

Uniwersytet Warszawski Wydział Nauk Ekonomicznych

NPV-based econometric modelling in the assessment of public intervention efficiency: The case of Special Economic Zones in Poland in 1995-2012

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Special Economic Zones in Poland: few facts

Created in 1994, will work till 2026, now 2519 permits.

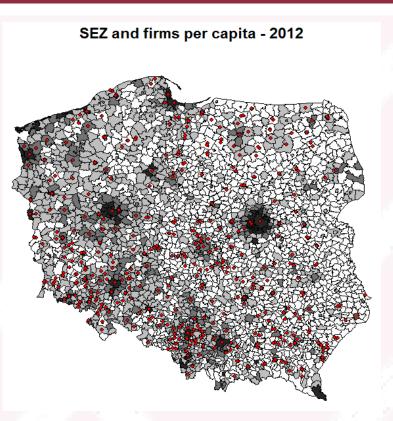
14 zones in 146 cities and in 210 municipalities (9,5 thous. ha = 8,4% of industrial sites in Poland).

Employment for approx. 250 thous. People (1,7% of working force in Poland).

The total investment of 85,8 bilion zł (approx. 6% of domestic investment)

Additionally: government and local spending on infrastructure amounted to almost 3 bilion zl.

The sum of tax exemptions is nearly 10 bilion zł (approx. 13% of the investment)



The total cost of creating SEZ is approx. 13.5 billion zł (17% of the investment)

Briefly about the literature on SEZ

1) The annual reports of the Ministry of Economy (and Labour) on Special Economic Zones - the most important quantitative and qualitative statement of operations in the SEZ

2) Scientific reports based on annual reports of Ministry of Economy, expading the selected topics from reports, e.g.: Kisiel & Lizińska (2012), Szczebiot-Knoblauch, Lizińska & Kisiel (2012), Gryczka (2009), Piwowarczyk (2013) etc.

3) Scientific reserach: Przybyła (2010) – SEZ and economic base of cities, Domański (2008) – territorial differentiation of capital investment

4) Information of the Supreme Chamber of Control (NIK, 2009) about the audit of functioning and the extension of the area of SEZ in 2006-2008

5) Reports by advisory firms: KPMG (2012), E&Y (2011)











Goal of the research (1)

SEZ, by assumption, are the instrument of supporting economically weaker areas mostly the peripheral areas of low endogenous potential, for which the exogenous impulses from SEZ were expected to be the driving force of local economies

The fundamental question: Did the municipalities, in which SEZ was located, benefit from this? \rightarrow budgetary and economic analysis from the perspective of local government.

Theoretical assumptions:

- the positive effects of diffusion of growth stimuli (spillover)
- the positive effects of spatial concentration
- **Costs** (lower revenues from CIT) < **Benefits** (higher revenues from PIT)

Hypotheses:

 SEZ provide benefits for both the local budgets in the form of increased own income and / or for a local labor markets in the form of increased employment.
 SEZ as an instrument to support cohesion policy, intensify the diffusion of positive development impulses, both within the municipality, as well as to neighboring areas.



Goal of the research(2)

- Do SEZ impact positively on economic and social development of the region and its neighbors? Is there a diffusion of development incentives to neighboring municipalities?

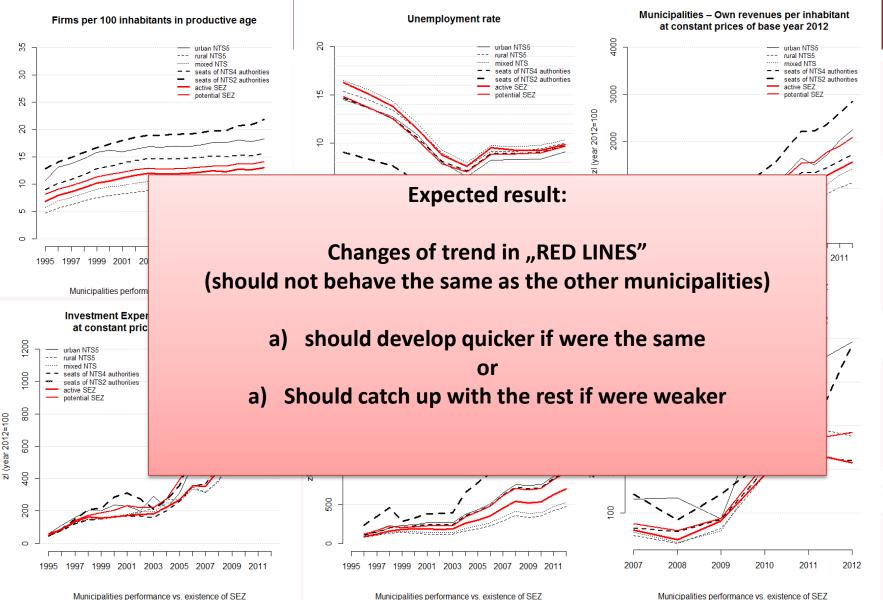
- Is the SSE is an efficient instrument to support economic development? Did the municupalities with SEZ significantly improved economic performance compared to other municipalities in the period of 18 years?

- What is the pattern of developmental changes at the local level: convergence, divergence or path-dependence (stability over time)? Does between different types of municipalities, cities, seats of *powiat* authorities, and municipalities with SEZ exists structural stability and significant differences in development are emerging?

- Is the hypothesis of *quasi "gift exchange"* feasible? That local governments attract investors to improve their situation in the long-term. In the short term, this means higher costs and expenses (investments in infrastructure, tax exemptions), but with the hope of increasing their own income from PIT and CIT in the future?

Four ways to test it!

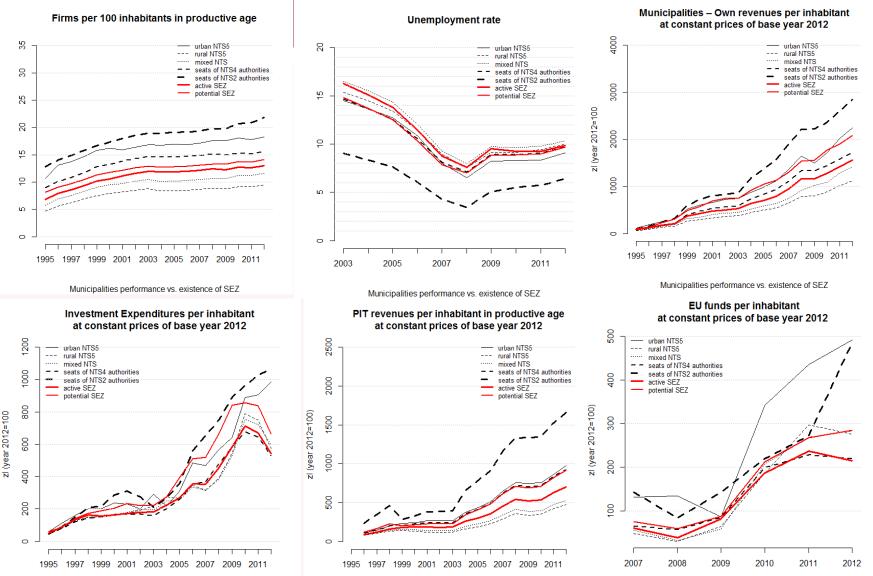
Method 1: Panel charts 1995:2012



Municipalities performance vs. existence of SEZ

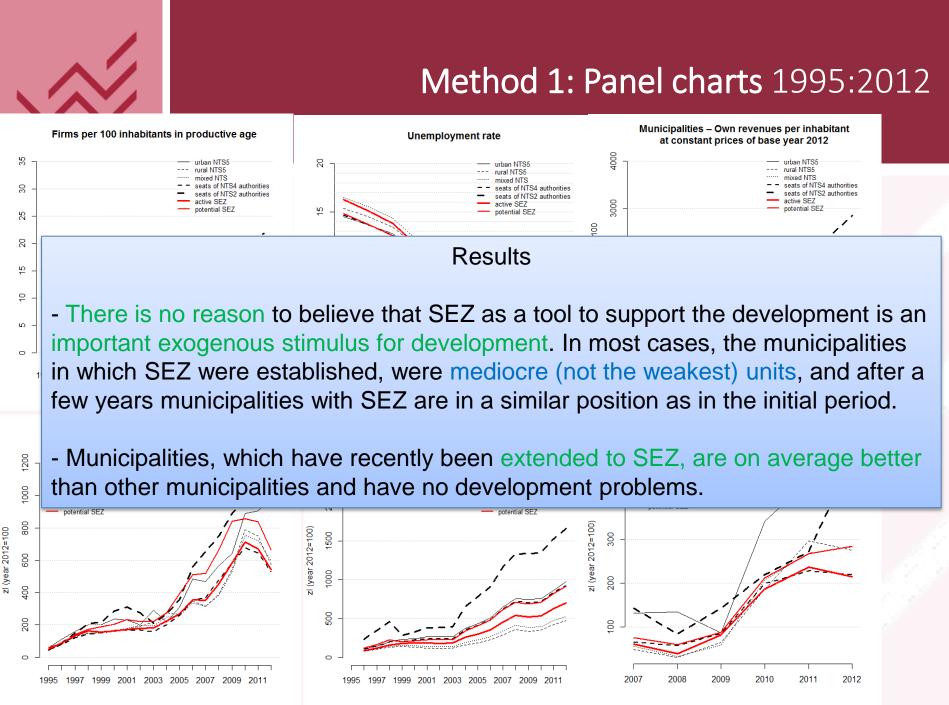


Method 1: Panel charts 1995:2012



Municipalities performance vs. existence of SEZ

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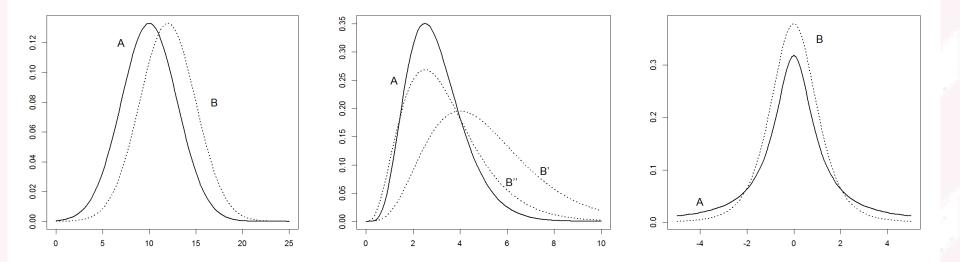
Method 2: Density distributions

Expected changes

global shift

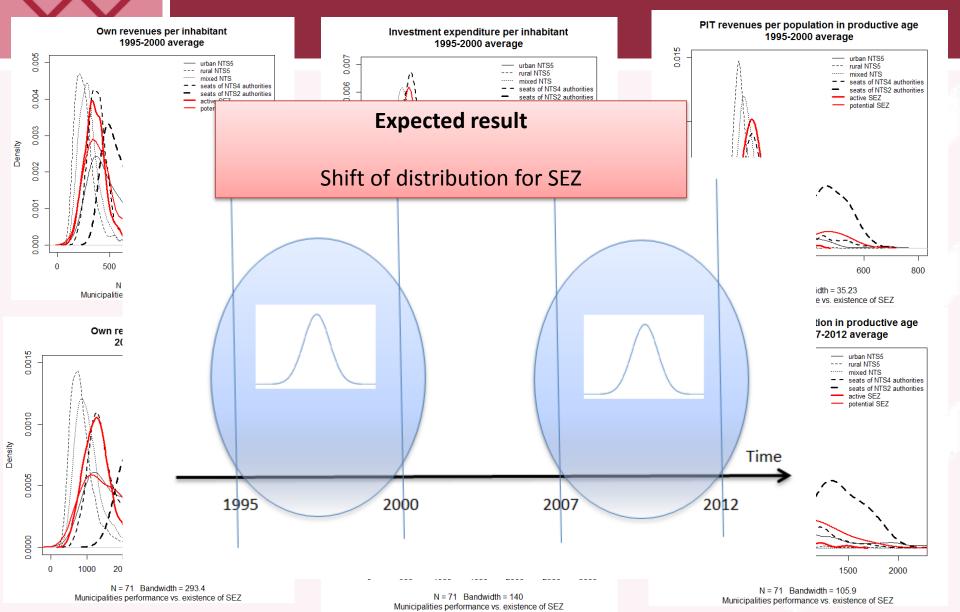
divergence

convergence



Source: Kopczewska K., 2014, L-moments skewness and kurtosis as measures of regional convergence and cohesion, Statistica Neerlandica (November 2014)

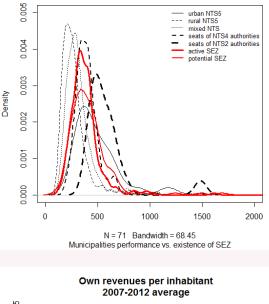
Method 2: Density distributions for 6-years averages in 1995-2000 and 2007-2012

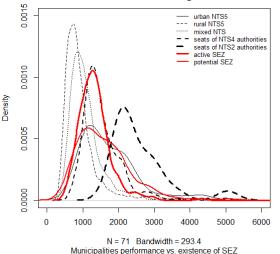




Method 2: Density distributions for 6-years averages in 1995-2000 and 2007-2012

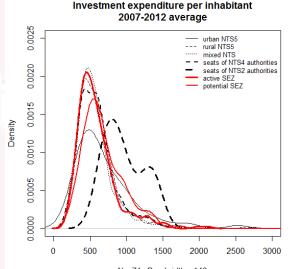
Own revenues per inhabitant 1995-2000 average

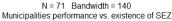


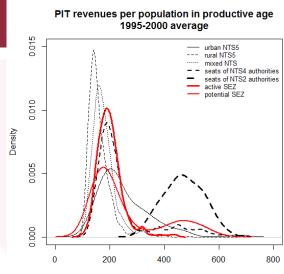


Investment expenditure per inhabitant 1995-2000 average 0.007 urban NTS5 --- rural NTS5 mixed NTS 0.006 seats of NTS4 authorities seats of NTS2 authorities active SEZ 005 potential SEZ ö 0.004 Density 0.003 0.002 0.001 8 d 0 200 400 600 800 1000 N = 71 Bandwidth = 43.03

N = 71 Bandwidth = 43.03 Municipalities performance vs. existence of SEZ

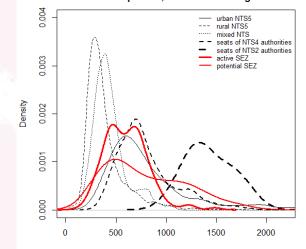




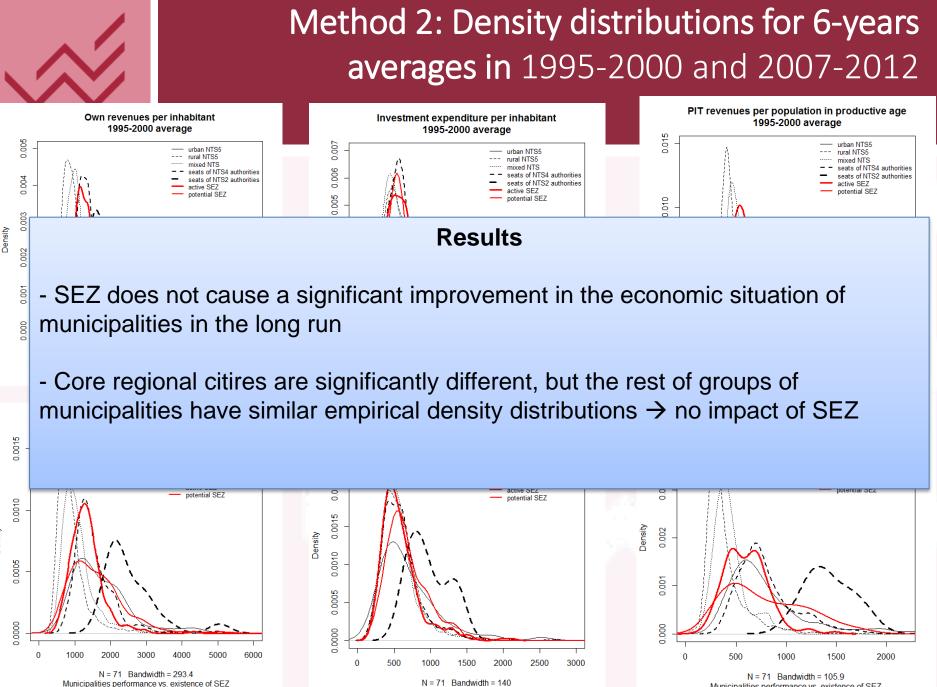


N = 71 Bandwidth = 35.23 Municipalities performance vs. existence of SEZ

PIT revenues per population in productive age municipalities, 2007-2012 average



N = 71 Bandwidth = 105.9 Municipalities performance vs. existence of SEZ



Municipalities performance vs. existence of SEZ

Municipalities performance vs. existence of SEZ

Density



- → Objective: To evaluate the significance of the impact of SEZs on the amount of own revenues in the years 1995-2012
 - → Did the municipalities with SEZ obtain significantly higher amount of own revenues per capita than other municipalities?

 \rightarrow Can we assume the quasi *"gift exchange"* hypothesis? – that local governments attract investors, to improve their situation in the long-run. In the short term, this means higher costs and expenses (investments in infrastructure, tax exemptions), but with the hope of increasing their own incomes, PIT and CIT.

- → Model: cumulative structure to reflect the flows, resources and stocks as well as the characteristics of the individual municipalities (constant over time). Investment approach, philosophy similar to the NPV model: discounted expenditures compared with the discounted (deflated) incomes in the whole period of the investment.
- → Incomes are the own revenues, expenditures are the investments. The first year of "investment" is 1995. Models are estimated for each year.



Rule of accumulation of flows over years:

model 1: 1995 model 2: 1995+1996 model 3: 1995+1996+1997

model 18: 1995+.....+ 2012

Spatial Estimation: for each year we estimate SAC model in general form as following: $y = \rho W y + \beta X + u$ i $u = \lambda W u + e$

Where:

W – contiguity matrix n x n

for variables constant over time: $x = x_i$

for stock variables: $x = x_{T,i}$, $y = y_{T,i}$,

for *flow* variables: $x = x_{T,i} = \sum_{t=1995}^{T} x_{t,i} \cdot d_t$, $y = y_{T,i} = \sum_{t=1995}^{T} y_{t,i} \cdot d_t$, where d_t is deflator for year t

	own		workers	
	revenues	investment	employed	 SEZ active
	flow	flow	stock	dummy
1995	Y (1995)	X1 (1995)	X2 (1995)	X3 (1995)
1996	Y (1996)	X1 (1996)	X2 (1996)	X3 (1996)
1997	Y (1997)	X1 (1997)	X2 (1997)	X3 (1997)
1998	Y (1998)	X1 (1998)	X2 (1998)	X3 (1998)
1999	Y (1999)	X1 (1999)	X2 (1999)	X3 (1999)
2000	Y (2000)	X1 (2000)	X2 (2000)	X3 (2000)
2001	Y (2001)	X1 (2001)	X2 (2001)	X3 (2001)
2002	Y (2002)	X1 (2002)	X2 (2002)	X3 (2002)
2003	Y (2003)	X1 (2003)	X2 (2003)	X3 (2003)
2004	Y (2004)	X1 (2004)	X2 (2004)	X3 (2004
2005	Y (2005)	X1 (2005)	X2 (2005)	X3 (2005)
2006	Y (2006)	X1 (2006)	X2 (2006)	X3 (2006)
2007	Y (2007)	X1 (2007)	X2 (2007)	X3 (2007)
2008	Y (2008)	X1 (2008)	X2 (2008)	X3 (2008)
2009	Y (2009)	X1 (2009)	X2 (2009)	X3 (2009)
2010	Y (2010)	X1 (2010)	X2 (2010)	X3 (2010)
2011	Y (2011)	X1 (2011)	X2 (2011)	X3 (2011)
2012	Y (2012)	X1 (2012)	X2 (2012)	X3 (2012)
	т			



Discounted cumulated flows: MONEY: own revenues *per capita*, investment expenditures *per capita*, PIT and CIT revenues *per capita* in productive age.

Values from the last period: number of empoyed & number of firms per capita in productive age.

Control variables constant over time: SEZ active (dummy), SEZ potential (dummy), distance from municipality to core city, status of core city (dummy)

 $\begin{aligned} & own \, rev. = \alpha + \rho \cdot own. \, rev_{Wlag} + \beta_1 \cdot investment + \beta_2 \cdot PIT \, rev. + \beta_3 \cdot CIT \, rev + \\ & + \beta_4 \cdot working + \beta_5 \cdot firms + \beta_6 \cdot SEZ_{active} + \beta_7 \cdot SEZ_{potent.} + \\ & + \beta_7 \cdot DIST + \beta_8 \cdot core \, city + u \\ & u = \lambda Wu + \varepsilon \end{aligned}$

Dataset: year 1995-2012 (18 years) 2474 spatial units 14 variables in whole analysis



623'448 observations



Table 1: Estimation of cumulative simultaneous spatial SAC model

4									
(Intercept) Investment PIT CIT Employee	ed2 Business	SEZ	SEZ	DIST	Regional	rho	lambda	AIC	AIC
expenditures1 revenues2 revenues2	units2	active3	potential3		core city3			Spat.	Lm
Expected results:			•		n:				-
$own \ rev. = \alpha + \rho \cdot own. \ rev_{Wlag} + \rho \cdot own. \ rev_{Wlag} + \rho \cdot own.$	+ spati	al depe	endenc	е					-
+ $\beta_1 \cdot investment$	🖁 + long-			•	•	er)			-
$+\beta_2 \cdot PIT rev. +\beta_3 \cdot CIT rev +$	🛛 + comp								-
$+\beta_4 \cdot working + \beta_5 \cdot firms +$					increas				ľ
$+\beta_6 \cdot SEZ_{active} + \beta_7 \cdot SEZ_{potent.} +$	🖬 + SEZ a				-		-		H
$+\beta_7 \cdot DIST$	· · · ·				ould wo				ce -
$+\beta_8 \cdot core \ city$	···		•		d improv	ve per	forma	nce	-
$+u \& u = \lambda W u + \varepsilon$	error	spatia	lly auto	ocorre	lated				-
2012 -3281,81*** 1,4*** 0,16*** 2,57*** 11601,46	5*** 22453,45***	-175,7	172,68	-3,64	-2071,08***	0,047***	0,3613***	46957	47176

1 *per capita*; 2 per productive age population; 3 dummy variable *Source:* Own results, estimated in R with packages spdep (Bivand, 2014)



Table 1: l	Estimation	of camulative	e simultar	ieous spat	ial SAC mod	lel								
	(Internet)	investment	PIT	CIT	Employed 2	Business	SEZ	SEZ	DIST	Regional	rho	lambda	AIC	AIC
	(Intercept)	expenditures1	revenues2	revenues2	Employed2	units2	active3	potential3	D151	core city3	rno	lambda	Spat.	Lm
1995	-42,15***	1,16***	102,47***	-1,04***	201,14***	-33,09	-5,68***	-6,05	0,06***	-4,15	0,0269	0,1918***	24695	24742
1996	-57,07***	1,05***	0,07	0,3***	268,03***	226,5***	-9,3	-9,29	0,1	-38,39	0,0361	0,1829***	28580	28634
1997	-130,83***	1,04***	0,02	0,69***	754,29***	-29,22	-43,55***	-43,88***	0,1	-118,59***	0,042***	0,1071***	31905	31929
1998	-157,54**	1,05***	0,12***	2,54***							186	0,124***		34595
1999	-133,03**	1,04***	0,13***	2,89***		Investr	nent e	expen	altur	es	156	0,1		36223
2000	-157,02**	1,07***	-),22* **	2,25***	1			-			032	0		7824
2001	-68,23	1,14***		*]						249			9140
2002	-165,87	1,21***	-	*]	Positi	ve an	d signi	ficant	ŀ	265	0		0547
2003	-298,5**	1,29***	- ,31***	3,92***]			•			255	0,2		41645
2004	-585,57* *	1,38***	- ,28***	3,7***	Lona-	term m	ultiplie	er from	າ 1.05	5 to 1.5	276	0,2504	.19	42661
2005	-903,58* *	1,49***	- ,23***	2,98***							259	0,2622***	43151	43242
2006	-1144,21* *	1,51***	- ,13***	3,47***	8639,21***	5304,05***	-256,6***	63,33	-3,02***	-1308,96***	0,0244	0,2747***	43733	43832
2007	-1325,43* *	1,5***	-0,07	3,25***	8555,09***	8619,99***	-238,29	82,84	-2,9	-1376,52***	0,0247	0,309***	44124	44254
2008	-1483,12***	1,51***	0,01	2,6***	8312,11***	11504,2***	-184,41	160,07	-2,85	-1068,79***	0,0255	0,3714***	44254	44455
2009	-1677,41**	1,39***	0,13***	2,39***	7020,99***	16105,41***	-144,19	75,86	-1,95	-880,87	0,0263	0,4226***	44674	44943
2010	-2233,4***	1,33***	0,17***	2,83***	7789,6***	17642,97***	-101,69	82,13	-1,6	-1275,94***	0,034***	0,4122***	45360	45637
2011	-2830,56***	1,33***	0,17***	2,85***	8375,56***	22820,49***	-109,21	115,69	-2,42	-1559,55***	0,044***	0,4031***	46166	46434
2012	-3281,81***	1,4***	0,16***	2,57***	11601,46***	22453,45***	-175,7	172,68	-3,64	-2071,08***	0,047***	0,3613***	46957	47176
1 per capita	; 2 per produc	ti e age populat d	n; 3 dummy	variable										

Source: Own results, estimated in R with packages spdep (Bivand, 2014)



Table 1: Estimation of cumulative sinvataneous spatial SAC model

				1										
	(Intercept)	Investment	T	CIT	Employed2	Business	SEZ	SEZ	DIST	Regional	rho	lambda	AIC	AIC
	(intercept)	expenditures1	re enues2	revenues?	Employeuz	units2	active3	potential3	D131	core city3	1110	Iallibua	Spat.	Lm
1995	-42,15***	1,16***	102,47***	-1,04***	201,14***	-33,09	-5,68***	-6,05	0,06***	-4,15	0,0269	0,1918***	24695	24742
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1998	-157,54***	1,05***	-0,12***	2,54***	1257,32***	-349,63***	-98,36***	-76,4***	0,03	-262,93***	0,0186	0,124***	34577	34595
1999	-133,03***	1,04***	-0,13***	2,89***	1830,96***	263,82	-114.65***	-96.02***	-0.41	-373,87***	0.0156	0.1936***	36179	36223
2000	-157,02***	1,07***	-0,22***	2,25***	419,64***	249,7	DI	Tand	CIT	revenu		***	37770	27824
2001	-68,23	1,14***	-0,31***	2,74***	666,82***	-225,6	ГІ	i anu	GII	revenu	162	***	-	1
2002	-165,87	1,21***	-0,36***	3,24***	135 🗖 🛤	524 <mark>3</mark>						7		
2003	-298,5***	1,29***	-0,31***	3,92***	14	8							\sim	
2004	-585,57***	1,38***	-0,28***	3,7***	656,1	1476,	Positiv	e/neaa	ative	and sig	Inifica	ant 📉		
2005	-903,58***	1,49***	-0,23***	2,98***	334,69***	3429,81		-		-		PP-		
2006	-1144,21***	1,51***	-0,13***	3,47***	639,21***	5304,05	Comp	onent	s ot c	own rev	<i>'enue</i>	S 🚥	45	-032
2007	-1325,43***	1,5***	-0,07	3,25***	555,09***	8619,99	-230,27	02,04	-4,7	-1370,32	0,0247	0,307 **	44124	44254
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1 nor conita	2 nor product	ivo ago populati	on dummy	wariahla										

1 per capita; 2 per productive age population; 1 dummy variable

Source: Own results, estimated in R with packager spdep (Bivary, 2014)



Table 1: l	Estimation	of cumulativ	e simultar	ieous spat	ti <mark>z I SAC m</mark> od	del									
	(July and)	Investment	PIT	CIT	E	I	Business	SEZ	SEZ	DICT	Regional		lamb da	AIC	AIC
	(Intercept)	expenditures1	revenues2	revenues2	Employed2		units2	active3	potential3	DIST	core city3	rho	lambda	Spat.	Lm
1995	-42,15***	1,16***	102,47***	-1,04***	201,14***		-33,09	-5,68***	-6,05	0,06***	-4,15	0,0269	0,1918***	24695	24742
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2000	-157,02***	1,07***	-0,22***	2,25**	3419,64***		249,77	-154,52***		ριογε	ed per	capit	a 🛒		
2001	-68,23	1,14***	-0,31***	2,74**	4666,82***		225,64	-153,21***	1		rking a				
2002	-165,87	1,21***	-0,36***	3,24* *	6135,54***		524	*]			aye		\sim	
2003	-298,5***	1,29***	-0,31***	3,92* *	7141,31***		443,	*	1				*		
2004	-585,57***	1,38***	-0,28***	3,7**	8656,17***		1476,3	-212,2***	1				***		1
2005	-903,58***	1,49***	-0,23***	2,98*	9334,69***	3	29,81***	-210,56***	Posi	itive a	and sigi	nifica	nt 🔤	43151	43242
2006	-1144,21***	1,51***	-0,13***	3,47****	8639,21***	5	04,05***	-256,6***			5	-,	,/***	43733	43832
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1995	-42,15***	1,16***	102,47***	-1,04***	201,14***	-33,09	-5,68***	-6,05	Dua			1918***	24695	24742
1996	-57,07***	1,05***	0,07	0,3***	268,03***	226,5***	-9,3	-9,29	Bus	iness (units	1829***	28580	28634
1997	-130,83***	1,04***	0,02	0,69***	754,29***	-29,22	-43,55***	-43,88***				1071***	31905	31929
1998	-157,54***	1,05***	-0,12***	2,54***	1257,32***	-349,63***	-98,36***	-76,4***				,124***	34577	34595
1999	-133,03***	1,04***	-0,13***	2,89***	1830,96***	263,82	114,65***	-96,02***	Po	sitive a	and	1936***	36179	36223
2000	-157,02***	1,07***	-0,22***	2,25***	3419,64**	249,77	154.52***	-141,51**				1803***		37824
2001	-68,23	1,14***	-0,31***	2,74***	4666,82**	-225,64		125 52**	SI	gnifica	nt	2532*	ە906 د	140
2002	-165,87	1,21***	-0,36***	3,24***	6135,54**	524,33),82		-		2523	40469	547
2003	-298,5***	1,29***	-0,31***	3,92***	7141,31**	443,82	19.7***	-49,47	ar	ter 200)4,	2555***	4156	1645
2004	-585,57***	1,38***	-0,28***	3,7***	8656,17**	1476,3	212,2***	-29,1				2504***	47	42661
2005	-903,58***	1,49***	-0,23***	2,98***	9334,69**	3429,81***	210,56***	28,15				2622***	4 1	43242
2006	-1144,21***	1,51***	-0,13***	3,47***	8639,21**	5304,05***	256,6***	63,33		earlier	,	2747***	45733	43832
2007	-1325,43***	1,5***	-0,07	3,25***	8555,09**	8619,99***	-238,29	82,84				,309***	4	44254
2008	-1483,12***	1,51***	0,01	2,6***	8312,11***	11504,2***	-184,41	160,07	insi	gnifica	nt –	3714***	4	44455
2009	-1677,41***	1,39***	0,13***	2,39***	7020,99***	16105,41***	-144,19	75,86		-		4226***	44674	44943
2010	-2233,4***	1,33***	0,17***	2,83***	7789,6***	17642,97***	-101,69	82,13		why?		4122***	45360	45637
2011	-2830,56***	1,33***	0,17***	2,85***	8375,56***	22820,49***	-109,21	115,69	-2,12	-1007,00	0,011	4031***	46166	46434
2012	-3281,81***	1,4***	0,16***	2,57***	11601,46***	22453,45**	-175,7	172,68	-3,64	-2071,08***	0,047***	0,3613***	46957	47176
a 11			2.1	1.1.1			-	-			-	-	-	

1 *per capita*; 2 per productive age population; 3 dummy variable *Source:* Own results, estimated in R with packages spdep (Bivand, 2014)



Table 1: I	Esti	mation of cumulative	e simultan	eous spati	ial SAC mod	lel		\frown								
	ſ	Investment	PIT	CIT	Employed2	Business units2	7	SEZ active3		SEZ tential3	DIST	Regional core city3	rho	lambda	AIC Spat.	AIC Lm
1995	H	Active	e SEZ		201,14***	-33,09		-5,68***	-	-6,05	0,06***	-4,15	0,0269	0,1918***	24695	24742
1996					268,03***	226,5***		-9,3		9,29	0,1	-38,39	0,0361	0,1829***	28580	28634
1997	-				754,29***	-29,22	•	-43,55***	-4	,88***	0,1	-118,59***	0,042***	0,1071***	31905	31929
1998	-	Negative and	d sian	ificant	1257,32***	-349,63**		-98,36***	-1	6,4***	0,03	-262,93***	-186	0,124***	34577	34595
1999	-	U	•	mount	1830,96***	263,82	-	114,65***	-9	02***	-0,41	-373.8		0,1936***	36179	36223
2000		till 2	006		3419,64***	249,77		154,52***	-14	4 ,51***	-0,84***	-46	7	1803***	37778	37824
2001					£666,82***	-225,64	-	153,21***	-13	3 ,52***	-1,24***	-51	\mathbf{V}	532***	39061	39140
2002					5 1	4,33	-	186,49***	-	1 9,82	-1,89***	-8-		523***	40469	40547
2003		After 2006 n	ogativ	o and	71	.3,82		-198,7***	-	4 9,47	-1,83	-104		2555***	41564	41645
2004	-	AILEI 2000 II	eyaliv	e anu	3656,17***	1476,3		-212,2***		- 9,1	-2,69***	-1248,		0,2504***	42579	42661
2005	-	insignificant	(increa	ase in	9334,69***	3429,81* *	* -	210,56***		2 3,15	-3,19***	-1152,12	كالعر	0,2622***	43151	43242
2006	-1	—	•		3639,21***	5304,05* *	*	-256,6***		(3,33	-3,02***	-1308,96***	0,0244	0,2747***	43733	43832
2007	-1	variar	nce –		3555,09***	8619,99*	2	-238,29		2,84	-2,9	-1376,52***	0,0247	0,309***	44124	44254
2008	-1				3312,11***	11504,2**		-184,41	- 1	60,07	-2,85	-1068,79***	0,0255	0,3714***	44254	44455
2009	-1	differentiation	on bec	asue	7020,99***	16105,41*		-144,19		75,86	-1,95	-880,87	0,0263	0,4226***	44674	44943
2010	-	of EU I	funda)		7789,6***	17642,97**		-101,69		82,13	-1,6	-1275,94***	0,034***	0,4122***	45360	45637
2011	-2	of EU 1	iunus)		3375,56***	22820,49**	*	-109,21	1	115,69	-2,42	-1559,55***	0,044***	0,4031***	46166	46434
2012	-				1601,46***	22453,45**	*	-175,7	1	172,68	-3,64	-2071,08***	0,047***	0,3613***	46957	47176
1 per capita	; 2							7								
Source: Own	ros	ults estimated in R with na	chages suder	(Biyand 201	4)											

Source: Own results, estimated in R with packages spdep (Bivand, 2014)



Table 1: I	Esti	mation of cumulative simultaneous spatia	al SAC mod	lel										
	æ	Investment PIT CIT	Employed2	Business	SEZ		SEZ	Г	IST	Regional	rho	lambda	AIC	AIC
				units2	active		potential3			core city3	1110	lamoua	Spat.	Lm
1995		Potential SEZ	201,14***	-33,09	-5,68*		-6,05	0,0)6***	-4,15	0,0269	0,1918***	24695	24742
1996			268,03***	226,5***	-9,3		-9,29		0,1	-38,39	0,0361	0,1829***	28580	28634
1997	-		754,29***	-29,22	-43,55	**	-43,88***		0,1	-118,59***	0,042***	0,1071***	31905	31929
1998	-	Negative and significant	1257,32***	-349,63***	-98,36	:*:*:	-76,4***	0	,03	-262,93***	186	0,124***	34577	34595
1999	-	0	1830,96***	263,82	-114,6	***	-96,02***	(),41	-373		0,1936***	36179	36223
2000	-	till 2001	3419,64***	249,77	-154,52	***	-141,51***	-()	84***	-46	7	1803***	37778	37824
2001			1666,82***	225,64	-153,2 1	***	-135,52***	-	24***	-51		532***	39061	39140
2002			51	4,33	-186,49	***	-109,82	-1	89***	-8-		523***	40469	40547
2003		After 2005 pecitive and	71	3,82	-198, *	***	-49,47		1,83	-104		2555***	41564	41645
2004	-	After 2005 positive and	3656,17***	1476,3	-212, *	kakak	-29,1	-1	69***	-1248		0,2504***	42579	42661
2005	-	insignificant	9334,69***	3429,81***	-210,5 5	***	28,15	-	19***	-1152,12	كالمس	0,2622***	43151	43242
2006	-1	U	8639,21***	5304,05***	-256,	***	63,33	- ,	02***	-1308,96***	0,0244	0,2747***	43733	43832
2007	-1	(on average better	3555,09***	8619,99***	-238,	9	82,84	-	2,9	-1376,52***	0,0247	0,309***	44124	44254
2008	-1	, C	3312,11***	11504,2***	-184,	1	160,07	-1	2,85	-1068,79***	0,0255	0,3714***	44254	44455
2009	-1	municipalities then the	7020,99***	16105,41***	-144,1	9	75,86	-1	1,95	-880,87	0,0263	0,4226***	44674	44943
2010	-	•	7789,6***	17642,97***	-101,6		82,13	-	1,6	-1275,94***	0,034***	0,4122***	45360	45637
2011	-2	other)	3375,56***	22820,49***	-109,2	1	115,69	-1	2,42	-1559,55***	0,044***	0,4031***	46166	46434
2012	-3,	201,01 1,4 0,10 2,5/ 1	1601,46***	22453,45***	-175,2	7	172,68	-:	3,64	-2071,08***	0,047***	0,3613***	46957	47176
1 ner canita	2 n	er productive age population: 3 dummy variable		•										

1 per capita; 2 per productive age population; 3 dummy variable Source: Own results, estimated in R with packages spdep (Bivand, 2014)



Table 1: Estimation of cumulative simultaneous spatial SAC model

Distance

Negative



Significant till 2006 Insignificant after 2006

(increase in variance – differentiation becasue of EU funds)

Peripherial locatations are weaker!

pati	al SAC mod	lel									
	Employed2	Business units2	SEZ active3	SEZ potential3	DIST		Regional core city3	rho	lambda	AIC Spat.	AIC Lm
	201,14***	-33,09	-5,68***	-6,05	0,06***		-4,15	0,0269	0,1918***	24695	24742
	268,03***	226,5***	-9,3	-9,29	0,1		-38,39	0,0361	0,1829***	28580	28634
	754,29***	-29,22	-43,55***	-43,88***	0,1	-	18,59***	0,042***	0,1071***	31905	31929
	1257,32***	-349,63***	-98,36***	-76,4***	0,03	-	2 52,93***	0,0186	0,124***	34577	34595
	1830,96***	263,82	-114,65***	-96,02**	-0,41	-	3 3,87***	0,015		36179	36223
	3419,64***	249,77	-154,52***	-141,51* *	-0,84***	-	4 3,81***	8	**	37778	37824
	4666,82***	-225,64	-153,21***	-135,52* *	-1,24***	-	5 0,43***			39061	39140
•	61	24,33	-186,49***	-109,82	-1,89***	-	8 [,] 6,51***			40469	40547
)	71	,3,82	-198,7***	-49,47	-1,83	-1	10 +6,49***			41564	41645
	8656,17***	1476,3	-212,2***	-29,1	-2,69***	-1	12 18,58***	Ó,	*	42579	42661
	9334,69***	3429,81***	-210,56***	28,15	-3,19***	-1	11 52,12***	0,025	-42***	43151	43242
_	8639,21***	5304,05***	-256,6***	63,33	-3,02***	-1	13 08,96***	0,0244	0,2747***	43733	43832
	8555,09***	8619,99***	-238,29	82,84	-2,9	-1	1: 76,52***	0,0247	0,309***	44124	44254
,	8312,11***	11504,2***	-184,41	160,07	-2,85	-1	68,79***	0,0255	0,3714***	44254	44455
	7020,99***	16105,41***	-144,19	75,86	-1,95		880,87	0,0263	0,4226***	44674	44943
	7789,6***	17642,97***	-101,69	82,13	-1,6	-1	275,94***	0,034***	0,4122***	45360	45637
	8375,56***	22820,49***	-109,21	115,69	-2,42	7	559,55***	0,044***	0,4031***	46166	46434
	11601,46***	22453,45***	-175,7	172,68	-3,64	1	2071,08***	0,047***	0,3613***	46957	47176
5											



Estimation	of cumulativ	e simultar	ieous snat	ial SAC mod	el				\wedge				
(Intercept)	Investment expenditures1	PIT revenues2	CIT revenues2	Employed2	Business units2	SEZ active3	SEZ potential3	DIST	Regional core city3	rho	lambda	AIC Spat.	AIC Lm
-42,15***	1,16***	102,47***	-1,04***	201,14***	-33,09	-5,68***	-6,05	0,06***	-4,15	0,0269	0,1918***	24695	24742
-57,07***	1,05***	0,07	0,3***	268,03***	226,5***	-9,3	-9,29	0,1	-38,39	0,0361	0,1829***	28580	28634
-130,83***				0:4.	-29,22	-43,55***	-43,88***	0,1	-118,59***	.042***	0,1071***	31905	31929
-157,54***	Re	giona	I Core	Спту	-349,63***	-98,36***	-76,4***	0,03	-262,93***	,0186	0,124***	34577	34595
-133,03***					263,82	-114,65***	-96,02***	-0,41	-373,87***	.0156	0,1936*	179	36223
-157,02***					249,77	-154,52***	-141,51***	-0,84* **	-463,81***	,032	0,1	N	37824
-68,23	Nega	ative a	nd sia	nificant	-225,64	-153 21***	_135 2***	-1,24 **	-570,43***	0249	0,1 .***	39	39140
-165,87			na org	mount	524,33	-186		-1,89 **	-846,51***	0265	0,2523***	1 1	40547
-298,5***					443,82	-198,7***	-4 47	-1,8	-1046,49***	0255	0,2555***	564	41645
-585,57***					1476,3	-212,2***	-29,1	-2,69 **	-1248,58***	0276	0,2504*	42579	42661
-903,58***	🗌 Own	rever	nues ic	ower in	3429,81***	-210,56***	28,15	-3,19 **	-1152,12***	0259	0,2622*	43151	43242
-1144,21***	ooro	citics	than in	a othor	5304,05***	-256,6***	63,33	-3,02 **	-1308,96***	0244	0,2747**	43733	43832
-1325,43***		CILIES	lian n	lotter	8619,99***	-238,29	82,84	-2,9	-1376,52***	,0247	0,309**	44124	44254
-1483,12***	mur	hicipal	ities —	whv?	11504,2***	-184,41	160,07	-2,85	-1068,79***	,0255	0,3714***	44254	44455
-1677,41***		noipui	nico	wily.	6105,41***	-144,19	75,86	-1,95	-880,87	0,0263	0,4226***	44674	44943
-2233,4***	1,33***	0,17***	2,83***	7789,6***	17642,97***	-101,69	82,13	-1,6	-1275,94***),034***	0,4122***	45360	45637
-2830,56***	1,33***	0,17***	2,85***	8375,56***	22820,49***	-109,21	115,69	-2,42	-1559,55***	0,044***	0,4031***	46166	46434
-3281,81***	1,4***	0,16***	2,57***	11601,46***	22453,45***	-175,7	172,68	-3,64	-2071,08***	0,047***	0,3613***	46957	47176
	(Intercept) -42,15*** -57,07*** -130,83*** -157,54*** -133,03*** -157,02*** -68,23 -165,87 -298,5*** -585,57*** -903,58*** -1144,21*** -1325,43*** -1483,12*** -1677,41*** -2233,4*** -2830,56***	Investment (Intercept) Investment -42,15*** 1,16*** -57,07*** 1,05*** -130,83*** 1,05*** -157,54*** Re -157,02*** Nega -68,23 Nega -165,87 -298,5*** -585,57*** Own -1144,21*** Core -1483,12*** Mult -1677,41*** 1,33*** -2830,56*** 1,33***	Investment expenditures1 PIT revenues2 -42,15*** 1,16*** 102,47*** -57,07*** 1,05*** 0,07 -130,83*** - 0,07 -133,03*** - - -157,54*** - - -157,02*** - - -68,23 - - -165,87 - - -903,58*** - - -1325,43*** - Own rever -1483,12*** - - -1483,12*** 1,33*** 0,17*** -2233,4*** 1,33*** 0,17***	Investment expenditures1 PIT revenues2 CIT revenues2 -42,15*** 1,16*** 102,47*** -1,04*** -57,07*** 1,05*** 0,07 0,3*** -130,83*** - 0,07 0,3*** -157,54*** - 0,07 0,3*** -157,02*** - - - - -68,23 - - Negative and sign -165,87 - - - - -903,58*** - - Setting - -1144,21*** - - Own revenues log - -1483,12*** - - - - - -2233,4*** 1,33*** 0,17*** 2,83*** -	Investment expenditures1 PIT revenues2 CIT revenues2 Employed2 -42,15*** 1,16*** 102,47*** -1,04*** 201,14*** -57,07*** 1,05*** 0,07 0,3*** 268,03*** -130,83*** -157,54*** -1,04*** 268,03*** -157,54*** -1,05*** 0,07 0,3*** 268,03*** -157,54*** -157,54*** -157,54*** -157,02*** -68,23 -165,87 -298,5*** -585,57*** -903,58*** -903,58*** -00Wn revenues lower in core cities than in other -1144,21*** -1325,43*** -0,17*** 2,83*** 7789,6*** -2233,4*** 1,33*** 0,17*** 2,85*** 8375,56***	(Intercept) expenditures1 revenues2 revenues2 Employed2 units2 -42,15*** 1,16*** 102,47*** -1,04*** 201,14*** -33,09 -57,07*** 1,05*** 0,07 0,3*** 268,03*** 226,5*** -130,83*** .105*** 0,07 0,3*** 268,03*** 226,5*** -130,83*** .105*** 0,07 0,3*** 268,03*** 226,5*** -130,83*** .133,03*** .29,22 349,63*** 263,82 249,77 -68,23 .165,87 .298,5*** .298,5*** .225,64 524,33 249,77 -298,5*** .298,5*** .443,82 1476,3 3429,81*** -903,58*** .00wn revenues lower in core cities than in other municipalities — why? 1504,2*** 504,05*** -1483,12*** 1,33*** 0,17*** 2,83*** 7789,6*** 17642,97*** -2830,56*** 1,33*** 0,17*** 2,85*** 8375,56*** 22820,49***	Investment expenditures1 PIT revenues2 CIT revenues2 Employed2 Business units2 SEZ active3 -42,15*** 1,16*** 102,47*** -1,04*** 201,14*** -33,09 -5,68*** -57,07*** 1,05*** 0,07 0,3*** 268,03*** 226,5*** -9,3 -130,83*** 1,05*** 0,07 0,3*** 268,03*** 226,5*** -9,3 -130,83*** 1,30,03*** - -9,3 -29,22 -43,55*** -165,87 - - -98,36*** -98,36*** -98,36*** -298,5*** - - -144,65*** -98,36*** -249,63*** -98,36*** -298,5*** - - - -144,65*** -144,65*** -249,63*** -249,63*** -249,63*** -249,63*** -249,63*** -249,63*** -249,63*** -249,63*** -249,63*** -249,77 -154,52**** -145,87 - - - - -249,77 -154,52**** -249,77 -154,52**** -249,77 -1	Investment expenditures1 PIT revenues2 CIT revenues2 Employed2 Business units2 SEZ active3 SEZ potential3 -42,15*** 1,16*** 102,47*** -1,04*** 201,14*** -33,09 -5,68*** -6,05 -57,07*** 1,05*** 0,07 0,3*** 266,03*** 226,5*** -9,3 -9,29 -130,83*** - .0,07 0,3*** 268,03*** 226,5*** -9,3 -9,29 -133,03*** - .57,07*** -9,3 -9,29 -9,29 -29,22 -43,55*** -43,88*** -157,02*** - .68,23 -114,65** -96,02*** -76,4*** -68,23 - Negative and significant -225,64 -153,21*** -141,51*** -68,23 - Own revenues lower in core cities than in other municipalities – why? -41,71 -44,71 -144,21*** - -210,56*** 28,15 -304,05*** -256,6*** 63,33 -1483,12*** - - - 249,77 -184,41 160,07 </td <td>Investment expenditures1 PIT revenues2 CIT revenues2 Employed2 Business units2 SEZ active3 SEZ potential3 DIST -42,15*** 1,16*** 102,47*** -1,04*** 201,14*** -33,09 -5,68*** -6,05 0,06*** -57,07*** 1,05*** 0,07 0,3*** 268,03*** 226,5*** -9,3 -9,29 0,1 -130,83*** -1057,54*** -29,22 -43,55*** -43,88*** 0,1 -157,54*** -68,23 -144,65*** -96,02*** -0,41 -157,02*** -68,23 -144,51*** -0,84 * -68,23 -165,87 -298,5*** -141,51*** -0,84 * -298,5*** -903,58*** -76,4*** 0,03 -12,4** -18,9 * -903,58*** -0wn revenues lower in core cities than in other municipalities – why? -44,47 -1,8 -1,89 * -1443,12*** -1,33*** 0,17*** 2,83*** 7789,6*** 17642,97*** -144,47 -1,8 -22</td> <td>Investment expenditures1 PIT revenues2 CIT revenues2 Employed2 Business units2 SEZ active3 SEZ potential3 DIST DIST Regional core city3 -42,15*** 1,16*** 102,47*** -1,04*** 201,14*** -33,09 -5,68*** -6,05 0,06*** -4,15 -57,07*** 1,05*** 0,07 0,3*** 268,03*** 226,5*** -9,3 -9,29 0,1 -38,39 -130,83*** 1,05*** 0,07 0,3*** 268,03*** 226,5*** -9,3 -9,29 0,1 -38,39 -130,83*** -157,54*** -43,55*** -43,55*** -43,88*** 0,1 -118,59*** -157,02*** -68,23 -668,23 -0,4 -373,87*** -225,64 -153,21*** -144,51*** -0,44 -373,87*** -165,87 -585,57*** -903,58*** -144,63*** -96,02*** -1,48 * 466,31*** -903,58*** -00wn revenues lower in core cities than in other municipalities – why? -1476,3 -212,2*** -29,1 -26,69 ** -1148,58***<!--</td--><td>Investment expenditures1 PIT revenues2 CIT revenues2 Employed2 Business units2 SEZ active3 SEZ potential3 DIST Regional core city3 rho -42.15*** 1.16*** 102.47*** -1.04*** 201.14*** 33.09 -5.68*** -6.05 0.06*** -4.15 0.0269 -57.07*** 1.05*** 0.07 0.3*** 268.03*** 226.5*** -9.3 -9.29 0.1 -38.39 0.0361 -130.83*** - - - -9.3 -9.29 0.1 -38.39 0.0361 -137.02*** - - - -9.3 -9.29 0.1 -38.39 0.0361 -157.02*** -</td><td>Investment expenditures1 PIT revenues2 CIT revenues2 Employed2 Business units2 SEZ active3 SEZ potential3 DIST Regional core city3 rho lambda -42,15*** 1,16*** 102,47*** -1,04*** 201,14*** -33,09 -5,68*** -6,05 0,06*** -4,15 0,0269 0,1918*** -57,07*** 1,05*** 0.07 0,3*** 266,03*** 226,5*** -9,3 -9,29 0,1 -38,39 0,0361 0,1829*** -130,83*** 0.07 0,3*** 266,03*** 226,5*** -9,3 -9,29 0,1 -38,39 0,0361 0,1829*** -157,02*** -157,02*** -43,85*** 0,1 -118,59*** 0,42*** 0,1071*** -68,23 - Negative and significant -225,64 -153,21*** -0,84* -463,81*** 0,026 0,225 0,225 -585,57*** - - -1,89** -846,51*** 0,026 0,225 0,225*** -1442,21**** - -1,248,58***<!--</td--><td>Investment expenditures1 PIT revenues2 CIT revenues2 Employed2 Business units2 SEZ active3 SEZ potential3 DIST Regional core city3 rho lambda AIC Spat. -42.15*** 1.16*** 102.47*** -1.04*** 201.14*** -33.09 -5.68*** -6.05 0.06*** -4.15 0.0269 0.1918*** 24695 -57.07*** 1.05*** 0.07 0.3*** 268.03*** 268.03*** -9.3 -9.29 0.1 -38.39 0.0361 0.1829*** 28580 -130.83*** 0.07 0.3*** 268.03*** -98.36*** -41.85 0.03 0.262.93*** 0.018*** 0.031 0.124*** 31005 -157.54*** -157.54*** -98.36*** -76.4*** 0.03 -262.93*** 0.156 0.124*** 349.53*** -76.4*** 0.03 -262.93*** 0.156 0.193.6*** -41.79 -157.54*** -68.23 Negative and significant -225.64 -153.21*** 130 0*** -1.24 ** -570.43*** 0.0250</td></td></td>	Investment expenditures1 PIT revenues2 CIT revenues2 Employed2 Business units2 SEZ active3 SEZ potential3 DIST -42,15*** 1,16*** 102,47*** -1,04*** 201,14*** -33,09 -5,68*** -6,05 0,06*** -57,07*** 1,05*** 0,07 0,3*** 268,03*** 226,5*** -9,3 -9,29 0,1 -130,83*** -1057,54*** -29,22 -43,55*** -43,88*** 0,1 -157,54*** -68,23 -144,65*** -96,02*** -0,41 -157,02*** -68,23 -144,51*** -0,84 * -68,23 -165,87 -298,5*** -141,51*** -0,84 * -298,5*** -903,58*** -76,4*** 0,03 -12,4** -18,9 * -903,58*** -0wn revenues lower in core cities than in other municipalities – why? -44,47 -1,8 -1,89 * -1443,12*** -1,33*** 0,17*** 2,83*** 7789,6*** 17642,97*** -144,47 -1,8 -22	Investment expenditures1 PIT revenues2 CIT revenues2 Employed2 Business units2 SEZ active3 SEZ potential3 DIST DIST Regional core city3 -42,15*** 1,16*** 102,47*** -1,04*** 201,14*** -33,09 -5,68*** -6,05 0,06*** -4,15 -57,07*** 1,05*** 0,07 0,3*** 268,03*** 226,5*** -9,3 -9,29 0,1 -38,39 -130,83*** 1,05*** 0,07 0,3*** 268,03*** 226,5*** -9,3 -9,29 0,1 -38,39 -130,83*** -157,54*** -43,55*** -43,55*** -43,88*** 0,1 -118,59*** -157,02*** -68,23 -668,23 -0,4 -373,87*** -225,64 -153,21*** -144,51*** -0,44 -373,87*** -165,87 -585,57*** -903,58*** -144,63*** -96,02*** -1,48 * 466,31*** -903,58*** -00wn revenues lower in core cities than in other municipalities – why? -1476,3 -212,2*** -29,1 -26,69 ** -1148,58*** </td <td>Investment expenditures1 PIT revenues2 CIT revenues2 Employed2 Business units2 SEZ active3 SEZ potential3 DIST Regional core city3 rho -42.15*** 1.16*** 102.47*** -1.04*** 201.14*** 33.09 -5.68*** -6.05 0.06*** -4.15 0.0269 -57.07*** 1.05*** 0.07 0.3*** 268.03*** 226.5*** -9.3 -9.29 0.1 -38.39 0.0361 -130.83*** - - - -9.3 -9.29 0.1 -38.39 0.0361 -137.02*** - - - -9.3 -9.29 0.1 -38.39 0.0361 -157.02*** -</td> <td>Investment expenditures1 PIT revenues2 CIT revenues2 Employed2 Business units2 SEZ active3 SEZ potential3 DIST Regional core city3 rho lambda -42,15*** 1,16*** 102,47*** -1,04*** 201,14*** -33,09 -5,68*** -6,05 0,06*** -4,15 0,0269 0,1918*** -57,07*** 1,05*** 0.07 0,3*** 266,03*** 226,5*** -9,3 -9,29 0,1 -38,39 0,0361 0,1829*** -130,83*** 0.07 0,3*** 266,03*** 226,5*** -9,3 -9,29 0,1 -38,39 0,0361 0,1829*** -157,02*** -157,02*** -43,85*** 0,1 -118,59*** 0,42*** 0,1071*** -68,23 - Negative and significant -225,64 -153,21*** -0,84* -463,81*** 0,026 0,225 0,225 -585,57*** - - -1,89** -846,51*** 0,026 0,225 0,225*** -1442,21**** - -1,248,58***<!--</td--><td>Investment expenditures1 PIT revenues2 CIT revenues2 Employed2 Business units2 SEZ active3 SEZ potential3 DIST Regional core city3 rho lambda AIC Spat. -42.15*** 1.16*** 102.47*** -1.04*** 201.14*** -33.09 -5.68*** -6.05 0.06*** -4.15 0.0269 0.1918*** 24695 -57.07*** 1.05*** 0.07 0.3*** 268.03*** 268.03*** -9.3 -9.29 0.1 -38.39 0.0361 0.1829*** 28580 -130.83*** 0.07 0.3*** 268.03*** -98.36*** -41.85 0.03 0.262.93*** 0.018*** 0.031 0.124*** 31005 -157.54*** -157.54*** -98.36*** -76.4*** 0.03 -262.93*** 0.156 0.124*** 349.53*** -76.4*** 0.03 -262.93*** 0.156 0.193.6*** -41.79 -157.54*** -68.23 Negative and significant -225.64 -153.21*** 130 0*** -1.24 ** -570.43*** 0.0250</td></td>	Investment expenditures1 PIT revenues2 CIT revenues2 Employed2 Business units2 SEZ active3 SEZ potential3 DIST Regional core city3 rho -42.15*** 1.16*** 102.47*** -1.04*** 201.14*** 33.09 -5.68*** -6.05 0.06*** -4.15 0.0269 -57.07*** 1.05*** 0.07 0.3*** 268.03*** 226.5*** -9.3 -9.29 0.1 -38.39 0.0361 -130.83*** - - - -9.3 -9.29 0.1 -38.39 0.0361 -137.02*** - - - -9.3 -9.29 0.1 -38.39 0.0361 -157.02*** -	Investment expenditures1 PIT revenues2 CIT revenues2 Employed2 Business units2 SEZ active3 SEZ potential3 DIST Regional core city3 rho lambda -42,15*** 1,16*** 102,47*** -1,04*** 201,14*** -33,09 -5,68*** -6,05 0,06*** -4,15 0,0269 0,1918*** -57,07*** 1,05*** 0.07 0,3*** 266,03*** 226,5*** -9,3 -9,29 0,1 -38,39 0,0361 0,1829*** -130,83*** 0.07 0,3*** 266,03*** 226,5*** -9,3 -9,29 0,1 -38,39 0,0361 0,1829*** -157,02*** -157,02*** -43,85*** 0,1 -118,59*** 0,42*** 0,1071*** -68,23 - Negative and significant -225,64 -153,21*** -0,84* -463,81*** 0,026 0,225 0,225 -585,57*** - - -1,89** -846,51*** 0,026 0,225 0,225*** -1442,21**** - -1,248,58*** </td <td>Investment expenditures1 PIT revenues2 CIT revenues2 Employed2 Business units2 SEZ active3 SEZ potential3 DIST Regional core city3 rho lambda AIC Spat. -42.15*** 1.16*** 102.47*** -1.04*** 201.14*** -33.09 -5.68*** -6.05 0.06*** -4.15 0.0269 0.1918*** 24695 -57.07*** 1.05*** 0.07 0.3*** 268.03*** 268.03*** -9.3 -9.29 0.1 -38.39 0.0361 0.1829*** 28580 -130.83*** 0.07 0.3*** 268.03*** -98.36*** -41.85 0.03 0.262.93*** 0.018*** 0.031 0.124*** 31005 -157.54*** -157.54*** -98.36*** -76.4*** 0.03 -262.93*** 0.156 0.124*** 349.53*** -76.4*** 0.03 -262.93*** 0.156 0.193.6*** -41.79 -157.54*** -68.23 Negative and significant -225.64 -153.21*** 130 0*** -1.24 ** -570.43*** 0.0250</td>	Investment expenditures1 PIT revenues2 CIT revenues2 Employed2 Business units2 SEZ active3 SEZ potential3 DIST Regional core city3 rho lambda AIC Spat. -42.15*** 1.16*** 102.47*** -1.04*** 201.14*** -33.09 -5.68*** -6.05 0.06*** -4.15 0.0269 0.1918*** 24695 -57.07*** 1.05*** 0.07 0.3*** 268.03*** 268.03*** -9.3 -9.29 0.1 -38.39 0.0361 0.1829*** 28580 -130.83*** 0.07 0.3*** 268.03*** -98.36*** -41.85 0.03 0.262.93*** 0.018*** 0.031 0.124*** 31005 -157.54*** -157.54*** -98.36*** -76.4*** 0.03 -262.93*** 0.156 0.124*** 349.53*** -76.4*** 0.03 -262.93*** 0.156 0.193.6*** -41.79 -157.54*** -68.23 Negative and significant -225.64 -153.21*** 130 0*** -1.24 ** -570.43*** 0.0250

1 per capita; 2 per productive age population; 3 dummy variable

Source: Own results, estimated in R with packages spdep (Bivand, 2014)



Table 1: Estimation of cumulative simultaneous spatial SAC model

Invoctmont	e	(Intercept)	
		-42,15***	1995
		-57,07***	1996
		-130,83***	1997
Rho		-157,54***	1998
انصنه		+23,03***	1999
simil		2***	2
		*	

L			2005
		-1144,21***	2006
uno		-1325,43***	2007
in e		-1483,12***	2008
		-1677,41***	2009
p		-2233,4***	2010
۲		-2830,56***	2011
		-3281,81***	2012
	iv	2 per product	1 ner canita

Spatial coefficients

Rusiness

Rho – rhoWy – own revenues similar in neighbourhood after 2009

Lambda – lambdaWu – unobservable spatial effects in error term (or ommitted) positive and significant (always)

SEZ SEZ Regional AIC AIC DIST lambda rho active3 potential3 core city3 Spat. Lm -5.68*** -6.05 0.06*** -4.150.0269 0.1918*** 24695 24742 8580 -9.3 -9.29 0.1 -38.39 0.0361 0.1829*** 28634 -43,55*** -43.88*** 0.1 -118.59** 0.042*** 0.1071*** 905 31929 -98.36*** -76.4*** 0.03 -262.93* 0,0186 0.124*** 577 34595 3 0.1936*** -114.65*** -96.02*** -373.87* 3(179 36223 -0.410.0156 -0,84*** -154.52*** -141.51*** -463,81* 0,1803*** 778 0,032 37 37824 -153 21*** -1 39 52*** -1.24*** -570.43* 0.0249 0.2532*** 61 39140 -1.89*** -846.51³ 0.0265 0,2523*** 40 69 40547 41 -1046.490.0255 0.2555*** 64 41645 5,47 -1.83 -198.7* -212,2*** -2.69*** 42 579 42661 -29,1 -1248,58 0,0276 0,2504*** 43 210.56*** 28.15 -3.19*** -1152.120.0259 0.2622*** 151 43242 -256.6*** -3.02*** -1308,96³ 0.2747*** 43 733 63,33 0,0244 43832 -1376,52* -238.29 82.84 0.0247 0.309*** 4 124 44254 -2.9 0,3714*** 254 -184,41 160.07 -2.85 -1068,79* 0.0255 44455 4674 -144,19 75.86 -1.95 -880,87 0,0263 0,4226*** 44943 -101,69 82.13 -1.6 -1275,94** 0.034*** 0.4122*** 5360 45637 -109,21 115.69 -2.42 -1559.55*** 0.044*** 0,4031*** 46166 46434 .047*** -175,7 172.68 -3.64-2071.08*** 0.3613** 46957 47176

1 per capita; 2 per productive Source: Own results, estimate



Table 1: Estimation of cumulative simultaneous spatial SAC model

				1										
	(Intercept)	Investment	PIT	CIT	Employed2	Business	SEZ	SEZ	DIST	Regional	rho	lambda	AIC	AIC
	(intercept)	expenditures1	revenues2	revenues2	Linployeuz	units2	active3	potential3	DIST	core city3	1110	lambua	Spat.	Lm
1995	-42,15***	1,16***	102,47***	-1,04***	201,14***	-33,09	-5,68***	-6,05	0,06***	-4,15	0,0269	0,1918***	24695	24742
199 199 199 199		_				Res						_	_	
200 -	SEZ	does no	ot caus	e a si	gnificar	nt impro	veme	nt in th	ne eco	onomic	situa	ation c	of	H
200	muni	cipalities	s in the	a long	run	•								H
200	mum	cipanties	5 111 111	e iong	Turi									1
200														[
200	Doto	ntial mu	nicinal	ition fo		norforn	n hotta	or thon	otho	rc				L L
200 -	Folei	illai mu	nicipai	mes n		penom	Delle	er men		15				L L
200														H
200														H
200														H
201	0000 5 0000	4.00444	0.15440	0.05445	0005554000		100.01		0.40		0.04465	0.4004455		14101
2011	-2830,56***	1,33***	0,17***	2,85***	8375,56***	22820,49***	-109,21	115,69	-2,42	-1559,55***	0,044***	0,4031***	46166	46434
2012	-3281,81***	1,4***	0,16***	2,57***	11601,46***	22453,45***	-175,7	172,68	-3,64	-2071,08***	0,047***	0,3613***	46957	47176

1 per capita; 2 per productive age population; 3 dummy variable

Source: Own results, estimated in R with packages spdep (Bivand, 2014)



Impacts in spatial model

Spatial lag models allow for estimation of spillover effects

- → Spillover: Impact of given variable x in analyzed region on studied phenomena in neighbourhood
 - \rightarrow Direct impact : impact of x in i on y in i
 - → *Indirect impact:* impact of x in i on y in j
 - → Total impact : sum of both effects



Impacts in spatial lag model: spillover effects

Investment Regional core PIT revenues² CIT revenues² Employed² Business units² SEZ active³ SEZ potential³ DISTANCE expenditures1 city³ direct direct indirect indirect 1995 1.15 0.03 102.48 2,81 -1,04 -0,02 201,17 5.53 -33.09 -0.91 -5.67 -0.16-6,04 -0,16 0.06 0.001 -4.15-0.11 1996 1.05 0.04 0.002 0.30 268.09 9,97 226.55 8.43 -9,30 -0,34 -9,29 -0.34 0.097 0.003 -38,40 0.06 0.01 -1.43 -43.56 -5.12 754,52 32,57 -1.26 -1.88 -43.89 -1.89 0.09 -118.62 1997 1.04 0.04 0.02 0.001 0.69 0.03 -29.22 0.004 1998 -262.94 1.05 0.02 -0.12 -0.002 2.53 0.04 1257.4 23.78 -349.64 -6.61 -98,37 -1.86 -76.40 -1.44 0.0004 -4.97 0.026 1999 1.04 0.02 -0.13 -0.002 2.88 0.04 1831,0 28.86 263.83 4.16 -114,65 -1.81 -96.02 -1.51 -0.41 -0.006 -373.88 -5.89 -0,22 2.25 8,20 -154,54 -5,07 -0.84 -15,23 1.07 0.03 0.07 3420.2 112,30 249.82 -141,53 -4.64 -0.02 -463,89 2000 -0,007 -14.52 2001 1.13 0.03 -0.31 -0.008 2.74 0.07 4667.3 118.83 -225.67 -5.74 -153.22-3.90 -135.53 -3.45 -1.24 -0.03 -570.49 524,39 1,21 0,03 14,23 -186,51 -5,06 -109,83 -2,98 -1,887 -22,98 2002 -0,36 -0,009 3,24 0,08 6136,3 166,58 -0,05 -846,61 1,28 186,21 11,54 -5,18 -49,47 -1,29 -1,83 -0,04 -27,27 2003 0.03 -0.30 -0.008 3.91 0.10 7142,1 443.87 -198,72-1046,6 1.37 8657,3 41.75 -212.23 -6.00 -29,10 -2.69 -35.31 2004 0.04 -0.27 -0.008 3.70 0.10 244.82 1476.5 -0.82 -0.07 -1248.72005 247,35 -3,18 2.98 9335.7 3430.2 90.88 -5.58 28.15 0.74 -1152.2 -30.53 1.49 0.04 -0.23-0.006 0.08 -210.58-0.08 132,14 -6.39 1.51 0.04 -0.003 215,24 -256.62 63.33 1.57 -3.02 -0.07 -1309.1-32.61 2006 -0.123.47 0.08 8640,1 5304,6 1.50 0.04 -0.002 3.25 8555.9 215.95 8620.9 217.59 -238.31 -6.01 82.84 2.09 -2.89 -1376.6 -34.74 2007 -0.070.08 -0.07 2,59 4,17 -2,85 -27,84 2008 1.51 0.04 0.006 0,0001 0,07 8313,2 216,56 11505 299,72 -188,44-4,80 160,00 -0,07 -1068,9 1.39 0.04 0.13 2.38 7021,8 189,05 16107 433.66 -144,21 -3.88 75,86 2.04 -1.94 -0.05 -880.97 -23.71 2009 0.003 0.06 1,33 0,05 7791,7 82,15 3,38 -1,56 -52,48 2010 0.17 0,007 2,83 0,11 320,43 17647 725,75 -101,73-4,18 -0.06 -1276,3 2011 1.33 0.06 0.17 0.008 2.85 0.13 8378.3 382.12 22828 1041.1 -109.24 -4.98 115,73 5.27 -2.42-0.11 -1560.1 -71.15 2012 1,41 0.07 0.16 0.007 2.57 0.12 11605 566,2 22462 1095,7 -175,76 -8.57 172,75 8.42 -3.64 -0,17 -2071,9 -101,1

Table 2: Impacts in cumulative simultaneous spatial SAC model

1 per capita; 2 per productive age population; 3 dummy variable

Source: Own results, estimated in R with packages spdep (Bivand, 2014)



Impacts in spatial lag model: spillover effects

Table 2: Impacts in cumulative simultaneous spatial SAC model

	Investment expenditures ¹		PIT revenues ²		CIT rev	venues ²	Sn			illover		re ³	SEZ potential ³		DISTANCE		Regional core city ³	
	direct	indirect	direct	indirect	direct	indire		Sh	лноч	EI		direct	direct	indirect	direct	indirect	direct	indirect
1995	1,15	0,03	102,48	2,81	-1,04	-0,0:						0,16	-6,04	-0,16	0,06	0,001	-4,15	-0,11
1996	1,05	0,04	0,06	0,002	0,30	0,01	2%-4%				0,34	-9,29	-0,34	0,097	0,003	-38,40	-1,43	
1997	1,04	0,04	0,02	0,001	0,69	0,03					1,88	-43,89	-1,89	0,09	0,004	-118,62	-5,12	
1998	1,05	0,02	-0,12	-0,002	2,53	0,04					1,86	-76,40	-1,44	0,026	0,0004	-262,94	-4,97	
1999	1,04	0,02	-0,13	-0,002	2,88	0,04					1,81	-96,02	-1,51	-0,41	-0,006	-373,88	-5,89	
2000	1,07	0,03	-0,22	-0,007	2,25	0,07						5,07	-141,53	-4,64	-0,84	-0,02	-463,89	-15,23
2001	1,13	0,03	-0,31	-0,008	2,74	0,07	Increasing over time –				3,90	-135,53	-3,45	-1,24	-0,03	-570,49	-14,52	
2002	1,21	0,03	-0,36	-0,009	3,24	0,08	etr	onac	r im	nact	on	5,06	-109,83	-2,98	-1,887	-0,05	-846,61	-22,98
2003	1,28	0,03	-0,30	-0,008	3,91	0,10	stronger impact on					5,18	-49,47	-1,29	-1,83	-0,04	-1046,6	-27,27
2004	1,37	0,04	-0,27	-0,008	3,70	0,10	neighbourhood, more connected local				6,00	-29,10	-0,82	-2,69	-0,07	-1248,7	-35,31	
2005	1,49	0,04	-0,23	-0,006	2,98	0,08					5,58	28,15	0,74	-3,18	-0,08	-1152,2	-30,53	
2006	1,51	0,04	-0,12	-0,003	3,47	0,08					6,39	63,33	1,57	-3,02	-0,07	-1309,1	-32,61	
2007	1,50	0,04	-0,07	-0,002	3,25	0,08						6,01	82,84	2,09	-2,89	-0,07	-1376,6	-34,74
2008	1,51	0,04	0,006	0,0001	2,59	0,07	economies					4,80	160,00	4,17	-2,85	-0,07	-1068,9	-27,84
2009	1,39	0,04	0,13	0,003	2,38	0,06	/021,0	107,03	10107	100,00	-177,61	3,88	75,86	2,04	-1,94	-0,05	-880,97	-23,71
2010	1,33	0,05	0,17	0,007	2,83	0,11	7791,7	320,43	17647	725,75	-101,73	-4,18	82,15	3,38	-1,56	-0,06	-1276,3	-52,48
2011	1,33	0,06	0,17	0,008	2,85	0,13	8378,3	382,12	22828	1041,1	-109,24	-4,98	115,73	5,27	-2,42	-0,11	-1560,1	-71,15
2012	1,41	0,07	0,16	0,007	2,57	0,12	11605	566,2	22462	1095,7	-175,76	-8,57	172,75	8,42	-3,64	-0,17	-2071,9	-101,1

1 per capita; 2 per productive age population; 3 dummy variable

Source: Own results, estimated in R with packages spdep (Bivand, 2014)



Conclusions

- SSE did not become a clear exogenous factor in development of municipalities. There is no global shift process due to the existence of the SEZ in the municipalities. Data prove rather structural stability of the economic situation in the municipalities with SEZ and without SEZ.

- It cannot be confirmed that there is a clear impact of SEZ on economic environment. It failed to confirm the significant positive spillover effects resulting from the SEZ.

- It should be noted that the impact of the SEZ is limited to a group of employees and their business performance. One should assume that the SEZ internalize the benefits, as well as they externalise costs.

- Municipalities with SEZ failed to significantly increase their own revenues due to activity of SEZ. Hypothesis of quasi "gift exchange" that they attract local investors to invest and hope to increase their own revenue in the future cannot be confirmed.

- The results indicate that municipalities profit more when investing in infrastructure that attracts investors than to deprive the own revenues as tax exemptions for SEZ.



Thank You!

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