

Firms' location choice based on trading and financing relationship

September 26th, 2015

The university of Tokyo Master's course

TEIKOKU DATABANK, LTD.

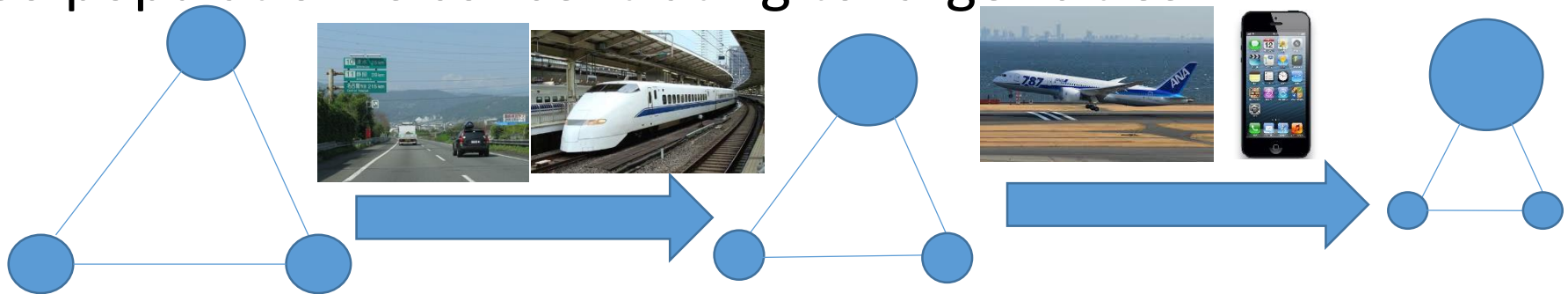
Ryo FUKUDA

Preventing accumulation

- Based on NEG model, Location is directed by transportation cost, increasing returns and diversity.

Promoting accumulation

- Historically transportation costs are decreasing, so population is concentrating to larger cities.



- There are many experimental studies. for example: quantity of international trade (Redding and Venables, 2004), Place of FDI (Head and Mayer, 2004), Relocating (Starauss-Kahn and Vives, 2009), ratio of newly opening (Davis and Henderson, 2008)

The main stream of relocation is minute moving.

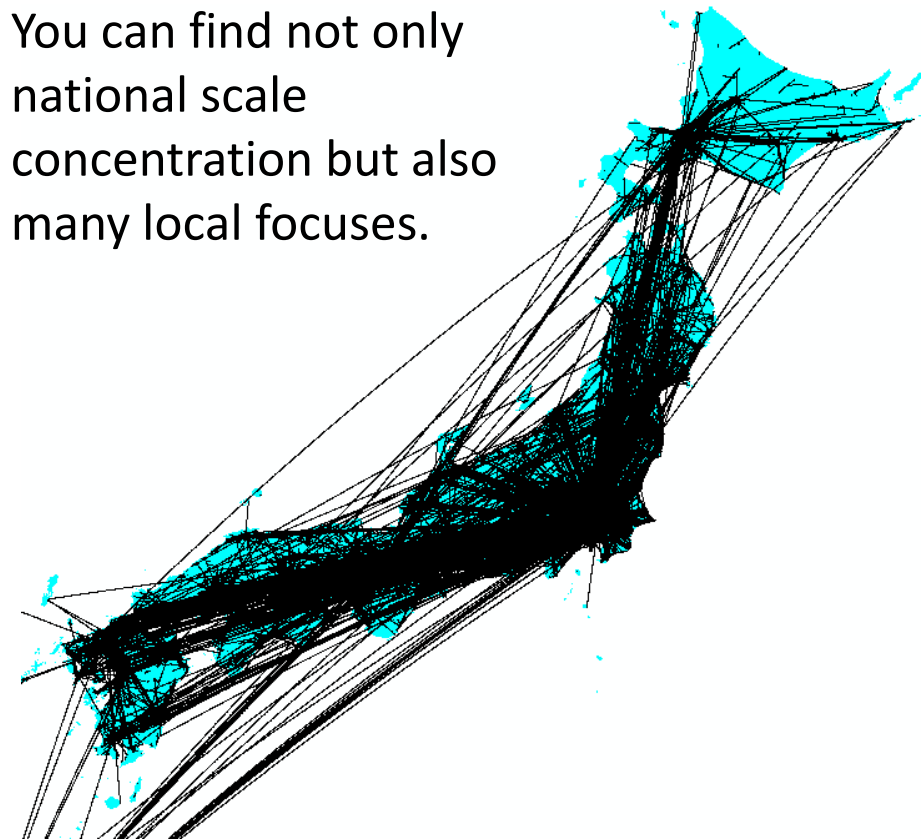
■ Component of relocation (2011-2014)

Over 80% of relocations are ending in one municipality.

	N	component ratio
To the same municipality	80967	81.66%
To the same prefecture (excluding above)	12466	12.57%
To the same region (excluding above)	4347	4.38%
To another region	1371	1.38%
sum	99151	100.00%

■ Network of origins and destinations (2011-2014)

You can find not only national scale concentration but also many local focuses.



Facts of relocating of firms

Some “opposite” relocations are happening.

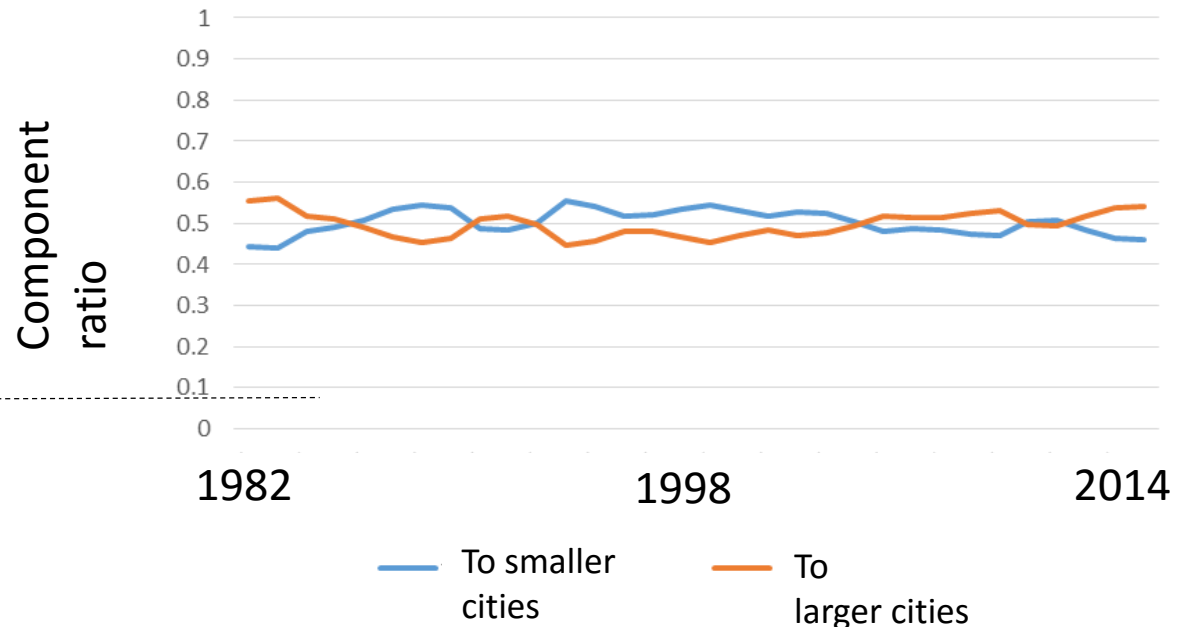
There are so many interaction of relocation.

On the basis of number of firms, there is not necessarily concentration to larger cities.

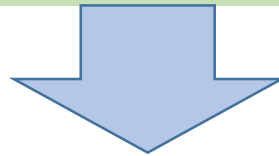
Origin and destination of relocation (2011-2014)

Origin	Destination										
	Hokkaido	Tohoku	Kanto	Chubu	Kinki	Chugoku	Shikoku	Kyoushu	Okinawa	sum	
Hokkaido	4211	4	46		6		1	1		4269	
Tohoku	4	5881	84	4	5	3		1		5982	
Kanto	24	82	43657	81	152	25	12	56	16	44105	
Chubu		3	99	8368	41	3		9		8523	
Kinki	1	8	259	48	13921	21	14	16	5	14293	
Chugoku			3	36	4	20	4742	4	12	4821	
Shikoku	2	1	22	3	14	8	1893			1943	
Kyoushu			2	60	3	13	17	1	13840	3	13939
Okinawa				4	1	3			1	1267	
sum	4242	5984	44267	8512	14175	4819	1925	13936	1291	99151	

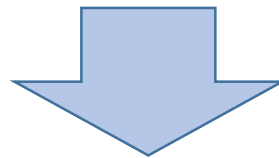
Long term trend of relocation (1982-2014)



- Much of relocating firms are **small and medium enterprises**, which are often subject to bigger firms.
- In fact, there are observed many relocations to the **“opposite” direction**.
- Looking at origin and destination, much of relocating firms are moving **locally**.



It is needed to soften the most suitable location choice.



Here I will focus on continuous relationship of firms

Trading (buying and selling)

Financing (low and high level)

- The database of Teikoku Databank, Ltd. gathered for credit research.

Location changing	01/2011 ~ 06/2014	99,152 firms
Trading network	01/2011	3,367,726 connections
Financing network	01/2011	1,409,582 firms-banks

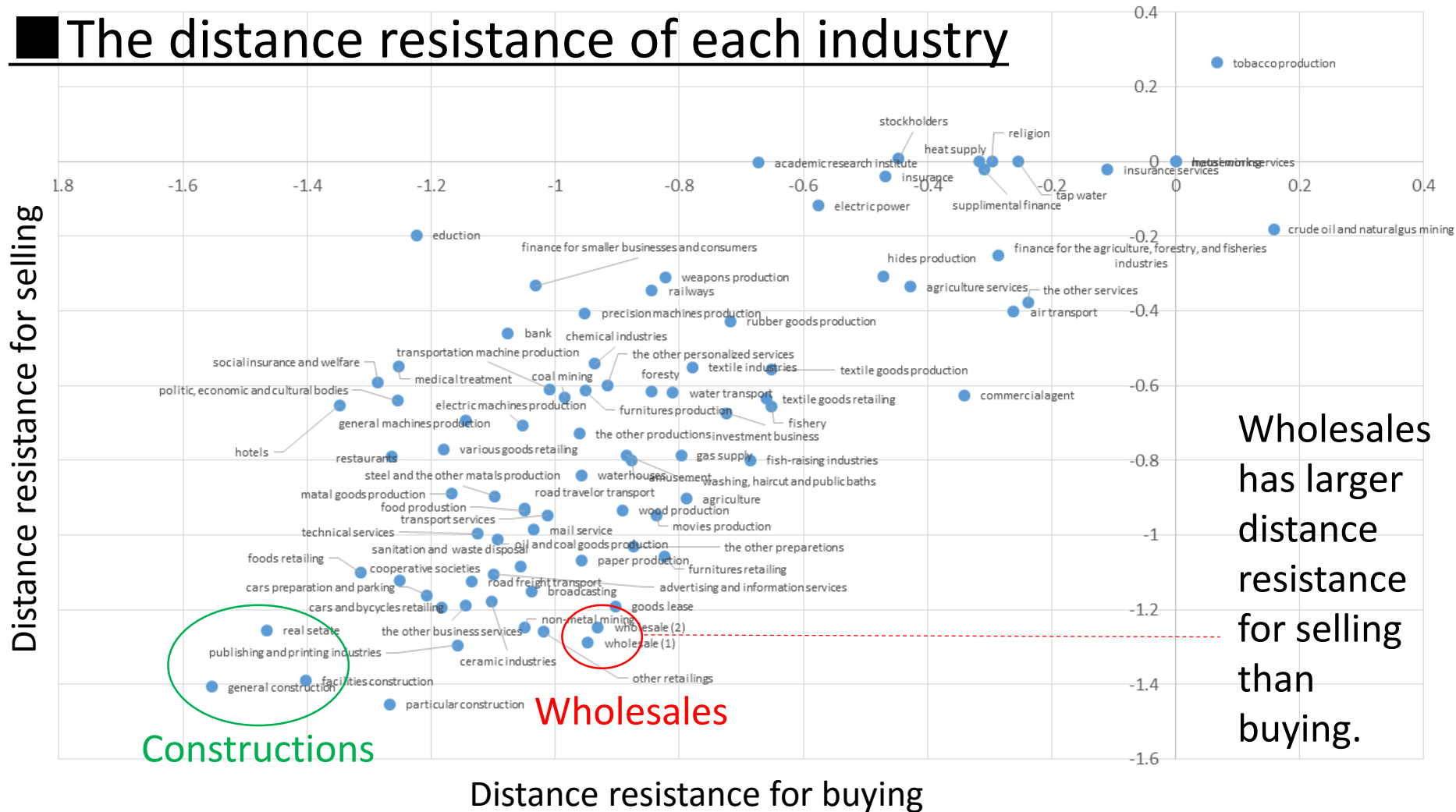
→ Here information of 25322 firms, whose all connections are available is used for analysis.

■ Unit

- choice of location of firm is regarded as choice of municipalities.
- 88 medium industry groups of Teikoku Databank are adopted.

Almost all industries, trend of declining with distance is observed.

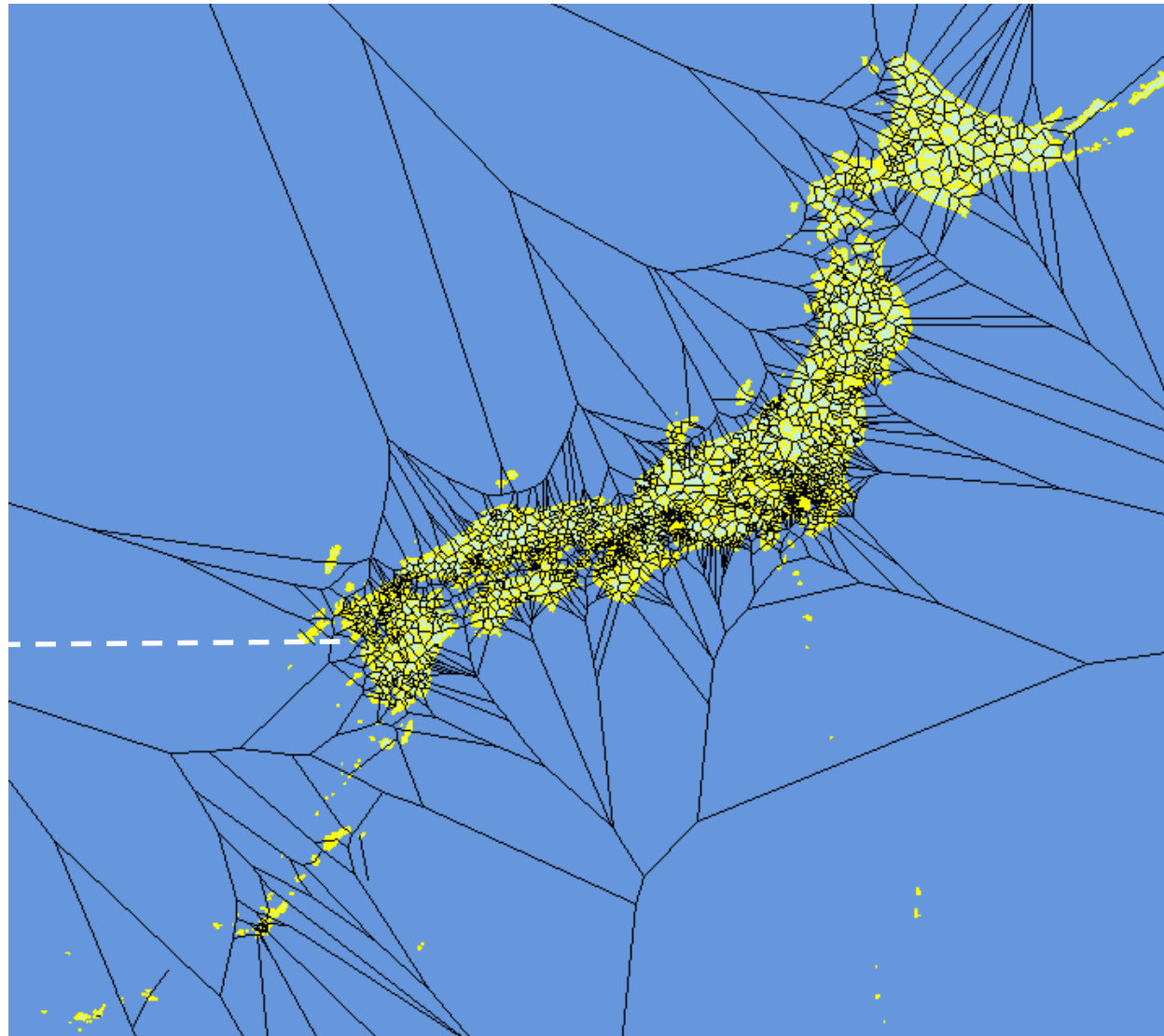
The distance resistance of each industry



Small and medium enterprises get from banks not only money but also information, so proximity is important.

■ Division of whole country based on main bank network

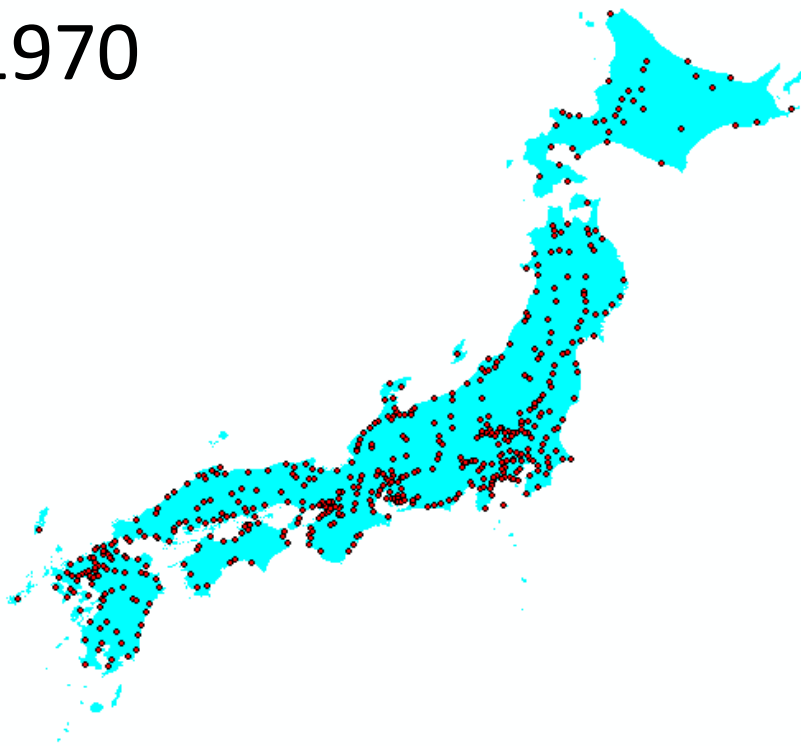
65% of finance service confirms in each division. Finance service has so large distance resistance



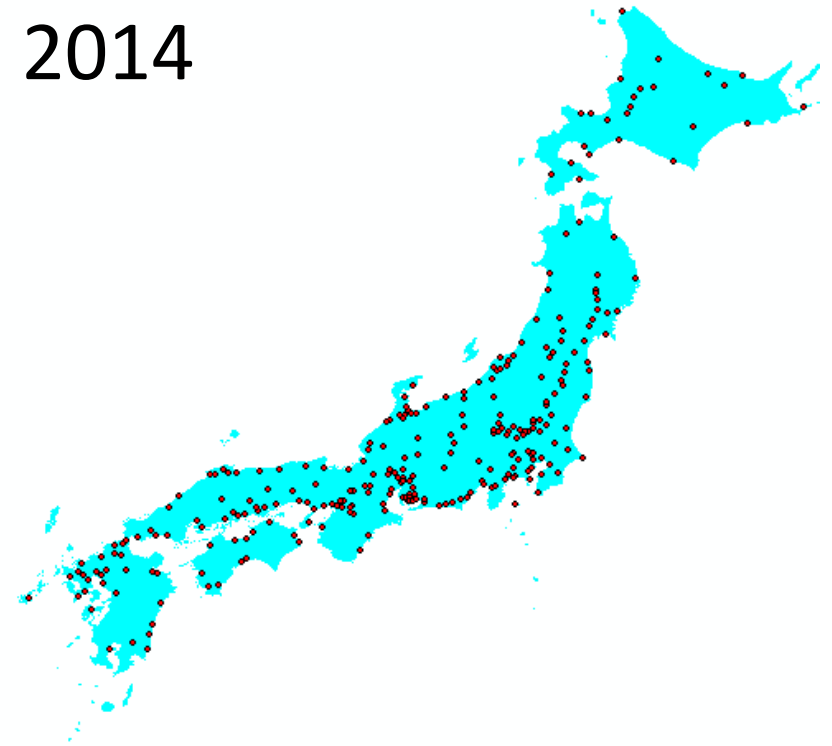
- It is assumed that functions of higher levels of financing are supplied at headquarters of banks.
- The location of this function is directed politically and tend to concentrate on a long-term basis.

■ The location of head quarters of banks

1970



2014



Apply nested logit model to explain location selection.

(Based on method of Strauss-Kahn and Vives 2009)

Whether to move

Move out

Not move out

Nest

Nest

Nest

- Region
- Population range

City

City

City

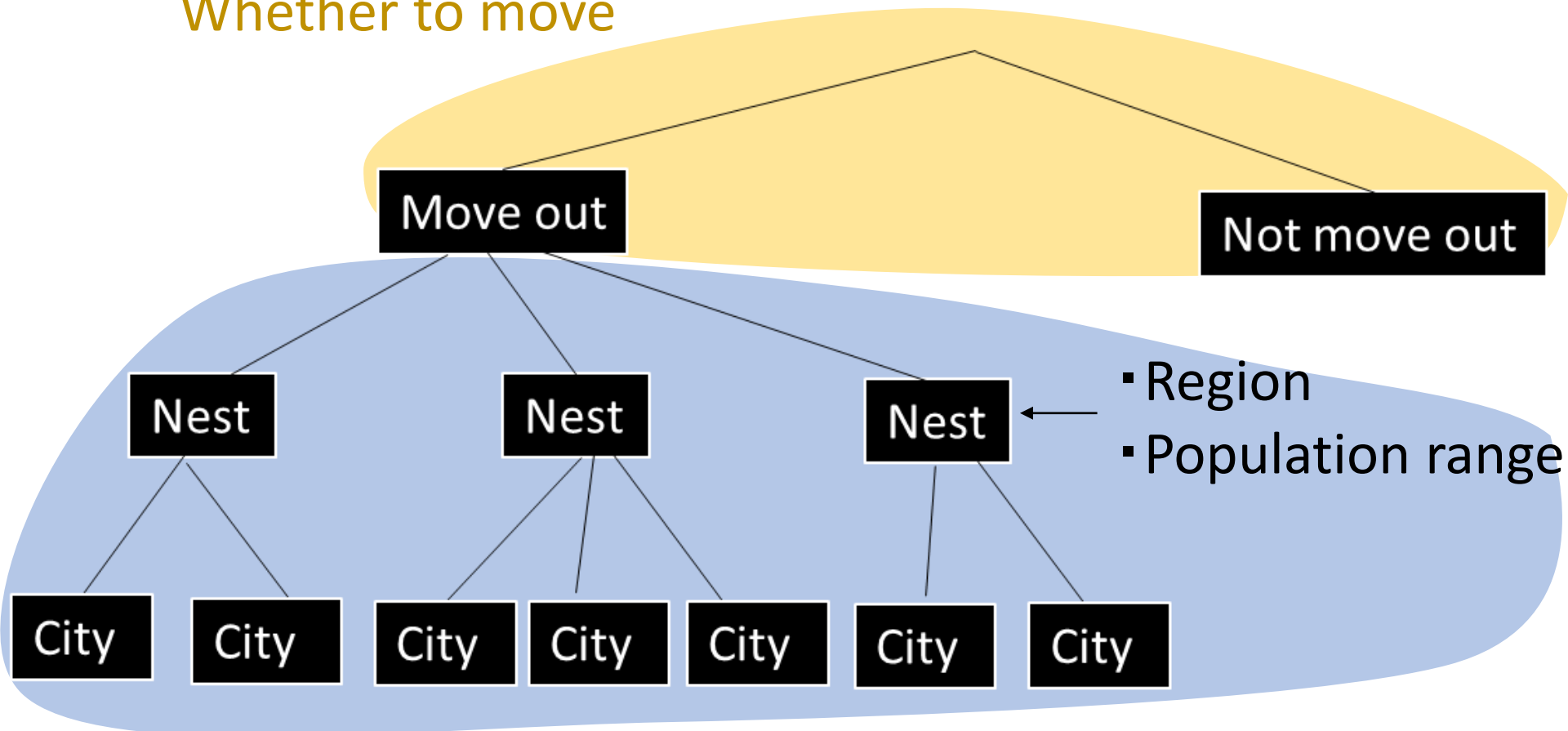
City

City

City

City

Where to move



Utility for firm i located in m

$$U_{ij} = \alpha X_{im} + \beta Y_{ir} + \gamma Z_{ij}$$

determining the choices of **whether** to locate determining the choices of **where** to locate

Possibility for firm i to relocate in j

$$P_{ij} = P_{im} * P_{ir|m} * P_{ij|rm}$$

$$\left\{ \begin{array}{l} P_{ij|rm} = \exp(\gamma Z_{ij}) / \sum_{k=1}^{N_r} \exp(\gamma Z_{ik}) \\ P_{ir|m} = \exp(\delta_1 I_{ir} + \beta Y_{ir}) / \sum_{k=1}^{N_r} \exp(\delta_1 I_{ik} + \beta Y_{ik}) \\ P_{im} = \exp(\delta_2 I_i + \alpha X_{im}) / (1 + \exp(\delta_2 I_i + \alpha X_{im})) \end{array} \right.$$

X_{im} : variables indicating utility not moving out
 Y_{ir} : variables indicating utility moving to nest r
 Z_{ij} : variables indicating utility moving to city j

N_r : number of cities included in nest r
 R : number of all cities

$$I_{ir} = \ln \sum_{k=1}^{N_r} \exp(\beta Z_{ik})$$

$$I_i = \ln \sum_{k=1}^R \exp(\delta_1 I_{ik} + \beta Y_{ik})$$

Two measurement of utility is introduced.

Potential location utility

Revealed location utility

definition

Utility which can be realized when a firm **change** its relationship in present place

Utility which should be realized when a firm **keep** its relationship in present place

Special features of measuring

Using **aggregate data** of cities and industries

Using **network data of individual firms**

indicators

Total buying between each combination of cities

Buying of the firm

Total selling between each combination of cities

Selling of the firm

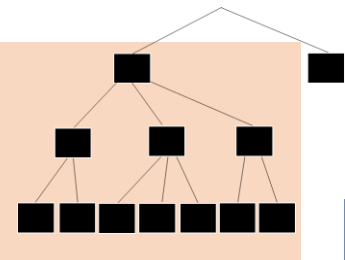
Variety of banks

Main bank

Headquarters of arbitrary banks

Headquarters of main bank

Estimation results (where to move)



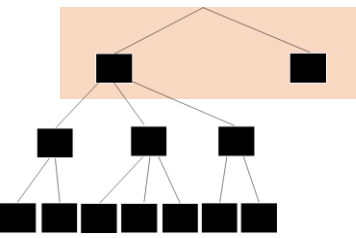
Utility Nest	Significance level ***: 0.001 **: 0.01 *: 0.05	Potential location utility			Revealed location utility			
		poplation	region		poplation	poplation	region	region
		(1)	(2)	(3)	(4)	(5)	(6)	(7)
size of workers of all industries		0.283*** (0.006)	0.216*** (0.008)	0.329*** (0.009)	0.130*** (0.006)	0.094*** (0.007)	0.189*** (0.009)	0.072*** (0.008)
size of workers of each industry		10.572*** (0.173)	2.410*** (0.247)	5.139*** (0.246)	0.254 (0.198)	1.227*** (0.194)	2.007*** (0.222)	3.476*** (0.221)
diatance		-1.579*** (0.012)	-1.050*** (0.030)	-1.581*** (0.022)	-0.795*** (0.017)	-0.780*** (0.017)	-1.405*** (0.020)	-1.178*** (0.018)
total buying			6.297*** (0.546)	11.004*** (0.639)				
total selling			-2.827*** (0.580)	-8.434*** (0.693)				
variety of banks			0.295*** (0.029)	1.082*** (0.044)				
headquarters of banks dummy			0.206** (0.074)	1.390*** (0.111)				
buying dummy					1.174*** (0.033)	1.182*** (0.034)	2.032*** (0.057)	1.722*** (0.054)
selling dummy					1.116*** (0.033)	1.138*** (0.034)	2.028*** (0.058)	1.738*** (0.055)
main bank dummy					2.109*** (0.044)	1.989*** (0.044)	2.994*** (0.075)	2.47*** (0.069)
headquarters of main bank dummy					0.632*** (0.046)		0.732*** (0.055)	
branches of main bank dummy						0.834*** (0.030)		1.919*** (0.057)
N		5140	5140	5140	5140	5140	5140	5140
log-likelihood		-21810	-19486	-20757	-16570	-16200	-17768	-16859

based on
aggregate data
of cities and
industries

based on
network data of
individual firms

All indicators of
networks are
significant,
especially main
bank is strong

Estimation results (whether to move) 13



based on
aggregate data
of cities and
industries

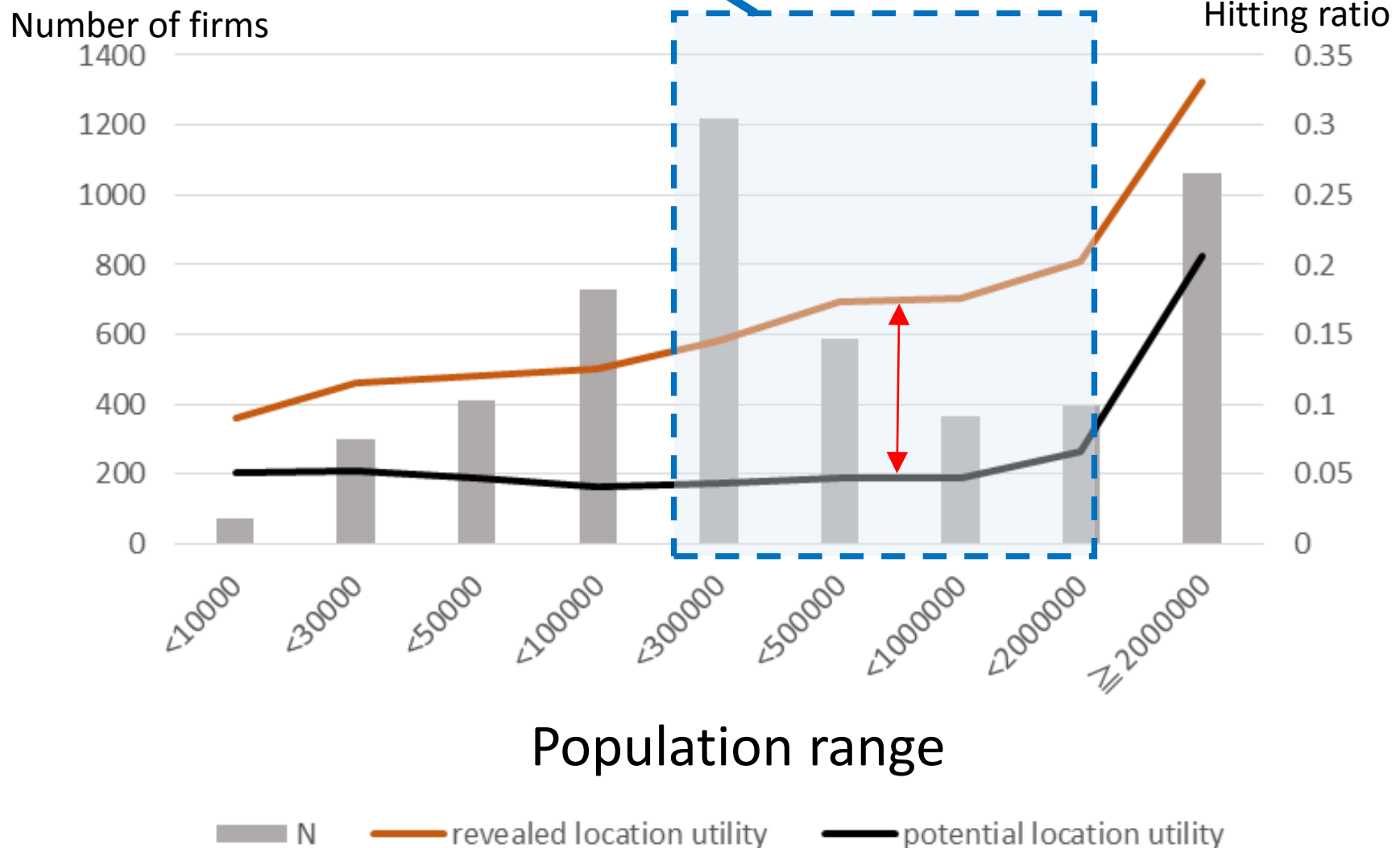
In contrast to “where
to move” model, main
bank is not significant,
buying is strong

based on
network data of
individual firms

firms location utility	Significance level ***: 0.001 **: 0.01 *: 0.05	all		small(workers ≤ 20)	
		potential (1)	revealed (2)	potential (3)	revealed (4)
number of workers		0.041* (0.019)	0.119*** (0.009)	-0.083** (0.03)	0.099*** (0.018)
size of workers of each industry		0.058*** (0.011)	-0.23*** (0.039)	0.053*** (0.013)	-0.181*** (0.048)
distance		0.001 (0.017)	-0.527*** (0.038)	-0.01 (0.021)	-0.575*** (0.048)
total buying		-5.589*** (0.171)		-4.993*** (0.222)	
total selling		0.195 (0.141)		0.051 (0.181)	
variety of banks		-0.642*** (0.105)		-0.354** (0.134)	
headquarters of banks dummy		0.076 (0.044)		-0.011 (0.055)	
buying dummy			-1.116*** (0.035)		-1.121*** (0.046)
selling dummy			-0.626*** (0.043)		-0.595*** (0.054)
main bank dummy			2.804* (1.094)		2.355 (1.478)
headquarters of main bank dummy			-1.380*** (0.215)		-0.816** (0.288)
N		25322	25322	15828	15828
AIC		22899	22058	14337	13766

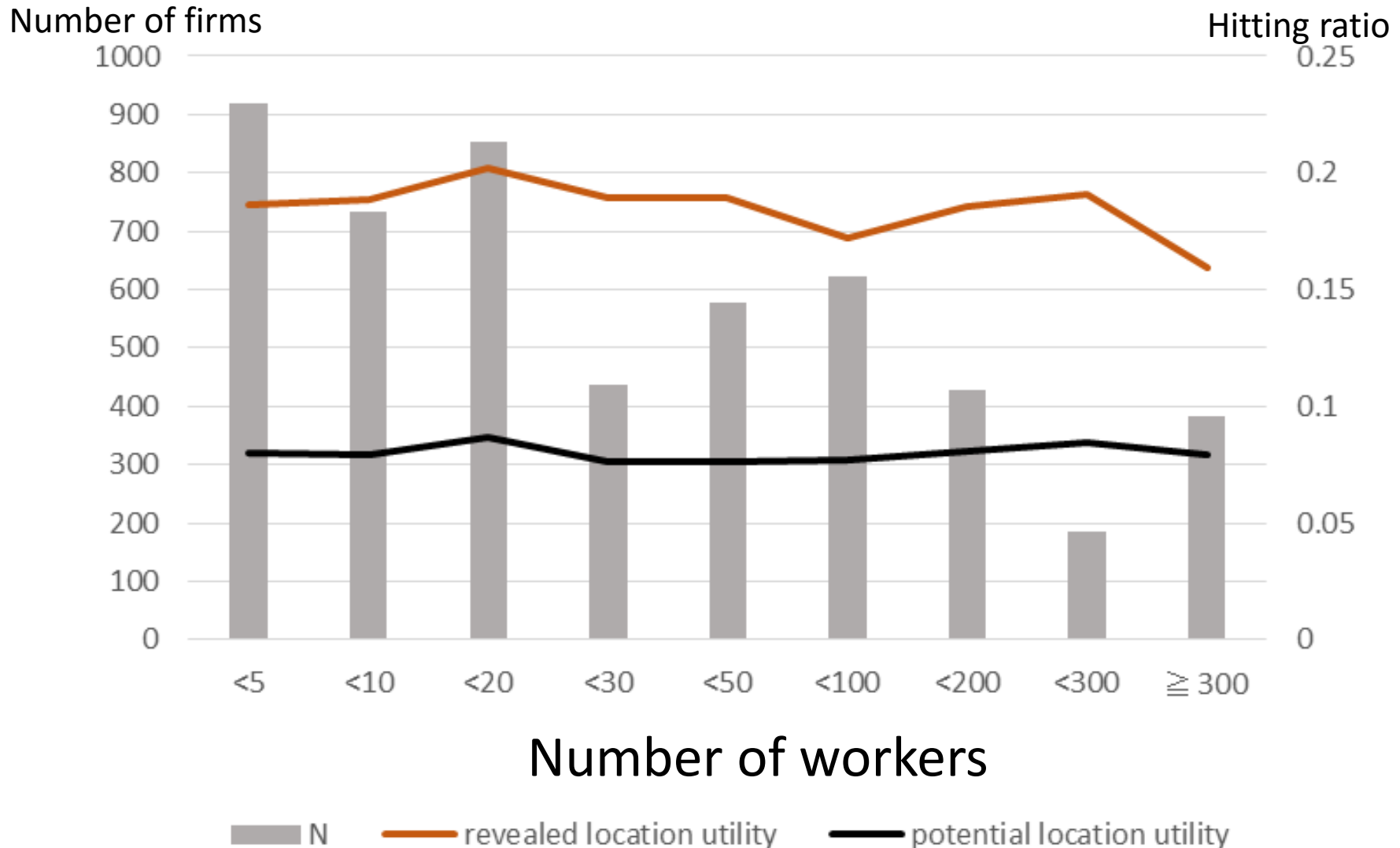
Hitting ratio of destinations

Especially this model contributes to estimation of relocation of middle-sized cities.



Hitting ratio of destinations

Hitting ratio for Small & medium enterprises is slightly higher than that for large companies.



- Much of relocation of firms are composed of minute or “opposite” movements.
- Focusing on continuous relationship such as trading and financing, you can explain choice of relocation more appropriately.
- This model is more effective to relocation to estimate relocation to medium-sized cities and of small & medium enterprises.

- Davis, J. C. and Henderson, J.V. (2008):The agglomeration of headquarters, *Regional Science and Urban Economics*, 38-5, pp. 445–460
- Head, K. and Mayer, T. (2004):Market potential and the location of Japanese investment in the European union, *The Review of Economics and Statistics*, 86(4), pp.959–972
- Redding, S. and Venables, A. J. (2004):Economic geography and international inequality, *Journal of International Economics* 62 pp.53-82
- Strauss-Kahn, V. and Vives, X. (2009):Why and Where do Headquarters Move?, *Regional Science and Urban Economics*, 39-2, pp. 168–186