Of Kinship and Wealth; An Agent-Based Model of Rural and Urban Migration

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Table of contents

Purpose

To explore the role of kinship and job-seeking in the decisions of urban-rural migrants.

Literature Review

- Todaro, Mchael P., *A Model of Labor Migration and Urban Unemployment in Less Developed Countries.*[1]
  - Migration proceeds in response to urban-rural differences in *expected earnings* with the urban employment rate acting as an equilibrating force on such equilibrium.

- Skeldon, R. *International Migration, Internal Migration, Mobility and Urbanization: Towards More Integrated Approaches.*[2]
  - Overall trend of Rural-Urban migration, but some "counter-urbanization"

- Skeldon, Ronald. *The Wiley Blackwell Encyclopedia of Race, Ethnicity, and Nationalism*. Stone, John, et al. Volume 5, Sou-Z, Wiley Blackwell, 2016.[3]
  - Internal population movements are rarely simple origin-to-destination flows

- Hatna, E, Benenson I., *The Schelling Model of Ethnic Residential Dynamics.*[4]
  - Even when individuals don't have an explicit desire to completely segregate themselves, they still look to be around some of "their own" resulting in auto segregation over time

Entities

Agent of type I

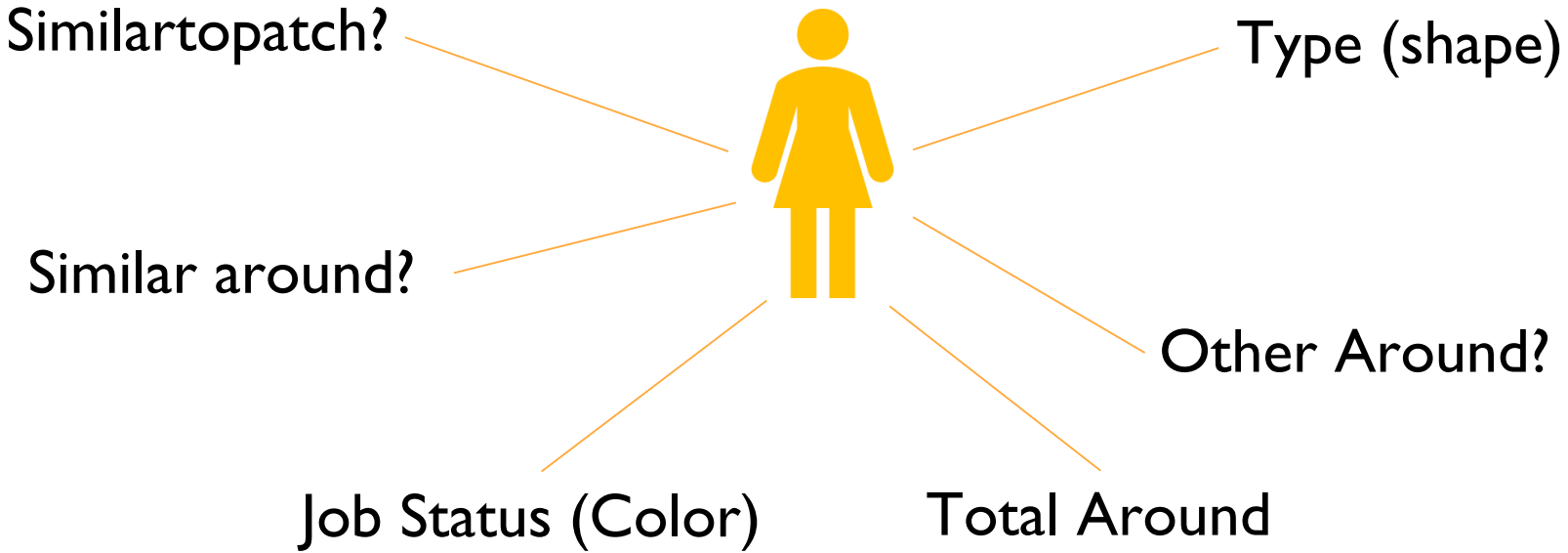
Agent of type II

Rural Regions

Urban Regions

Methodology

Turtles
Attributes



Methodology

Patch Attributes

Number of Jobs

Wage

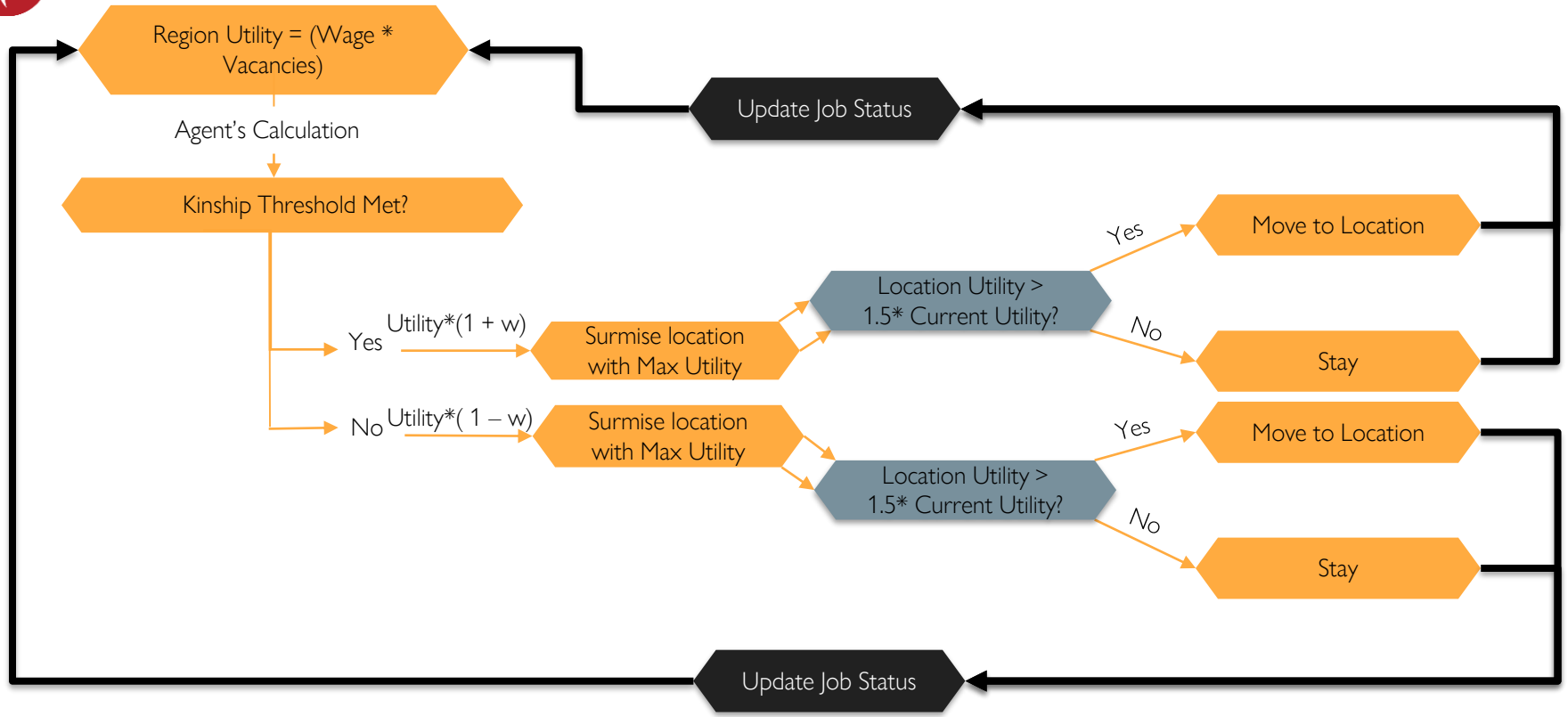
Unemployment

Vacancies

Utility

Region Type (color)

Employment


Region Utility = (Wage * Vacancies)
Agent's Calculation
Kinship Threshold Met?
Yes
Utility*(1 + w)
Surmise location with Max Utility
Location Utility > 1.5* Current Utility?
Yes
Move to Location
No
Stay
No
Utility*(1 – w)
Surmise location with Max Utility
Location Utility > 1.5* Current Utility?
Yes
Move to Location
No
Stay
Update Job Status
Update Job Status

Test 1

Initial Conditions

- Agents **70**
- Single **Urban** region
- Urban Jobs **70**
- Rural Jobs **0**
- Urban Wage **20**
- Rural Wage **15**
- %-Similar-wanted **50%**

Output

- All turtles employed
- Turtles non-migratory

Test II

Initial Conditions

- Agents **70**
- One **Urban** region
- One **Rural** region
- Urban Jobs **75**
- Rural Jobs **0**
- Wage Urban **20**
- Wage Rural **15**
- %-Similar-Wanted **50%**

Output

- Complete Urbanization
- 100% Employment
- High-Volume Rural-Urban Migrations

Baseline

Baseline

Initial Conditions

- Agents **70**
- One **Urban** region
- One **Rural** region
- Urban Jobs **35**
- Rural jobs **28**
- Urban wage **20**
- Rural wage **15**
- %-Similar-Wanted **50%**

Output

- Migrate initially for kinship, later for employment.
- Small disparity employment by region.
- Low unemployment
- Higher Urban Utility

Scenario 1
Seeking Kinship

Scenario I

Initial Conditions

- Agents **70**
- One **Urban** region
- One **Rural** region
- Urban Jobs **35**
- Rural jobs **28**
- Urban wage **20**
- Rural wage **15**
- %-Similar-Wanted **80%**
- Threshold weight **40%**

Output

- %similar threshold not met, agents still migrate seeking greater utility
- Small disparity employment by region.
- Low unemployment

Scenario 2, Rural Boom

Scenario II

Initial Conditions

- Agents **70**
- One **Urban** region
- One **Rural** region
- Urban Jobs **35**
- Rural jobs **28**
- Urban wage **25**
- Rural wage **35**
- %-Similar-Wanted **50%**

Output

- Agents remain in Urban Region
- Higher employment in Urban Region
- Agents decide to stay in Urban if they don't see job opportunities in Rural Region.

Scenario 3, Multiple Regions

Scenario III

Initial Conditions

- Agents **70**
- Multiple **Urban** region
- Multiple **Rural** region
- Standard Deviations **1**
- Average Urban Jobs **20**
- Average Rural jobs **15**
- Average Urban wage **20**
- Average Rural wage **15**
- %-Similar-Wanted **50%**

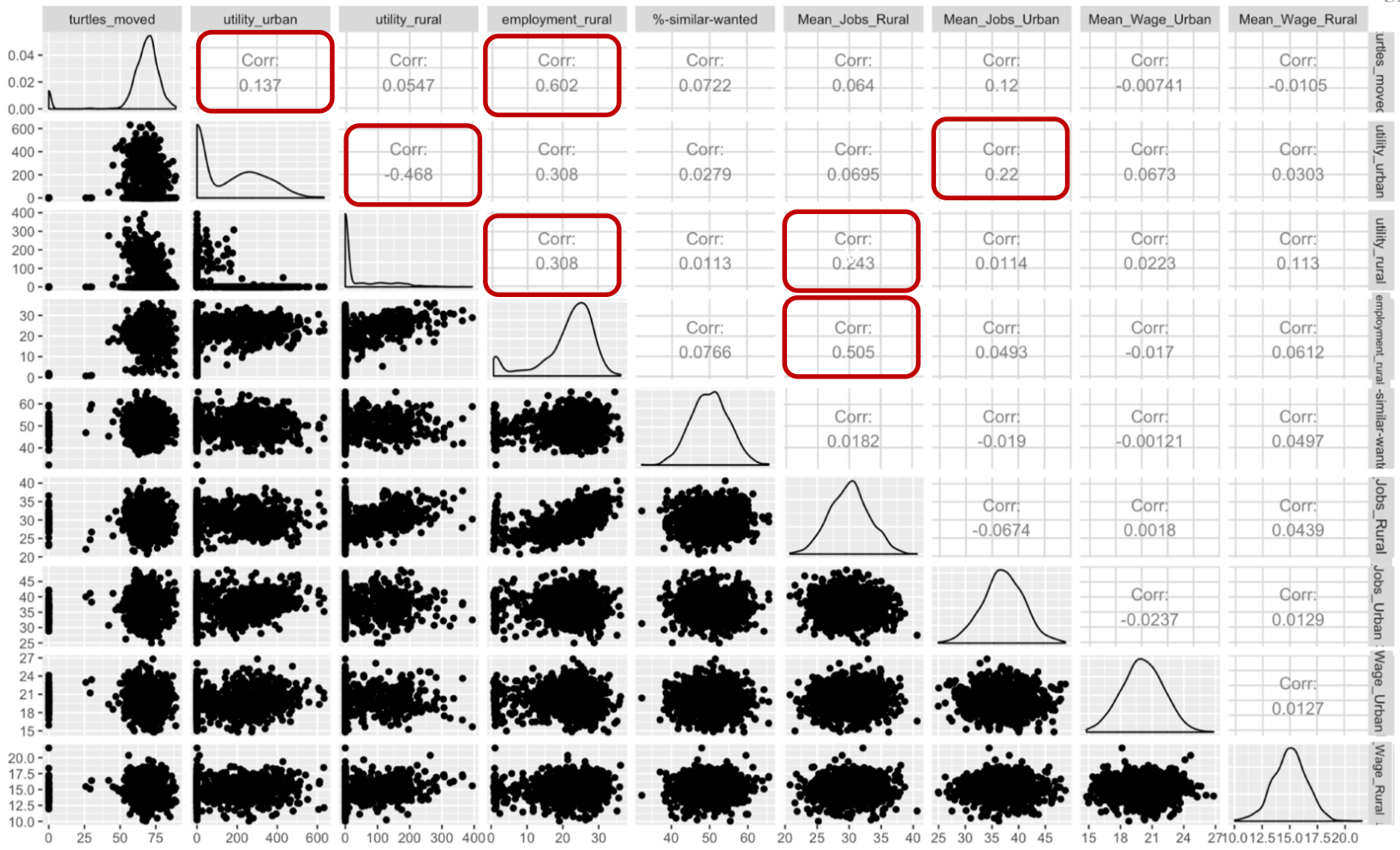
Output

- Complete Urbanization.
- 100% employment
- Migrations between Urban regions.
- Clusters

Results
Jobs and Similarity (increasing the weight of utility

Regression Results

	Dependent variable:		
	Turtles moved	utility urban	utility rural
	(1)	(2)	(3)
Employment urban	0.885***	9.439***	-1.630***
	(0.064)	(0.879)	(0.363)
Employment rural	0.593***	-1.954**	3.992***
	(0.078)	(0.954)	(0.505)
Similar to patch true		-0.482*	-0.160
		(0.260)	(0.125)
Mean Jobs Urban		-0.756	
		(1.450)	
Mean Wage Urban	0.040	6.038***	
	(0.206)	(2.266)	
Mean Jobs Rural			1.254
			(0.867)
Mean Wage Rural	-0.454*		4.126***
	(0.266)		(1.403)
`%-similar-wanted`	0.126		
	(0.083)		
Constant	27.351***	-145.830**	-93.689***
	(7.051)	(69.765)	(32.671)
Observations	1,000	1,000	1,000
R2	0.468	0.235	0.133
Adjusted R2	0.466	0.231	0.128
Residual Std. Error (df = 994)	12.816	140.807	67.420
F Statistic (df = 5; 994)	175.193***	60.905***	30.434***
Note:			*p<0.1; **p<0.05; ***p<0.01


turtles_moved
utility_urban
utility_rural
employment_rural
%-similar-wanted
Mean_Jobs_Rural
Mean_Jobs_Urban
Mean_Wage_Urban
Mean_Wage_Rural
Corr: 0.137
Corr: 0.0547
Corr: 0.602
Corr: 0.0722
Corr: 0.064
Corr: 0.12
Corr: -0.00741
Corr: -0.0105
Corr: -0.468
Corr: 0.308
Corr: 0.0279
Corr: 0.0695
Corr: 0.22
Corr: 0.0673
Corr: 0.0303
Corr: 0.308
Corr: 0.0113
Corr: 0.243
Corr: 0.0114
Corr: 0.0223
Corr: 0.113
Corr: 0.0766
Corr: 0.505
Corr: 0.0493
Corr: -0.017
Corr: 0.0612
Corr: 0.0182
Corr: -0.019
Corr: -0.00121
Corr: 0.0497
Corr: -0.0674
Corr: 0.0018
Corr: 0.0439
Corr: -0.0237
Corr: 0.0129
Corr: 0.0127

Model Summary

	Baseline	Scenario I: Seeking Kinship	Scenario II: Rural Boom	Scenario III: Multiple Regions
Initial Conditions	Agents **70** One **Urban** region One **Rural** region Urban Jobs **35** Rural jobs **28** Urban wage **20** Rural wage **15** %-Similar **50%**	Agents **70** One **Urban** region One **Rural** region Urban Jobs **35** Rural jobs **28** Urban wage **20** Rural wage **15** %-Similar **80%** Threshold weight 0.4	Agents **70** One **Urban** region One **Rural** region Urban Jobs **35** Rural jobs **28** Urban wage **25** Rural wage **35** %-Similar **50%**	Agents **70** Multiple **Urban** region Multiple **Rural** region Average Urban Jobs **20** Average Rural jobs **15** Average Urban wage **20** Average Rural wage **15** %-Similar **50%**
Results	• Migrate initially for kinship, later for employment. • Small disparity employment by region. • Low unemployment • Higher Urban Utility	• %similar threshold not met, agents still migrate seeking greater utility. • Small disparity employment by region. • Low unemployment.	• Agents remain in Urban Region • Higher employment in Urban Region • Agents decide to stay in Urban if they don't see job opportunities in Rural Region.	• Complete Urbanization. • Migrations between Urban regions. • 100% Employment. • Clusters.

Conclusion

- Intuitively, Job vacancies are highly salient.
- Agents prefer proximity to kin, but will migrate for employment.
- Wage can be salient, but ineffective if lack of vacancies exists
- Despite job vacancies at the time of the utility calculation being high enough to warrant an individual to migrate, she runs the risk of being unemployed once she arrives at the chosen location in this instance. Consequently, agents' simultaneous calculation of the location with the highest utility does not prove to be the most effective strategy for agents to maximize their utility.

Future Research

- Future runs conducted with more than two types of agents
- More individualization of each agent
- Introduction of non-economic or kinship factors. (political, demographic. etc.)
- Introduction of more migration incentives.
- Case-studies of specific regions and periods.

Bibliography

1. Todaro, Michael P., *A Model of Labor Migration and Urban Unemployment in Less Developed Countries.* The American Economic Review Vol. 59, No. 1 (1969), pp. 138-148.
2. Hatna, E, Benenson I., *The Schelling Model of Ethnic Residential Dynamics: Beyond the Integrated - Segregated Dichotomy of Patterns.* Journal of Artificial Societies and Social Simulation. (2012).
3. Skeldon, R. *International Migration, Internal Migration, Mobility and Urbanization: Towards More Integrated Approaches.* United Nations Expert Group Meeting on Sustainable Cities, Human mobility and International Migration. (2007).

Thank you!

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