
Koranic schooling					0.554***	0.507**
					(0.213)	(0.253)
Resident spouse/child					0.418***	0.395***
					(0.155)	(0.129)
Son/daughter of head					0.107	0.0908
					(0.148)	(0.135)
Italy (d)			-0.0441	-0.0673	0.131	0.129
			(0.090)	(0.108)	(0.173)	(0.192)
Mauritania (d)			-1.171***	-1.175***	-1.447***	-1.448***
			(0.092)	(0.091)	(0.163)	(0.177)
Constant	2.247***	2.154***	5.368***	4.856***	9.905***	9.683***
	(0.362)	(0.329)	(0.571)	(0.611)	(0.841)	(0.911)
Selection probability		0.239**		-0.385**		-2.206**
		(0.109)		(0.294)		(0.974)
Selection probability^2		-0.052**		0.220**		2.343**
		(0.023)		(0.098)		(0.940)
Observations	813	813	255	255	249	249

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Step 3 : Household selection equation (structural form)

	clogit
Home earnings	2.585*
	(1.112)
Destination earnings	-24.59***
	(2.945)
Remittances	16.36***
	(2.436)
Observations	2110

Conclusion

- Extension of the Roy model to account for household-based migration decisions
- Address the original issue of intra-household selection into migration
- Preliminary results suggest that the within-household selection decision depends on :
  - Expected remittances (from the migrant) - positively
  - Expected home earnings (of remaining members) - positively
  - Expected earnings abroad (of the migrant) - negatively