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Do jobs-follow-people or people-follow-jobs?

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Overview

- > Motivation
- > Theoretical debate
- > Dutch context
- > Results Meta-analysis 64 empirical studies of the Carlino-Mills model for jobs-follow-people versus people-follow-jobs
- > Conclusion and discussion


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Classis question about regional growth still in debate

Literature: do “jobs-follow-people or people-follow-jobs” (Borts and Stein 1964; Steinnes and Fisher 1974) or related “chicken-or-egg” (Muth 1971). Later *The Determinants of County Growth* by Carlino and Mills (1987) with lagged adjustment framework. The question relates to questions like:

- > Do people move for amenities and quality-of-life factors or economic factors (e.g. Lowry, 1966; Partridge 2010).
- > Is the residential location decision made before or after the job location decision (e.g., Deding et al. 2009).
- > Are employment locations really exogenous to residential locations? Or vice-versa (as assumed in the monocentric city model).

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Duelling theoretical models

- > New Economic Geography (Krugman, 1991): falling transport cost lead to concentration
- > Amenity migration (Graves, mid1970s): people are moving to nice places, warm climates
- > Agglomeration effects, attractiveness of (big) cities (Gleaser et al, 2001 etc., Florida, 2003)
- > Storper & Scott (2009): people only move to nice places with suitable employment


→ Partridge (2010): for the US, Graves is the winner!


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Policy relevance

- > The question what determines growth plays a central role in policy discussions as to whether catering to the wishes of firms and improving the business climate of a place is a better strategy than catering to wishes of people and improving the people climate of a place when aiming to stimulate local or regional growth.
- > Core – periphery debate in The Netherlands: is the Randstad area with Amsterdam/Rotterdam the engine of national growth or an area at risk with (too) high cost?
- > Changing policy focus from only economic goals like GDP, income and (un-)employment to broader goals like well-being and quality of life

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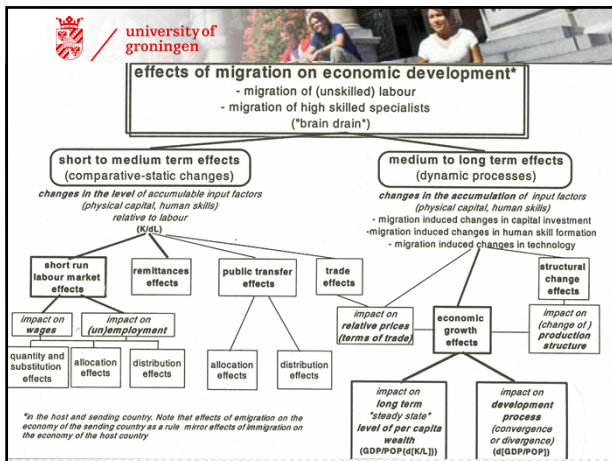


Modelling do 'jobs follow people' or 'people follow jobs'?

- > Late 1960s variety of techniques were put forward, but in a small and fragmented group of studies.
- > Late 1980s, the number of research studies has rapidly grown and there has been relatively little disagreement about the choice of methodology due to the publication of *The Determinants of County Growth* by **Carlino and Mills** (1987), which marked a radical departure from previous causality studies in two respects.
- > To illustrate the importance of the publication: it was the most cited regional science article of 1987. Isserman (2004)

Slide 1

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Innovative features of the Carlino-Mills models:

- > First, US nationwide analysis of population–employment interactions at a very detailed spatial scale (county level).
- > Second, and even more importantly, it was the first study to investigate these interactions by using a **simultaneous equations model** similar to the one introduced by Steinnes and Fisher (1974), but with a **lagged adjustment framework built in**.
- > **Criticism:** the identification of the simultaneous equations system is often problematic because of the lack of good instruments and that the results may therefore not be reliable (see, e.g., Rickman 2010).

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Carlino-Mills model structures

$$\bar{E}_t = \alpha_0 + \alpha_1 E_{t-1} + \alpha_2 (I + \bar{W}_1) \bar{P}_t + \alpha_3 \bar{W}_2 \bar{E}_t + \alpha_4 S_{t-1} + u_t \quad (1)$$

$$\bar{P}_t = \beta_0 + \beta_1 P_{t-1} + \beta_2 (I + \bar{W}_1) \bar{E}_t + \beta_3 \bar{W}_2 \bar{P}_t + \beta_4 T_{t-1} + v_t \quad (2)$$

$$\bar{E}_t = E_t - \delta_1 E_{t-1} \quad \text{changes: } \delta_1 \text{ and } \delta_2 = 1 \quad (3)$$

$$\bar{P}_t = P_t - \delta_2 P_{t-1} \quad \text{end-of-period levels: } \delta_1 \text{ and } \delta_2 = 0 \quad (4)$$

$$\bar{W}_1 = \delta_3 W \quad \text{spatial cross-regressive system } \delta_3 = 1 \quad (5)$$

$$\bar{W}_2 = \delta_4 W \quad \text{spatial autoregressive system } \delta_4 = 1 \quad (6)$$

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Taxonomy of Carlino-Mills model specifications

levels vs changes with/without cross/spatial autoregressive lags

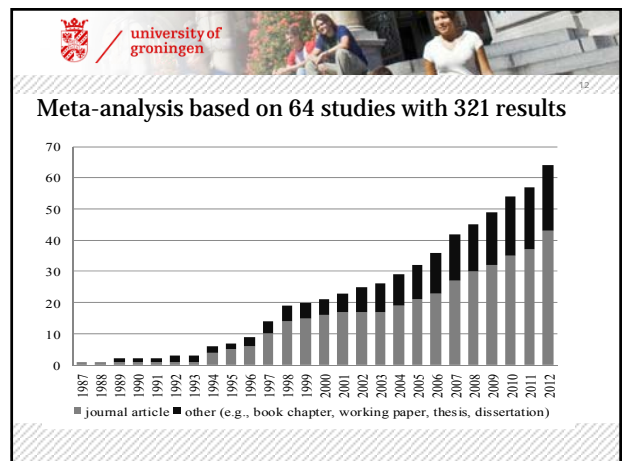
	E_t/P_t (LHS)	E_t/P_t (RHS)	\bar{W}_1	\bar{W}_2	Introduced by:
	δ_1/δ_2^*	δ_1/δ_2^*	δ_3^{**}	δ_4^{***}	
a	0	0	0	0	Carlino & Mills (1987)
b	1	0	0	0	Mills & Carlino (1989)
c	1	1	1	0	Boarnet (1992)
d	0	0	1	0	Luce (1994)
e	0	0	0	1	Vias (1998)
f	1	1	1	1	Henry et al. (2001)
g	1	0	0	1	Carruthers & Mulligan (2008)
h	1	1	1	1	Kim (2008)

Note: LHS (RHS) refers to variables on the left-hand-side (right-hand side) of the equations.
* 0 = population/employment levels and 1 = population/employment changes. ** 0 = without spatial cross-regressive lags and 1 = with spatial cross-regressive lags. *** 0 = without spatial autoregressive lags and 1 = with spatial autoregressive lags. See also Equations (1)–(6).

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Meta-analysis

- > "The application of statistical techniques to collections of empirical findings from previous studies for the purpose of integrating, synthesising, and making sense of them" (Wolf, 1986)
- > We will use a multinomial logit model and base the interpretation on the marginal effects obtained from this model



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43 Journal articles

7 x Journal of Regional Science	1 x International Regional Science Review
5 x Annals of Regional Science	1 x Journal of Develop. Entrepreneurship
4 x Journal of Urban Economics	1 x Journal of Economic Research
3 x Agricultural and Resource	1 x Journal of Leisure Research
3 x Papers in Regional Science	1 x Journal of Transport Geography
2 x Geographical Analysis	1 x Land Use Policy
2 x Growth and Change	1 x Public Finance Quarterly
2 x Reg. Science and Urban Economics	1 x Région et Développement
2 x Review of Regional Studies	1 x Review of Agric. and Environ. Studies
1 x Economic Analysis and Policy	1 x Transportation Research A
1 x Food Economics	1 x Urban Geography

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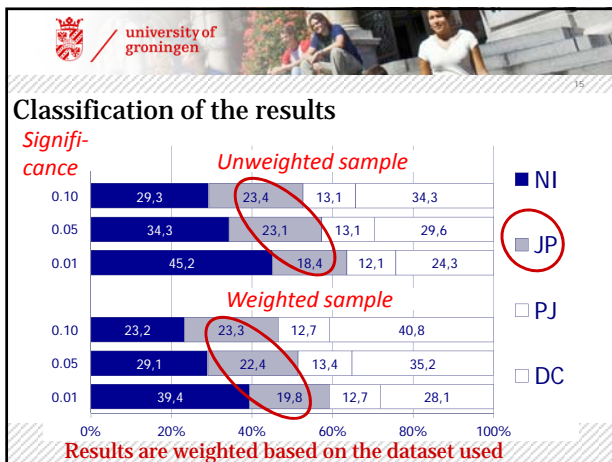
Carlino-Mills model with simultaneous equations: possible outcomes

$$\tilde{P}_t = a_0 + a_1 P_{t-1} + a_2 (I + \tilde{W}) \tilde{E}_t + \dots + u_t$$

$$\tilde{E}_t = b_0 + b_1 E_{t-1} + b_2 (I + \tilde{W}) \tilde{P}_t + \dots + v_t$$

	$b_2 \leq 0$	$b_2 > 0$
$a_2 \leq 0$	No interaction	jobs follow people only
$a_2 > 0$	people follow jobs only	dual causality

$a_2 > 0$ (people follow jobs)
 $b_2 > 0$ (jobs follow people)



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- ### Meta analysis with control variables
- > Model specification: changes/levels, spatial weights
 - > Area scaling: densities VS shares
 - > Linear VS Non-linear (mostly logarithm) specification
 - > Two or more equations in the simultaneous system
 - > Weightmatrix: flows vs distance/no
 - > Geographical area: (parts of) US, Europe
 - > Area size: small – medium – large
 - > Period: 1970s + 1980s VS 1990s + 2000s
 - > With Land use, Income, Economic variables included
 - > Total population/employment vs subgroups
 - > Journal vs non-journal articles
 - > Note: only studies with results at 5% significance are used for the multivariate meta analysis

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Distribution of study results across selected study factors (in %)

	NI	JP	PJ	DC	n
<i>Substantive study factors</i>					
US West	56.7	24.0	9.6	9.6	104
US East	24.4	22.2	20.0	33.3	90
Non-US	35.9	28.2	11.5	24.4	78
Entire US*	2.0	14.3	10.2	73.5	49
<i>Small sized area obs.</i>					
Medium sized area obs.*	80.6	8.1	9.7	1.6	62
Large sized area obs.	29.1	23.6	14.3	33.0	182
	9.1	33.8	13.0	44.2	77
<i>1970s + 1980s data</i>					
1990s + 2000s data*	41.4	21.7	12.7	24.2	157
	27.4	24.4	13.4	34.8	164
<i>Subgroups</i>					
Total pop/emp data*	50.0	24.1	12.1	13.8	58
	30.8	22.8	13.3	33.1	263

* Reference group in logit regression % > 40%

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Distribution of study results across selected study factors (in %)

	NI	JP	PJ	DC	n
<i>Methodological study factors</i>					
LHS & RHS levels	22.2	61.1	7.4	9.3	54
RHS changes & LHS levels	10.2	18.4	10.2	61.2	49
LHS & RHS changes*	42.7	14.7	15.1	27.5	218
<i>Densities</i>					
Shares*	17.9	21.7	17.0	43.4	106
	42.3	23.7	11.2	22.8	215
<i>Non-linear functional form</i>					
Linear functional form*	19.8	16.0	7.4	56.8	81
	39.2	25.4	15.0	20.4	240
<i>Flow matrix</i>					
Other*	24.5	15.1	18.9	41.5	53
	36.2	24.6	11.9	27.2	268
<i>With SAR</i>					
Without SAR*	26.9	13.5	5.8	53.8	52
	35.7	24.9	14.5	24.9	269
<i>2+ Equations</i>					
2 Equations*	31.8	7.6	12.1	48.5	66
	34.9	27.1	13.3	24.7	255



Distribution of study results across selected study factors (in %)

	NI	JP	PJ	DC	n
Land use variables included	44.4	23.7	11.1	20.7	135
Land use variables excluded*	26.9	22.6	14.5	36.0	186
Income variables included	21.5	25.6	14.4	38.5	195
Income variables excluded*	54.0	19.0	11.1	15.9	126
Economic variables included	35.6	26.4	12.0	25.9	216
Economic variables excluded*	31.4	16.2	15.2	37.1	105
<i>External study factors</i>					
Non-journal article	47.1	21.2	10.6	21.2	104
Journal article*	28.1	24.0	14.3	33.6	217

NI = No Interaction, JP = Jobs follow People, PJ = People follow Jobs, DC = Dual Causality. Study results are at the 5% significance level. * reference categories in the multinomial logit model.



Estimation results multinomial logit model (marginal effects at the means)

	NI	JP	PJ	DC
<i>Substantive study factors</i>				
US West	.586 (.103)	.149 (.099)	.100 (.049)	-.835 (.097)
US East	.329 (.094)	.137 (.137)	.369 (.139)	-.835 (.109)
Non-US	.226 (.091)	-.476 (.189)	-.098 (.116)	-.800 (.134)
Entire US*				
Small sized area obs.	.614 (.137)	-.150 (.143)	.025 (.070)	-.489 (.124)
Large sized area obs.	-.164 (.109)	-.050 (.281)	.692 (.260)	-.478 (.135)
Medium sized*				
1970s + 1980s data	.092 (.076)	-.111 (.112)	.026 (.107)	-.007 (.085)
1990s + 2000 data*				
Subgroups	.729 (.085)	-.329 (.098)	-.102 (.064)	-.298 (.079)

In parentheses the standard errors.

Significant at the 5% level



Methodological study factors

	NI	JP	PJ	DC
LHS & RHS levels	-.256 (.100)	.700 (.144)	-.309 (.081)	-.134 (.115)
RHS changes & LHS levels	.127 (.396)	.238 (.295)	-.296 (.086)	-.069 (.183)
LHS & RHS changes*				
Densities	-.256 (.095)	-.161 (.117)	.104 (.135)	.313 (.158)
Shares*				
Non-linear function form	-.217 (.091)	-.260 (.106)	-.100 (.086)	.576 (.155)
Linear				
Flow matrix	-.381 (.052)	-.083 (.142)	-.066 (.108)	.530 (.210)
Other, like distances*				
With SAR	.086 (.131)	.033 (.164)	-.080 (.090)	-.038 (.087)
2+ Equations	-.249 (.121)	-.119 (.183)	.120 (.122)	.248 (.238)
Land use variables incl.	.119 (.086)	.000 (.090)	-.144 (.078)	.025 (.073)
Income variables incl.	.384 (.112)	-.252 (.172)	-.090 (.126)	-.043 (.143)
Economic variables incl.	-.254 (.091)	.212 (.108)	.042 (.099)	.000 (.126)
<i>External study factors</i>				
Non-journal article	.083 (.095)	-.193 (.119)	-.088 (.077)	.198 (.120)

In parentheses the standard errors.

Significant at the 5% level



Conclusions and discussion

- Empirical evidence from 64 studies on jfp-pj still mixed and inconclusive
- One third each for no-interaction, jfp+pfj, dual causality
- Jobs-follow-people > people-follow-jobs (about 2x more)
- Jobs follow people > people follow jobs (about 2x more)
- Data matter: results vary by geographic location of the regions, spatial resolution and population and employment characteristics, but not by time period
- Methodology: results vary by levels vs changes, functional form, specification weightmatrix, standardization by density or shares, number of equations, inclusion of other variables; but not by SAR
- No difference by publication type



Suggestions for future research on jfp-pj

- Use models that permit causality running in different directions and test robustness with alternative models
- Non-linear models with more than two equations and standardized in densities lead to better results than simple CM models, but are more difficult to implement
- Include variables for land use, spatial policies, income and economic conditions. Natural and cultural amenities, location and demographics are less important
- W-matrix with flows is preferred, but less exogenous
- Meta-analysis on size of the parameters instead of sign
- Or: Microlevel analysis of underlying processes based on firm-employer micro-data



Policy relevance

- The question: improve the business climate for firms or the living conditions for the people?
 - depends on the characteristics of the region
 - place based policies needed.
- Most likely improving both is needed
- Dutch context: is investing in the Randstad more profitable than outside the Randstad?
- From economic or well-being perspective?