Local Governments Expenditures and Spillover Effects

Evidence from Walloon Municipalities

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Table of content I

Table of content

Background (1)

Budget spillover effects (1)

- In traditional models of public expenditure determination, local governments are concerned with the well-being of their citizens
- The utility of a representative consumer in a municipality can be expressed as

$$V_i = V_i[Y_i - T_i, G_i, \Phi_i] \tag{1}$$

in which
Y_i is the per capita income in municipality i
T_i is the (lump-sum) tax burden of each consumer
G_i is the level of public services provided in municipality i
Φ_i is a vector of exogenous conditions that affect the utility of residents of the state

Background (2)

- But benefits of public expenditures in one municipality can 'spill over' into another
- The utility of a representative consumer in a municipality can be rewritten as follow

$$V_i = V_i[Y_i - T_i, G_i, G_i^P, \Phi_i] \tag{2}$$

in which
G_i^P is the level of public services provided by a subset of municipalities (P) that are located in proximity of the municipality i

Background (3)

- Of course, the level of G_i^P can affect the level of public services provided by the municipality i (G_i) in two possible ways:
  - Monetary impacts of spillover effects: the provision of a public service by a municipality decreases the need to provide this service for neighbouring municipalities and hence, their level of expenditure. For the providing municipality, the effect is not obvious.
  - Yardstick competition: the voters compare the level of public services provided by their local government with the services provided in neighbouring municipalities, which incentivizes local governments to mimic public choices of neighbours

    (rem: not directly related to budget spillover effects)

Objectives

Objectives:

- Understand what drives per capita expenditure of local government
- Analyze and quantify the monetary impacts of spillover effects

Methodology

Methodology:

- Municipalities are differently affected by spillover effects
- We can distinguish 3 categories of municipalities:
  - Generating
  - Neutral
  - Beneficiaries
- Exploit subset of municipalities whose expenditures are not affected by spillovers (neutral)
  $\rightarrow$ Recover consistent effects of variables of interest without need to model spillover interactions
- Analyze municipalities within subgroups and compare expenditure processes across subgroups in order to learn about the monetary impact of spillovers

Table of content

A general model of local government expenditures (1)

We model expenditure of local authorities as

$$\mathbb{E}[y_{it}|\mathbf{x}_{it}^{'}, e_{it}, \eta_i] = \mathbf{x}_{it}^{'}\boldsymbol{\beta} + e_{it} + \eta_i \tag{3}$$

y_{it} is the real public expenditure per capita
$\mathbf{x}_{it}$ is the vector of explanatory variables (anterior policies, socio-economic characteristics, time dummies, ...)
e_{it} is the (unobserved) impact of spillover effects
η_i is the (unobserved) municipality heterogeneity

A general model of local government expenditures (2)

- Effects of spillovers are unobserved. Nevertheless, there exist municipalities that are neither dependent of others nor providers of services to others := neutral municipalities (N).
  $\rightarrow$ for these municipalities, spillovers effects can be deemed negligible
- Empirically, analyze geographic characteristics etc. to determine neutral municipalities.

A general model of local government expenditures (3)

For these neutral municipalities, we have:

$$\mathbb{E}[y_{it}|\mathbf{x}_{it}^{'}, e_{it}, \eta_i] = \mathbf{x}_{it}^{'}\boldsymbol{\beta} + \eta_i \tag{4}$$

- An estimator controlling for the unobserved heterogeneity delivers a consistent estimate of $\boldsymbol{\beta}$.

A general model of local government expenditures (4)

	dGMM	Mundlak/FE
lag 1	0.519** (0.243)	0.520*** (0.0515)
lag 2	0.120 (0.248)	0.0591* (0.0341)
population density	-0.0611 (0.525)	-0.341 (0.264)
prop. of old people	6.478 (4.855)	8.704 (5.337)
prop. of young people	8.538 (6.663)	10.01 (6.336)
unemployment rate	-3.329 (4.844)	-3.504 (4.119)
property tax potential	1.391 (4.554)	3.553 (2.700)
income tax potential	6.648** (2.741)	5.553* (3.089)
municipality endowment fund	0.391*** (0.152)	0.353* (0.182)
first order neighbours expenditure	0.278* (0.156)	0.180* (0.0930)
second order neighbours expenditure	0.184 (0.233)	0.280*** (0.0859)
area		0.00416 (0.0316)
urban centrality		1.578 (1.993)
constant		81.58* (43.87)
Sargan (p)	0.265	
Hansen (p)	0.726	
Instruments	43	
N	879	971

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

Expectations of the monetary impacts of spillover effects (1)

- We have seen it is possible to recover a consistent estimator $\hat{\beta}$ for the intercept and the coefficients of the controls in the expenditure equation.
- This suggests to obtain $\hat{c}_{it} = e_{it} \widehat{+ \eta_i +} \epsilon_{it} = y_{it} - \mathbf{x}_{it}^{'}\hat{\beta}$ and to take the average over municipalities that benefit from spillover (:= beneficiary (B)) in order to recover an estimated expected value of the impact of spillovers $\rightarrow \hat{c}$
- One can also look at the average over municipalities that generate spillover effects (:= generating (G))
- Potential empirical issues: omitted variables differing systematically across groups; expectancy of unobserved heterogeneity may differ across groups

Expectations of the monetary impacts of spillover effects (2)

Table: Empirical estimates

Beneficiaries	
$\hat{c}$	-52
long-run	-145

Generating	
$\hat{c}$	75
long-run	208

Partial effects on the monetary impacts of spillovers (1)

For beneficiary and generating municipalities, $e_{it} \neq 0$ is unobserved

$$\mathbb{E}[y_{it}|\mathbf{x}_{it}^{'}, \eta_i, S] = \mathbf{x}_{it}^{'}\boldsymbol{\beta} + \mathbb{E}[e_{it}|\mathbf{x}_{it}^{'}, \eta_i, S] + \eta_i \tag{5}$$

$S \in B, G$.
Under linearity of the conditional expectation of e_{it}, i.e.
$\mathbb{E}[e_{it}|\mathbf{x}_{it}^{'}, \eta_i, S] = \mathbf{x}_{it}^{'}\boldsymbol{\delta_S} + \zeta_i$, we obtain

$$\mathbb{E}[y_{it}|\mathbf{x}_{it}^{'}, \eta_i, S] = \mathbf{x}_{it}^{'}(\boldsymbol{\beta} + \boldsymbol{\delta_S}) + \eta_i + \zeta_i \tag{6}$$

Regressions using the subgroup of beneficiaries and the subgroup of neutral municipalities allow to recover the partial effects, $\hat{\delta}_B$.

Partial effects on the monetary impacts of spillovers (3)

Fitted values for the impact of spillovers can readily be obtained considering

$$\hat{e}_{it} = \mathbf{x}_{it}^{'}\hat{\boldsymbol{\delta}}_S, i \in S. \tag{7}$$

It is then interesting to summarize the information using the impact of spillovers at a representative point such as the average in the sample, yielding $\hat{e}_S = \overline{\mathbf{x}}^{'}\hat{\boldsymbol{\delta}}_S$.
Our preliminary results suggest $\hat{e}_B = -14$ and $\hat{e}_G = 639$.

Partial effects on the monetary impacts of spillovers (4)

Table: Preliminary results - Beneficiaries

	Coeff	Std.error	z	P-value
lag 1	-0.109	0.289	-0.377	0.706
lag 2	0.204	0.245	0.834	0.404
population density	0.007	0.897	0.008	0.994
prop. of old people	-3.407	6.779	-0.503	0.615
prop. of young people	-4.593	9.102	-0.505	0.614
unemployment rate	-0.389	6.679	-0.058	0.954
property tax potential	1.854	5.802	0.319	0.750
income tax potential	-0.174	3.457	-0.050	0.960
municipality endowment fund	-0.302	0.303	-0.998	0.318
first order neighbours expenditure	-0.345	0.253	-1.363	0.173
second order neighbours expenditure	-0.132	0.335	-0.394	0.693
population ratio	-2266.6	6871.12	-0.330	0.741
exp. most central neighbour	152.97	118.14	1.295	0.195
constant	-2064.85	54.969	-37.563	0

Partial effects on the monetary impacts of spillovers (5)

Table: Preliminary results - Generating

	Coeff	Std.error	z	P-value
lag 1	-0.307	0.374	-0.822	0.411
lag 2	-0.043	0.283	-0.151	0.880
population density	-2.150	3.966	-0.542	0.588
prop. of old people	-63.760	97.851	-0.652	0.515
prop. of young people	-64.678	85.033	-0.761	0.447
unemployment rate	43.843	28.776	1.524	0.128
property tax potential	6.342	42.348	0.150	0.881
income tax potential	59.639	99.774	0.598	0.550
municipality endowment fund	0.684	1.021	0.670	0.503
first order neighbours expenditure	-0.020	0.590	-0.034	0.973
second order neighbours expenditure	-0.469	1.090	-0.430	0.667
population ratio	10987.07	33449.41	0.328	0.743
exp. most central neighbour	-612.716	1078.89	-0.568	0.570
constant	13804.8	882.24	15.647	0

Table of content

Further research

- Other models or estimation procedures
  $\rightarrow$ for instance, maximum of likelihood estimations
- Investigate the explanatory variables of monetary impacts of spillovers
- Robustness checks, additional variables, category definitions...

Conclusion

Thank you for your attention !