
Firms and jobs location in Ile-de-France: the role of accessibility and other determinants

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4th Kuhmo conference, July, 2007

Motivation

- Understand and estimate the mechanisms of employment evolution
- Predict local employment in short, medium and long run
- Special focus on accessibility
- Find the most relevant scale:
 - At the commune / Grid cell level, and
 - At the Firm / Job level
- Part of a global project: Develop a tool for simulating the impact of transportation infrastructures, taking into account interactions between job location, household location, real estate price, urban development, transportation and accessibility → use UrbanSim (integrated model developed by P. Waddell)

Outline

- Jobs location or firms location?
- Different sources of employment variation
- Data and estimation strategy
 - Spatial scale: commune versus grid cell
 - Econometric models
- Estimation results

Jobs location or firms location?

- **Jobs** location is part of a global project using the integrated UrbanSim tool
- UrbanSim usually models **jobs** location
 - A job is characterized by an activity sector and a location,
 - But it is not attached to a firm → the locations of the different jobs in a firm are independent
- Our data are organized by **firms**
- In practice, **firms** rather than jobs **move** → modelling firm location is more realistic
- Solution: work on an extension to UrbanSim which models **firm** location

Different sources of employment variation

1. Destruction of firms

- Probability depends on firm size and sector, and on local (dis)amenities

2. Creation of firms characterized by:

- An activity sector → sector-specific creation rate
- A number of employees → predictions assume a sector-specific distribution, constant over time
- A location

3. Net variation of the number of employees in fixed firms

4. Relocation of existing firms:

- Destruction in initial location + Creation in new location
- Sector and number of employees equal to those of the initial firm
- Location choice as if totally new firm

Our database

- Two cross-sections of **all** firms located in Paris region
 - in 1997
 - in 2001
- One line per firm
 - Number of employees
 - Economic sector (more or less detailed)
 - Location at commune level: all firms
 - Location at grid cell level: some firms (mainly if >10 employees or inside Paris or close to Paris)

Firms creations and destructions (including relocations)

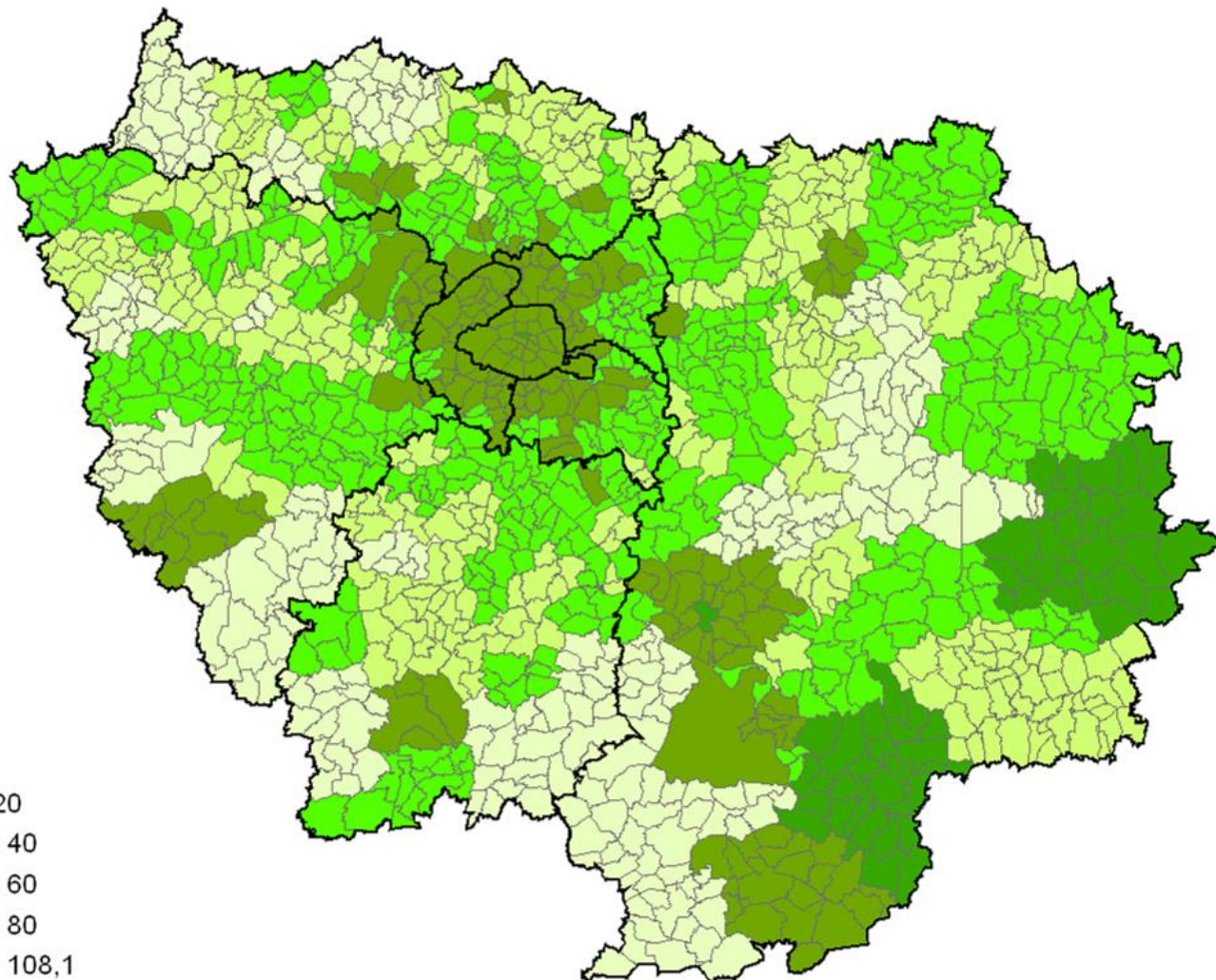
2001 \ 1997	Not here	Here	Total
Not here	ND	Creation 120 428 → 41.1%	Creation 120 428
Here	Destruction 112 177 → 39.4%	Fixed 172 435	Total 1997 284 147
Total	Destruction 112 177	Total 2001 292 863	Total 405 040

- Creation rate = $120\,428 / 292\,863 = 41.12\%$
- Destruction rate = $112\,177 / 284\,147 = 39.41\%$

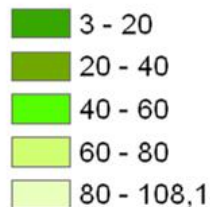
Jobs creations and destructions and average size

2001 1997	Not here	Here	Total
Not here	NA	Creation 1,625,748 → 31,5% 13.5	Creation 1,625,748
Here	Destruction 1,342,695 → 28.4% 12.0	Fixed 3,378,487 in 97 3,537,740 in 01 19.6 to 20.5	Total97 4,721,182 16.6
Total	Destruction 1,342,695	Total01 5,163,488 17.6	Total 6,346,930 in 97 6,506,183 in 01

Region under study: Counties, communes and average travel time (minutes)



Legend



Spatial scale: fraction of firms & jobs located, by county

	75	92	94	93	78	91	95	77
% Firms located								
% Jobs located								

Spatial scale: Indicators of county “size”

	75	92	94	93	78	91	95	77
Nb grid cells	420	704	980	952	9400	7399	5187	24194
Nb communes	20	36	47	40	262	196	185	514
Nb Firms	102649	35564	35564	26724	27159	22410	19791	24342
Nb Jobs	1137002	579553	331201	342869	349381	277638	243326	276770

Accessibility variables, by county

Variable \ District	75	92	94	93	78	91	95	77
Subway and tramway stations	8,2	0,8	0,7	0,7	0,0	0,0	0,0	0,0
Subway and tramway stations around	71,9	7,1	5,8	6,5	0,0	0,0	0,0	0,0
Train stations	1,0	0,8	0,4	0,5	0,5	0,5	0,7	0,3
Train stations around	9,4	6,9	3,9	4,8	4,3	4,1	5,6	2,4
Accessibility to employment (Public)	50,9	49,3	48,0	48,3	45,2	44,3	46,0	41,9
Accessibility to employment (Private)	54,5	53,9	53,4	53,5	51,2	51,2	51,8	48,6
Accessibility to employment (M)*	-72,9	-72,3	-73,9	-74,0	-73,8	-93,3	-68,8	-89,9
Average travel time (Public Transit)	28,1	31,5	38,5	38,5	47,8	52,0	46,2	48,9
Average travel time (Private Car)	16,2	16,1	16,3	16,9	24,1	36,6	20,3	35,6
Accessibility to shops (Public Transit)	33,2	32,3	32,0	32,1	30,3	30,3	30,9	28,7
Accessibility to shops (Private Car)	35,6	35,3	35,3	35,3	34,1	34,3	34,5	33,0
Private car travel time variability	2,7	4,1	3,1	3,5	3,6	6,7	3,7	3,6

Estimation Strategy: Commune or grid cell

All models:

- ❑ 1 line per firm → firm-level estimates
- ❑ Weights = Nb employees for job-level estimates

1. Firms destruction/move

- ❑ Binary logit model;
- ❑ Commune-level data since precise location unknown in 1997

2. Variation of the number of employees in fixed firms

- ❑ Linear regression model
- ❑ Endogenous variable=final nb. Employees, (relative) variation of Nb empl. (<0 or >0)

3. Firms (re)Location

- ❑ MNL model
- ❑ Commune-level / grid cell level only for large firms or close to Paris

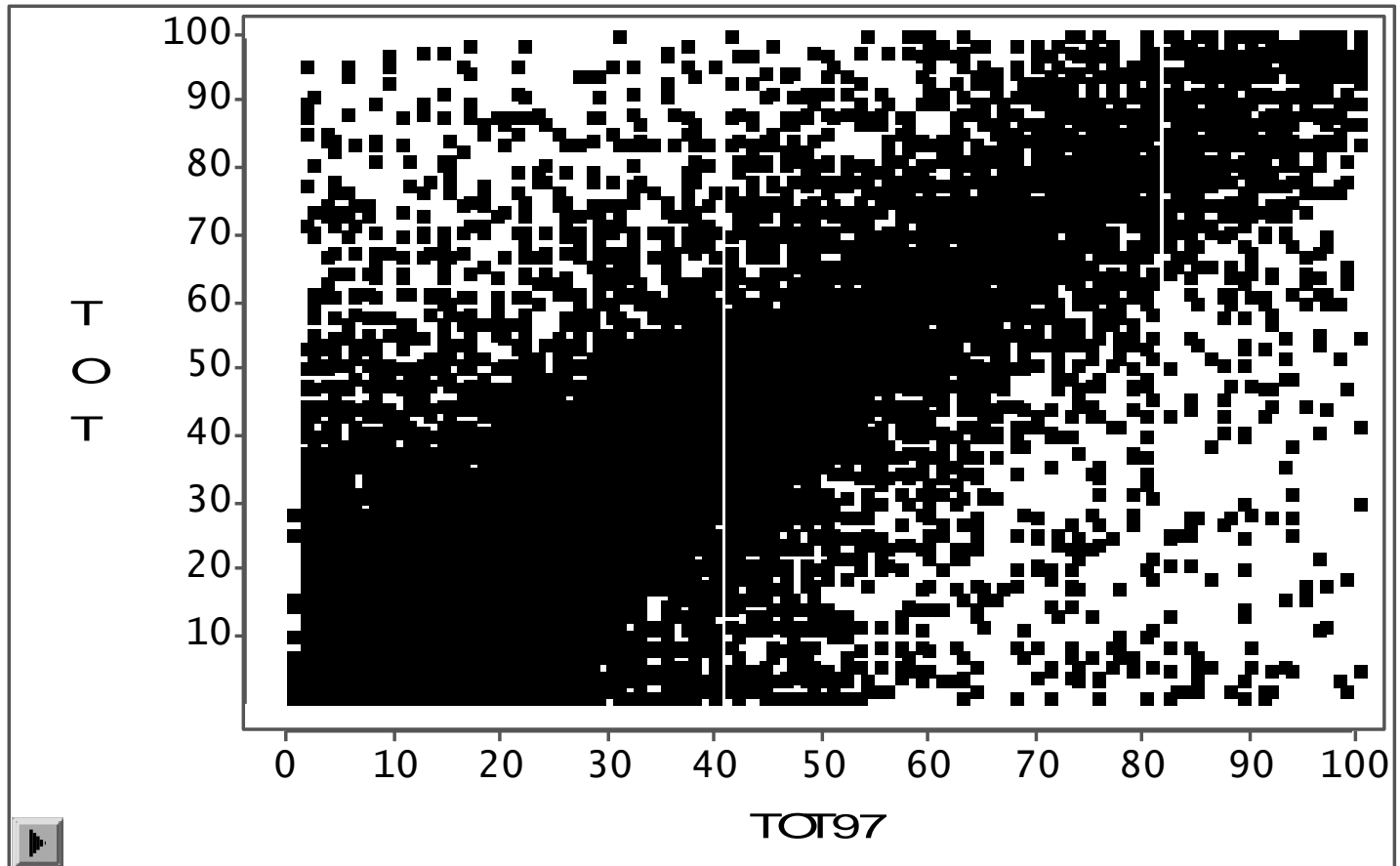
Firms destruction/move: firm covariates

- Results qualitatively similar at firm and at job level
- Destruction rate higher:
 - In small firms (highly significant, highly non linear)
 - 3 times larger if 1 employee compared to 100 + employees)
 - 2 times larger if 2 employees compared to 100 + employees)
 - 1.5 times larger if 3-5 empl. compared to 100 + employees)
 - In sectors 1 (agriculture) , 4 (equipment industry), 3 (car industry), 8 (retail), 10 (financial activities), 13 (services to households)

Firms destruction/move: local covariates

- Destruction rate higher:
 - ❑ In far away suburbs and, to a less extent, close suburbs
 - ❑ When there is more employment around, especially in agricultural and industry sectors
 - ❑ When a larger fraction of surface is dedicated to 3rd sector activity
 - ❑ When population density is higher
 - ❑ When local population is rather rich, medium aged, or foreign
- Destruction rate is lower:
 - ❑ In larger communes (in terms of surface)
 - ❑ When real estate is expensive (prestigious locations)

Variation of the Nb employees in fixed firms



Variation of the Nb employees in fixed firms

- Explanatory power dramatically depends on the endogenous variable:
 - 86% if $Y = \text{Nb employees in 2001}$
 - 4% if $Y = \text{abs. variation nb employ. from 97 to 01}$
 - 3% if $Y = \text{rel. variation nb employ. from 97 to 01}$
- Most relevant explanatory variables:
 - Firm size
 - Sector
 - County
 - Employment level and composition
 - Population level and composition
 - Accessibility

Firms (re)Location

- Multinomial Logit Model
- Nested Logit Model
 - County
 - Commune
 - (Grid cell → only partial information)

Conclusions

- Ongoing research
- No source of employment variation can be neglected
- All the models have to be run sequentially in order to predict overall employment variation, and especially interactions with:
 - household location,
 - real estate price,
 - urban development,
 - transportation and accessibility