Network effects in Hungarian internal migration

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Aims

- Previous studies find significant social network effects on migration

- Mostly international migration, individual level surveys

- The process of migration can be described by two phases: (1) a decision to leave the current residence and (2) a the "relocation decision" made between alternatives by their "place utility". Thus, there is a possible difference of factors influencing the decision to leave and the factors influencing the choices of the destination (Brown and Moore 1970, DeJong, Sell 1978)

- We analyze
  - Internal migration on settlement level (3000+)
  - Flows based on official data
  - Networks are measured by social network data (iWiW)
  - Two mdels: One for outmigration and one for location choice
  - Measurnig the effect of social network connections and previous migration simultaneously

1.1 Outmigration & networks

- Sociological factors can be incorporated to the push-pull models of mmigration

- Presence of local kinship ties prevent migration (Johnston 1971, Kobrin, 1983): presence of relatives and friends of children impede the out-migration of families (Dawkins 2006).

- Location-specific capital and information costs determines the willingness of the individual to migrate (DaVanzo 1981)

- Cost and risk-reducing nature of information available through the network (Deléchat 2001):

- Cumulative causation: after the initial migrants, the probability of further movement is continuously increasing as time passes. Every single migratory act modifies the social context that influences the upcoming migratory decisions, therefore increasing the probability of following migration (Massey et al. 1993).

- Migrants keep in touch with the remaining people, so the proportion of external contacts grow in the community, so reducing the uncertainty of „migratory investment". On a long-term, migration culture can evolve.

1.2 Destination choice & networks

- The chain migration phenomenon. First breadwinners move, (using middlemen) than families follows.
  - Italian migration to US. (MacDonald and MacDonald 1964)
  - Great migration of blacks from the south to the north (Gottlieb 1987, Grossman 1989)
- Economic model with endogeneous moving cost (Carrington et al. 1996)
- Chain migration is an important migration persisting network effect. An individual maintains some of her relationships after moving, so her migration creates new relationships between her place of origin and her place of residence and this can lead to further migration.
  - From the previous models it seems that both previous migration and relationships have a positive impact on migration (Bauer, Epstein, Gang 2002).
- Size of the ethnic group at the destination area: similar-ethnicity minority can provide "ethnic goods" (Chiswick and Miller, 2005).
  - Immigrants tend to move in to location where similar ethnicity minorities are present: OECD countries (Gross and Schmitt 2005), European regions (Nowotny and Pennerstorfer, 2012), municipality choice of refugees (Aslund, 2001; Damm, 2009).
- Presence of friends and relatives are beneficial on the long runs. They provide smaller and bigger services, financial aid, emotional support and companionship to the family members (Wellman and Worthley 1990) - the higher the number of friends and relative on the potential destination, the more valuable the location is
- Migrants receive help from friends and relatives at the destination place (Blumberg and Bell 1959, Chlodin, 1973, Banerjee 1983), thus presence of friends and relatives decrease the cost of moving.

1.3 Hypotheses

- *H1/a: More people migrate from settlements with greater external social network than from places where the greater part of the social network is internal.*

- *H1/b: In those settlements where migration has had a high rate in previous years, it will be high in the given year too.*

- *H2/a: From a given settlement people rather tend to migrate to a destination of which inhabitants they have more contact with.*

- *H2/b: High rates of migration between two settlement in the previous years occurs high migration rate in the given year.*

2. Data

- Time series data (2000-2014) on the migration between Hungarian settlements (CSO – domestic migration database). Information on the age, gender, and marital status of the migrants, and from which settlement to which did they move in which year. Therefore, the individual can not be identified, also we dont know where is their permanent address is when they establish an official temporary address.

- The density of relationships between settlements involves direct data: using the 2013 data from the iWiW social network sites database. We used an aggregate version of the individual relationship database: on settlement - settlement and settlement - demographic group-level.

- KSH T-Star database: Settlement statistical database system that collects the most important quantified information from the municipal statistical information systems. Finally we extracted 6 variables with Principal Components Analysis from the selected 22 relevant variables to describe the amenities and infrastructure of the settlements

- "KÖZÚT" database (CERS HAS Data Bank): is used to estimate the distance between the settlements in travel time in minutes, by car on road.

3. Methods

1. Leaving settlements 2000-2014

H1/a. How the likelihood of displacement from a given settlement is related to the migration of the previous year?

$$\frac{M_{iast}}{P_{iast}} = \alpha + \beta_1 f_{i,t-1} + \beta_2 \frac{M_{ias,t-1}}{P_{ias,t-1}} + \beta_3 \frac{M_{i,t-1}}{P_{i,t-1}} + \beta_4 S_{it} + \beta_5 P_{it} + \gamma D_{ias} + \varepsilon_{iast} + \xi_{it}$$

Where M = number of migrants, leaving „i" settlement in „t" year – belonging to „a" agegroup and „s" sex. „P" is the number of population of the settlement.

- „f" are the factors describing the characteristics of the settlements and „S" is the type of the settlement.

- D_{ias} are dummies of the demographic groups. And $\varepsilon_{iast}, \xi_{it}$ are the error members in the multilevel regression.

3. Methods

2. Leaving settlements 2014

H1/b. How the likelihood of displacement from a given settlement is related to the migration of the previous year and the relationships on iWiW?

$$\frac{M_{ias}}{P_{ias}} = \alpha + \beta_1 f_i + \beta_2 \frac{M_{ias}}{P_{ias}} + \beta_3 \frac{M_i}{P_i} + \beta_3 c_{ieas} + \beta_3 c_{ibas} + \beta_3 N_{ias} + \beta_3 N_i + \beta_4 S_i + \beta_5 P_i + \gamma D_{ias} + \varepsilon_{ias} + \xi_i$$

Where M = number of migrants, leaving „i" settlement in „t" year – belonging to „a" agegroup and „s" sex. „P" is the number of population of the settlement.

- $c_{ieas} = \frac{c_{ieas}}{N_{ias}}$ external connections on iWiW divided by the number of users (demographic group)

- „f" are the factors describing the characteristics of the settlements and „S" is the type of the settlement.

- D_{ias} are dummies of the demographic groups. And $\varepsilon_{iast}, \xi_{it}$ are the error members in the multilevel regression.

3. Methods

3. Choice of destination 2000-2014

H2/a. How the likelihood of choosing a given settlement is related to the migration of the previous year?

$$\frac{M_{ijt}}{M_{it}} = \alpha + \beta_1 f_{i,t-1} + \beta_2 f_{j,t-1} + \beta_3 \frac{M_{ij,t-1}}{M_{i,t-1}} + \beta_4 S_{jt} + \beta_5 P_{it} + \beta_6 P_{jt} + \beta_7 C_{ijt} + \gamma D_i + \varepsilon_{ijt} + \xi_{it}$$

Where M = number of migrants, leaving „i" settlement in „t" year and choosing „j" settlement as destination

- „f" are the factors describing the characteristics of the settlements and „S" is the type of the settlement. „P" is the number of population of the settlement. „C" is a binary, shows if the source and destination are in the same county

- D_i are the fixed effect dummies of the source settlements.

3. Methods

4. Choice of destination 2014

H2/b. How the likelihood of choosing a given settlement is related to the migration of the previous year and the relationships on iWiW?

$$\frac{M_{ij}}{M_i} = \alpha + \beta_1 f_i + \beta_2 f_j + \beta_3 k_{ij} + \beta_4 c_{ij} + \beta_5 S_j + \beta_6 P_i + \beta_7 P_j + \beta_8 C_{ij} + \gamma D_i + \varepsilon_{ij} + \xi_i$$

Where M = number of migrants, leaving „i" settlement and choosing „j" settlement as destination

- $c_{ij} = \frac{c_{ij}}{c_{ie}}$ share of the destination settlement in all external links of the settlement on iWiW

- „f" are the factors describing the characteristics of the settlements and „S" is the type of the settlement. „P" is the number of population of the settlement. „C" is a binary, shows if the source and destination are in the same county

- D_i are the fixed effect dummies of the source settlements.

4.1 Results
Leaving settlements 2000-2014

	(1)	(2)	(3)	(4)
Dependent variable		Out-migration rate		
Independent variables				
Out-migration rate, previous year (settlement)	0.523*** (0.00940)		0.382*** (0.00977)	0.197*** (0.0163)
Out-migration rate, previous year (settlement x demographic groups)		0.128*** (0.00201)	0.107*** (0.00207)	0.110*** (0.00362)
Population of the settlement	-1.58e-07*** (3.43e-08)	-1.86e-07*** (3.53e-08)	-1.56e-07*** (3.42e-08)	-9.16e-08** (3.63e-08)
Additional controls:				
Settlement FE	no	no	no	no
Settlement type, settlement characteristics, agexgender dummies	yes	yes	yes	yes
Lagged dep vars: t-5, t-4, t-3 t-2	no	no	no	yes
Observations (settlement x demo. group x year)	247,634	247,405	247,405	89,077
Number of groups (settlement x year)	20,721	20,721	20,721	7,508

Notes: Standard errors in parentheses. *** $p<0.01$, ** $p<0.05$, * $p<0.1$

Relative migration likelihood by demographic groups
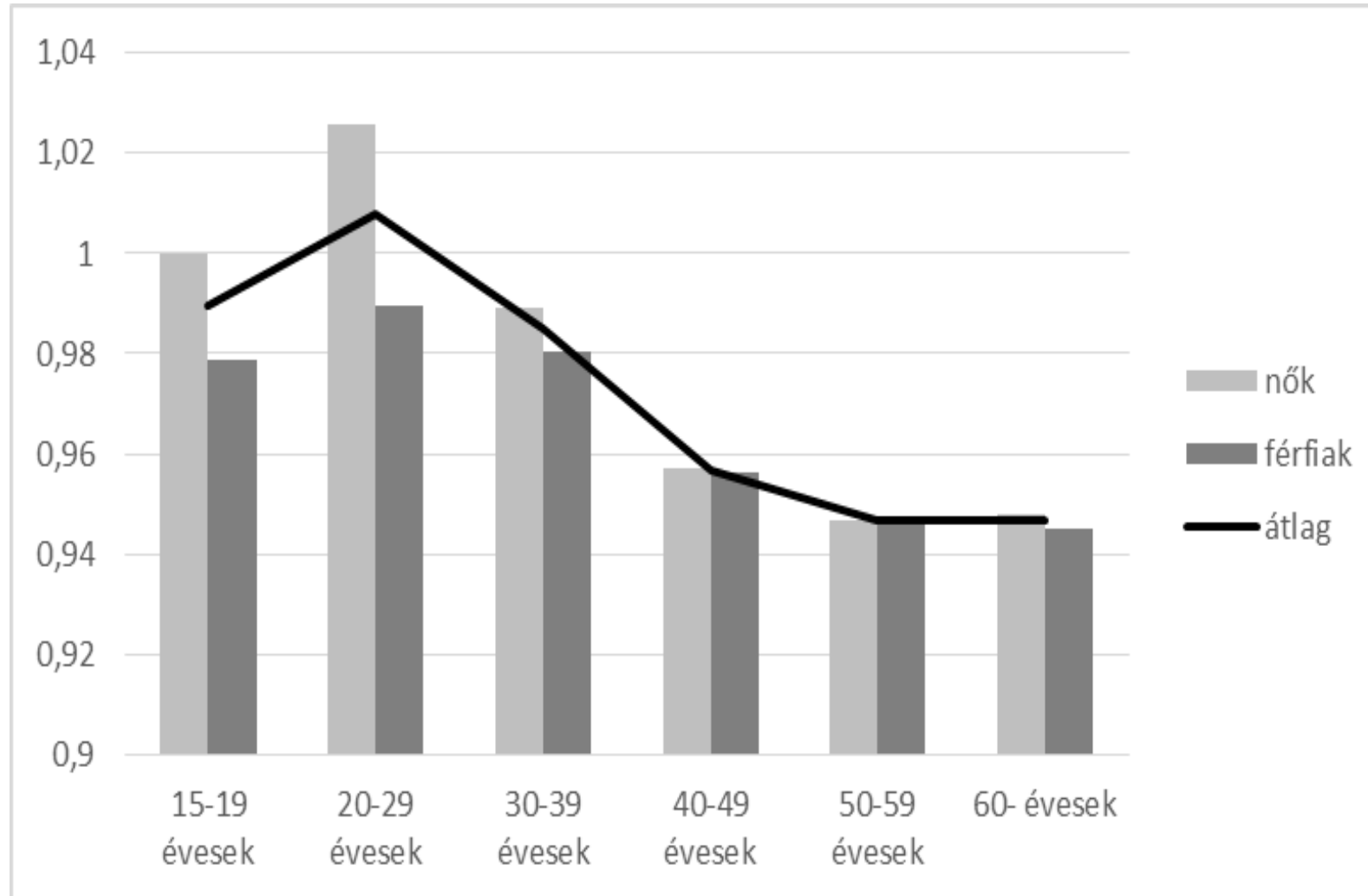
Effects of settlement characteristics on out-migration

Characteristics of the settlement (factor scores, previous year)				
Urban services	0.00196***	0.00278***	0.00200***	0.000612***
	(0.000174)	(0.000178)	(0.000173)	(0.000194)
Local economy	-0.00270***	-0.00356***	-0.00267***	-0.000918***
	(0.000144)	(0.000146)	(0.000143)	(0.000198)
Service orientation of local econ.	-0.00134***	-0.00157***	-0.00123***	-0.000710***
	(0.000151)	(0.000156)	(0.000151)	(0.000208)
Basic public services	-0.000270**	-0.000214*	-0.000215*	-0.000206
	(0.000122)	(0.000126)	(0.000122)	(0.000158)
Labor market	-0.00295***	-0.00387***	-0.00287***	-0.000703***
	(0.000139)	(0.000141)	(0.000139)	(0.000187)
Industrial orientation of local econ.	-0.00110***	-0.00142***	-0.00108***	-0.00110***
	(0.000156)	(0.000160)	(0.000155)	(0.000256)

4.2 Results
Leaving settlements 2014

Dependent variable	Out-migration rate (2014)			
External connections per user on iWiW in 2013 (demographic group)	-1.39e-06 (9.28e-06)	-6.35e-07 (8.98e-06)	-3.52e-06 (9.88e-06)	1.92e-06 (8.70e-06)
Internal connections per user on iWiW in 2013 (demographic group)	-0.000104*** (2.24e-05)	-7.03e-05*** (2.07e-05)	-8.78e-05*** (2.82e-05)	-4.34e-05** (1.97e-05)
External connections per user on iWiW in 2013 (settlement)			3.79e-05 (2.43e-05)	
nternal connections per user on iWiW in 2013 (settlement)			4.30e-05 (3.74e-05)	
Out-migration rate, 2013 (settlement)		0.559*** (0.0500)	0.572*** (0.0503)	0.215*** (0.0583)
Out-migration rate, 2013 (settlement x demographic groups)		0.129*** (0.0127)	0.128*** (0.0127)	0.0938*** (0.0127)
Additional controls:				
Settlement FE	no	no	no	no
Settlement type, settlement characteristics, age x gender dummies, settlement size	yes	yes	yes	yes
Lagged dep vars: t-5, t-4, t-3 t-2	no	no	no	yes
Observations (settlement x demo. group)	6,997	6,993	6,993	6,976
Number of groups (settlements)	608	608	608	608

Notes: Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

4.3 Results
Choice of destination 2000-2014

Dependent variable	Choice of the destination settlement among out-migrants of the settlement				
Choice of the destination in the previous year	0.310*** (0.00191)	0.305*** (0.00192)	0.145*** (0.00203)	0.259*** (0.000319)	0.136*** (0.000389)
Distance (in minutes)	-2.06e-05*** (1.16e-07)	-1.39e-05*** (1.06e-07)	-6.99e-06*** (9.62e-08)	-1.80e-05*** (1.02e-07)	-9.75e-06*** (1.16e-07)
Distance (in minutes) squared	1.14e-09*** (2.63e-10)	8.06e-10*** (2.10e-10)	3.64e-10*** (6.45e-11)	1.07e-09*** (0)	5.17e-10*** (0)
Population of the source settlement	-2.06e-09*** (7.44e-10)	2.04e-10 (7.33e-10)	-2.31e-10 (6.47e-10)	2.85e-10 (3.80e-09)	-3.70e-10 (4.22e-09)
Population of the destination settlement	5.15e-08*** (2.94e-10)	1.36e-08*** (6.21e-10)	8.21e-09*** (6.75e-10)	2.88e-09 (3.80e-09)	-4.84e-08*** (4.23e-09)
Source and destination settlement in the same county		0.00215*** (1.58e-05)	0.000906*** (1.81e-05)	0.00220*** (1.82e-05)	0.000970*** (1.99e-05)
Source settlement FE	X	X	X	X	X
Destination settlement FE	-	-	-	X	X
Settlement type	-	X	X	-	-
Source and destination settlement characteristics	X	X	X	-	-
Lagged dep vars: t-5, t-4, t-3 t-2	no				
N (settlement pairs x years)	7,176,066	7,176,066	5,046,500	8,948,072	6,388,215
R^2	0.369	0.371	0.454	0.273	0.353

Notes: Robust standard errors in parentheses. *** $p<0.01$, ** $p<0.05$, * $p<0.1$

The effect of settlement type and characterstics

Type of destination settlement[b]			
Capital		0.0640***	0.0317***
		(0.00114)	(0.00124)
County town		0.00125***	0.000470***
		(6.41e-05)	(6.75e-05)
City		0.000286***	0.000116***
		(1.61e-05)	(1.78e-05)
Characteristics of the source settlement (factor scores, previous year)			
Urban services	-4.21e-05***	-3.27e-05**	-1.81e-05
	(1.29e-05)	(1.29e-05)	(1.61e-05)
Local economy	-0.000110***	-4.58e-05***	-3.14e-05***
	(9.87e-06)	(9.82e-06)	(1.13e-05)
Service orientation of local econ.	-1.63e-05	-3.21e-05	-2.36e-05
	(2.28e-05)	(2.28e-05)	(3.31e-05)
Basic public services	-9.36e-06	-1.46e-05	-8.06e-06
	(2.77e-05)	(2.77e-05)	(2.99e-05)
Labor market	1.11e-05	-8.50e-06	-1.90e-06
	(1.62e-05)	(1.62e-05)	(1.99e-05)
Industrial orientation of local econ.	1.04e-05	7.05e-06	6.18e-06
	(1.74e-05)	(1.74e-05)	(2.47e-05)
Characteristics of the destination settlement (factor scores, previous year)			
Urban services	2.05e-05***	0.000206***	8.29e-05***
	(2.86e-06)	(4.10e-06)	(4.28e-06)
Local economy	3.71e-05***	-4.27e-05***	6.83e-06
	(6.49e-06)	(6.39e-06)	(6.31e-06)
Service orientation of local econ.	-5.33e-05***	-5.94e-05***	-4.00e-05***
	(5.37e-06)	(5.69e-06)	(6.41e-06)
Basic public services	8.61e-05***	6.28e-05***	2.78e-05***
	(6.74e-06)	(6.76e-06)	(7.26e-06)
Labor market	-7.18e-05***	2.20e-05***	2.68e-06
	(5.41e-06)	(5.39e-06)	(5.39e-06)
Industrial orientation of local econ.	-1.68e-05***	-3.46e-05***	-9.21e-06
	(5.82e-06)	(5.86e-06)	(6.99e-06)

4.4 Results
Choice of destination 2014

	Choice of the destination settlement among out-migrants (2014)				
Share of destination in all external links on iWiW (2013)	0.141*** (0.00284)	0.112*** (0.00256)	0.0611*** (0.00215)	0.116*** (0.000680)	0.0675*** (0.000714)
Choice of the destination settlement (2013)		0.188*** (0.00700)	0.120*** (0.00588)	0.170*** (0.00121)	0.113*** (0.00123)
Distance (in minutes)	-1.41e-05*** (3.14e-07)	-1.15e-05*** (3.22e-07)	-7.28e-06*** (3.24e-07)	-1.21e-05*** (3.10e-07)	-7.99e-06*** (3.02e-07)
Distance (in minutes) squared	6.14e-10*** (0)	4.99e-10*** (0)	3.16e-10*** (0)	5.26e-10*** (0)	3.48e-10*** (0)
Population of the destination settlement	9.25e-09*** (2.11e-09)	7.31e-09*** (2.04e-09)	4.74e-09** (1.93e-09)		
Source and destination settlement in the same county	0.00131*** (5.61e-05)	0.00107*** (5.60e-05)	0.000640*** (5.54e-05)	0.000861*** (4.95e-05)	0.000534*** (4.81e-05)
Source settlement FE	X	X	X	X	X
Destination settlement FE	-	-	-	X	X
Dest. settlement type dummies	X	X	X	-	-
Characteristics of the the destination settlement	X	X	X	-	-
Lagged dep vars: t-5, t-4, t-3 t-2	-	-	X	-	X
Observations (settlement pairs)	482,710	482,710	482,594	593,050	592,905
R^2	0.422	0.446	0.481	0.411	0.441

Notes: Robust standard errors in parentheses. *** $p<0.01$, ** $p<0.05$, * $p<0.1$

Conclusions

Networks have a significant and positive effect both on leaving and choosing a settlement:

- Previous years of migration influences migration
  - For outmigration
  - For pairs of settlements
- Networks, measured by the social network connections also have an impact
  - Extensive internal networks constrains outmigration from settlements, but
  - Extensive external networks do not enhance it
  - Links between the ettlements enhance migration
- These two factors are interrelated