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Urban sprawl and regional growth: empirical evidence from Italian Regions

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Abstract

Urban sprawl may affect economic growth through its negative effects on a number of relevant aspects of the economic activity. We test the negative impact of urban sprawl on regional economic growth using Italian data. Our results confirm such negative impact and suggest policies aimed to incentivate urban development in the main cities instead of the provincial territory.

1. Introduction

Urban sprawl is mainly a US phenomenon associated with the rapid low-density outward expansion of US cities, dating back to the early part of the 20th century. It was fuelled by the rapid growth of private car ownership and the preference for detached houses with gardens. In Europe, cities have traditionally been much more compact, developing a dense historical core shaped before the emergence of modern transport systems. Compared to most American cities, their European counterparts remain in many cases compact. However, European cities were more compact and less sprawled in the mid-1950s than they are today, and urban sprawl is now a common phenomenon throughout Europe. The new sprawling nature of Europe's cities is critically important because of the major impacts that are evident in increased energy, land and soil consumption.

Although there is considerable evidence that urban sprawl has adverse effects on public health, the environment and infrastructure and transport costs, there is a lack of research on the overall impact of the urban sprawl on economic growth.

This paper aims to test the possible negative relationship between urban sprawl and economic growth in Italy, one of the "most sprawling" country in Europe.

We use a dataset on 15 ordinary status regions over the period 1996-2009 in order to test the impact of the urban sprawl, here the share of population not living in the main provincial cities, on the regional GDP growth rate.

Our results provide empirical evidence on the existence of a negative relationship between urban sprawl and economic growth in the Italian context. The main policy implication is that there is the need of more incisive policies of sprawl containment by the Italian political authorities.

Besides this introduction, the rest of the paper is organized as follows: section 2 provides a detailed literature review on the possible links between urban sprawl and economic growth; section 3 introduces the urban sprawl in the Italian framework; section 3 shows the econometric strategy and the data; section 4 shows the results of the empirical analysis. Finally, section 5 concludes. Appendix A briefly focuses on the Italian subnational institutions, while tables and figures are placed in Appendix B.

2. Urban sprawl and economic activity

Urban sprawl is characterized by compact growth around a number of smaller centres located at a distance from the main urban core (Clawson 1973) and it causes low-density development, large outward expansions, and leapfrog growth patterns that are likely to produce a number of negative effect on the economic activity.

Many studies focus on the negative impact of urban sprawl on the infrastructure cost of provision within the national area.[1] In fact, transport savings due to high urban density are a central topic in the new economic geography literature (Fujita, Krugman, and Venables 1999).

The existing literature shows that, at the local level, the higher the urban density, the lower the per-capita length of collector roads, water distribution lines, or sewer collection lines and, consequently, the lower the per capita public expenditure in infrastructures (Carruthers and Ulfarsson 2003). At the regional or state level, the spatial pattern of urbanised areas is particularly important. In compact, contiguous patterns, infrastructure costs are significantly lower than in spread-out patterns (Speir and Stephenson 2002),

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[1] See Burchell et al. (2005) for an exhaustive literature review on urban sprawl and infrastructures' cost.

while, in highly dispersed service areas, the length of inter-neighbourhood service networks is higher than average (Burchell et al. 1998). Furthermore, urban systems characterized by high density in central cities may benefit from scale economies. In fact, a greater number of people in larger cities pay fixed costs, so that the per capita costs are lower than in small towns or spread-out subdivisions (Carruthers and Ulfarsson 2003).

Consequently, sometimes national governments do not invest sufficiently in internal transport and telecommunications, especially in less populated regions (Henderson and Kuncoro 1996). It follows that the negative impact of the urban sprawl on economic growth is higher in regions characterized by both high dispersion and low population.

Urban sprawl has important effects on the industrial sector too. In fact, manufacturing is much more efficient when concentrated in dense business-industrial districts in cities. Furthermore, spatial proximity promotes positive information spillovers amongst producers that make labour markets more efficient. Furthermore, many empirical studies (Capello e Nijkamp 1996, Henderson 1988, Ciccone and Hall 1995, Glaeser et al. 1992) provide evidence on the existence of localized scale externalities.

Urban sprawl may also cause high distortionary local taxes or subsidies. In fact, local taxes or user fees that are generally independent to location, causing remote development to be subsidised (Brueckner 2000, Heimlich and Anderson 2001, Wasserman 2000), often finance the increased cost of infrastructures and public services. Furthermore, high urban density can give some advantages on raising local taxes. In particular, tax compliance is less expensive in the presence of high population density in urban areas. On the other hand, since people live close to their neighbours in big cities' urban setting, informal transaction (tax evasion) become more feasible (Kau and Rubin 1981). It follows that the overall effect of urban sprawl on local revenues is ambiguous.

Urban sprawl may also cause a number of environmental damages. Sprawled development decreases the amount of forest area and woodland (Macie and Moll 1989; MacDonald and Rudel 2005, Hedblom and Soderstrom 2008) and fragments farmland's ecosystems and habitats (McArthur and Wilson 1967, O'Connor et al. 1990, Lassila 1999). Therefore, it causes a reduction of the productivity in the primary sector of the economy (Harvey and Clark 1965). Furthermore, provincial tax and land-use policies related to urban sprawl create financial pressures that propel farmers to sell productive land to speculators, causing the loss of hundreds of hectares of productive agricultural land per year (Berry and Plaut 1978, Fischel 1982, Nelson 1990, Burchell et al. 2005).

Finally, urbanization of remote rural area may also have important negative effects on public health, reducing labour force's productivity. In fact, one of the main features of sprawl is increasing car dependency and more health hazards, air pollution, motor vehicle crashes, and pedestrian injuries and fatalities (Frumkin 2002, Savitch 2003, Sturm and Cohen 2004, Yanos 2007).

3. Urban Sprawl in Italy

Differently from other European countries, for some reason, the urban sprawl in Italy is not seen as a negative phenomenon (Gibelli and Salzano 2006).

This lack of interest on the Italian urban sprawl is unjustified. In fact, in Italy, new urban areas are "outward oriented", while the old existing urban system is "inward oriented". The result is a system of highly "dispersed cities" (Calafati 2003). A clear example of the Italian outward oriented urban sprawl is provided by the river Po' Valley (Turri 1990, 2004), in Emilia-Romagna region (figures 1 and 2 in appendix),

characterized by a very complex network of small-medium urban centres not contiguous but strictly interconnected.[2]

The "Istituto Superiore per la Protezione e la Ricerca Ambientale" (ISPRA - The Italian national institute on environmental research) shows that in Italy, during the period 2000 - 2006, peripheral and sub-urban areas increased four times faster than city centres (ISPRA 2013). This trend is in contrast to what is happening in the rest of Europe (EEA 2010). In addition, the "*Land Use and Cover Area frame Survey*" of Eurostat (Eurostat 2013) shows that the percentage of soil covered by "artificial activities" (buildings, roads, housing, recreation and open pit mining) is about the 7.8% of the national territory, while the European average is the 4.6%. Italy is ranked at the fifth position after Malta (32.9%), Belgium (13.4%), Netherlands (12.2%) and Luxembourg (11.9%).

Urban sprawl in Italy has increased over time, and Italian dispersed cities have contributed to air pollution and traffic congestion and created the demand for new transport infrastructures. The empirical evidence corroborates the hypothesis of the extremely high – unsustainable – costs of the Italian dispersed cities (Camagni et al. 2002).

Italy is also characterized by a lack of coordination in planning policies aimed to harmonize the urban expansion and the farmland use (Di Iacovo et al. 2010). Uncontrolled urban expansion and land use are causing serious damages to the specific public functions of the farmland, such as food production; land fertility; water cycle etc. (Rovai et al. 2010).

The combined effect of all these negative aspects of the urban sprawl induces to think that the urban sprawl may exert a negative effect on regional economic growth in Italy.

In the next section, we will test this possible effect through an empirical analysis on a panel of Italian regions.

4. Data and empirical strategy

The econometric specification used in this paper is based on the literature on the effect of government size on GDP growth, following the studies of Barro (1990a, 1990b), Rahn and Fox (1996), Scully (1994, 1995, 2000, 2002, 2003) and Pevcin (2004, 2008). This literature is based on the idea of the existence of the so-colled "Armey Curve", an "inverted U" shape relationship between government size and economic growth.

Similar analyses, based on regional data, have been conducted by Di Liddo et al. (2015) taking into account also the degree of decentralization in sub-national jurisdictions.

In the following empirical analysis, the dependent variable is the regional GDP growth in percentage and the independent variable of interest is the measure of the urban sprawl suggested by Downs (1999), that is, the percentage of total population living outside the main urbanized centres. In this case, we consider as main urbanized areas the chef-lieus of the 110 Italian provinces.

We use panel data regarding Italian regional jurisdictions over the 1996-2009 period. The analysis focuses on the fifteen Italian regions[3] with ordinary statutes (figure 2). In fact, Italian special status regions have a higher level of legislative autonomy from the central government. Following Fiorino and Ricciuti (2007), we exclude special status

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[2] The image in figure 1 is in the public domain because it is a detail of an image solely created by NASA. NASA copyright policy states that "NASA material is not protected by copyright unless noted". See http://www.jsc.nasa.gov/policies.html#Guidelines for further details.

[3] For further details on Italian regional institutions, see Appendix A.

regions from our analysis in order to work with a more homogenous sample (in terms of institutional factors).

Data on regional GDP come from the Italian National Statistical Institute (ISTAT). These provide a detailed time-homogeneous series for the years 1996-2009 (ISTAT, 2010). The source of census data is DEMO ISTAT.[4]

The dataset also includes a set of control variables. Data on local expenditure and revenue come from the Regional Public Accounts (RPA) produced by ISTAT et al. (2012), a database created jointly by the Italian National Institute of Statistics (ISTAT), the State General Accounting Department (RGS), the Organization for Economic Co-operation and Development (OECD) and other central and local institutions.

The database covers different macro-areas and administrative regions. The public sector comprises, in addition to general government, central and subnational entities that provides public goods and services.

We measure the level of fiscal decentralization as the ratio of public spending under control of the subnational governments (regional governments, provincial governments, municipalities and other minor local administrations) over the total public expenditure (central, regional and local governments) in each regional jurisdiction. That is:

$$Fiscal\ decentralization = \frac{Subnational\ administrations\ expenditure}{Total\ public\ expenditure}.$$

Our proxy of the government size is the ratio of the total public expenditure in each region over the regional GDP. That is:

$$Government\ size = \frac{Total\ public\ expenditure}{Regional\ GDP}.$$

We also include a measure of the vertical fiscal imbalance (VFI) that captures the impact of different fiscal policies followed by local governments. Broadly speaking, variables on fiscal decentralization and vertical fiscal imbalance are included in the econometric specification in order to capture institutional aspects that may also influence regional economic growth.

Political variables come from the Italian Ministry of the Interior[5], while data on the degree of openness (Export and Import/GDP) of the regional economies come from Territorial Indicators of ISTAT.[6] Tables 1-14 in appendix show the main descriptive statistics for each year.

Our econometric specification is an extension of the model used by Forte and Magazzino (2011) and Di Liddo et al. (2015). The econometric specification, in a semi-matrix notation, is:

$$g_{it} = \rho g_{it-1} + \beta\ Urban_{sprawl_{it}} + \rho_1 govsize_{i(t-1)} + \rho_1 govsize^2_{1(t-1)} + \delta' D_{it} +$$
$$\vartheta' V_{it} + \gamma'_1 I^D_{it} + \gamma'_2 I^V_{it} + \theta' C_{i(t-1)} + \omega' T + \sum_{j=1}^{j} \varphi_j g_{i(t-j)} + \alpha_i + \varepsilon_{it}, \tag{1}$$

where *i* is the regional index and *t* is the year index. Variable *g* is the regional GDP growth rate, *govsize* is the total expenditure-GDP ratio and *Urban_sprawl* is our measure of urban sprawl, given by the percentage of the regional population living outside the main cities

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[4] The dataset is available at http://demo.istat.it/.
[5] Data are available at http://elezionistorico.interno.it/
[6] Data are available at http://sitis.istat.it/sitis/html/

(Italian provincial Chef-lieus). D is a second order polynomial of our measure of expenditure decentralization, V is a second order polynomial of the measure of the vertical fiscal imbalance (VFI), I^D represents the interaction term between the government size and the level of expenditure decentralization and I^V represents the interaction term between the government size and the local fiscal policy. C is a set of control variables including census variables (population, percentage of population under 0-14, percentage of population over 65), political variables (centre-left regional government dummy and margin of victory), and other economic variables (export and import extra-EU as a percentage of GDP and inflation rate). T is the quadratic trend, α_i captures the unobserved heterogeneity and ε_{it} is the idiosyncratic stochastic component.

We use lagged values of the government size because we assume that public expenditure at period $t-1$ influences the growth rate at period t. On the other hand, following the empirical literature, decentralization measures are not lagged.[7]

Several econometric problems may arise. First of all, some independent variables (for example the government size and the urban sprawl) are assumed to be endogenous because causality may run in both directions. As a result, these variables may be correlated with the error term.

Furthermore, time-invariant country characteristics (fixed effects), such as geography and demographics, may be correlated with the explanatory variables. The fixed effects are contained in the error term in equation (1), which consists of the unobserved country-specific effects α_i, and the observation-specific errors ε_{it}. Finally, the presence of the lagged dependent variable gives rise to autocorrelation.

To cope with the endogeneity problem, we conduct panel analyses[8] using the Arellano – Bond (1991) difference GMM. Instead of using only exogenous instruments, lagged levels of the endogenous regressors are included too. This makes the endogenous variables pre-determined and, therefore, not correlated with the error term in equation (1).

To cope with the fixed effects problem, the difference GMM uses first-differences of all variables, removing the country specific effects. Finally, we use as instruments the past levels of the first-differenced lagged dependent variable in order to cope with the autocorrelation problem.

In particular, as our set of instrumental variables is composed as follows. First of all we use the differences of the variables considered to be endogenous, such as GDP growth rate, urban sprawl, government size and the squared government size starting from lag 2 (GMM-style instruments). Subsequently, we use as additional instruments the remaining supposed exogenous variables included in our specification (IV-style instruments).

5. Results

Table 15 in appendix reports the coefficient point estimates and the p-value of the Sargan statistic obtained using different specifications. We can observe negative and significant estimated coefficients associated with the urban sprawl measure in specifications (4-7). The Arellano-Bond autocorellation test - which is applied to the first differenced residuals - reports a p-value smaller than 0.05 for all estimations, confirming that residuals are AR(1), as expected. The Arellano-Bond test applied to the second differenced residuals reports a p-value greater than 0.05 for all estimations. As a result, it

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[7] For example, Eyraud and Lusinyan (2013). They use contemporary values of a VFI measure and lagged values of public debt.

[8] For a detailed analysis of panel modelling used see, among others: Wooldridge (2002), Baltagi (2005), and Roodman (2009).

is possible to reject the hypothesis of autocorrelation in second differences, concluding that the error term in the levels equation is not autocorrelated.

Table 15 also reports the results of the Sargan test in order to check the validity of the included instruments. In our estimates we register p-values of the Sargan test greater than 0.05, so we can confirm the validity of the instruments (under the null hypothesis, the estimates are not weakened by many instruments).

We also estimate a Fixed Effect model in order to check the robustness of our results. Final results (table 16) remain qualitatively the same with all alternative specifications of the baseline model.

Regarding the coefficient point estimates of some relevant control variables, we can see (table 15 in appendix) that the inverted U-shaped relation between government size and growth is also confirmed. In fact, the estimated coefficients of the governments size are positive while the estimated coefficients of the squared governments size are negative in specifications (5-7). In specifications (1-4) they are not statistically significant.

In all specifications, inflation rate shows negative and significant estimated coefficients, providing strong evidence in favour of a negative relation between inflation and growth.

Regarding the inverse measure of vertical fiscal imbalance, an inverted U-shaped relation with economic growth emerges only from specification (5). Instead, in specifications (3) and (6-7) estimates we observe positive and significant estimated coefficients associated to the inverse measure of vertical fiscal imbalance, suggesting a linear relation between vertical imbalance and growth. In particular, we found that an alignment between spending and revenue-raising competencies between local governments stimulates regional economic growth.

The estimated point coefficients associated to the decentralization index are positive and significant in specifications (3) and (5-7) suggesting the existence of a linear relation between expenditure decentralization and regional economic growth.

To conclude, we also observe significant coefficients associated to the interaction terms between government size and expenditure decentralization (and to the squared interaction term), suggesting the existence of a bell-shaped curve between these variables and the regional economic growth.

6. Final remarks

Italy is characterized by a high degree of urban sprawl, defined as the urbanization of provincial areas around the main city centres.

Urban sprawl may negatively affect economic growth through a number of channels. The negative effect may be due either to increased infrastructure's cost (Burchell et al. 2005) and the reduction in productivity of farmland (Harvey and Clark 1965) or the increase in distortionary local taxes or subsidies (Brueckner 2000, Heimlich and Anderson 2001, Wasserman 2000). Furthermore, urbanization of remote rural area may also have important negative effects on public health (Frumkin 2002, Savitch 2003, Yanos 2007, Sturm and Cohen 2004).

This paper provides empirical evidence on the negative impact of the urban sprawl on regional economic growth. The main implication that can be drown for Italy is that there is a need of policies that encourage urban development in the main cities instead of in the provincial areas. In fact, big and concentrated cities encourages development, which keeps housing costs low, and simultaneously prevents urban sprawl and congestion. Cities are more business-friendly, so that companies from all sectors are encouraged to

set up shop and create a competitive environment that keeps consumer costs low, and creates jobs. This in turn promotes education, which combats corruption, which then helps keep cities clean and helps fight crime (Glaeser 2011). For example, to further fight congestion of the urban areas, Glaeser (2011) suggests congestion pricing, which is in use in places like London and Singapore. This simple concept generates revenue and productivity by charging commuters for the environmental costs of driving, while reducing traffic.

In short, well-managed successful cities can promote education, consumerism, and growth.

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APPENDIX A: Italian Regions - institutional framework

Italy is a unitary democratic parliamentary republic ruled by a central government with three sub-national levels: 20 regions (regioni), 111 provinces (province), and 8101 municipalities (comuni).

The 2001 reform plainly qualifies the regions as "constituent parts of the Italian Republic and as autonomous levels of government" (Art. 114 Const.).

As regards the regional governments, the most important sub-national level of government, the development of Italian regionalism can be roughly divided into three stages: the early times (1948-1972), the implementation of regional autonomy (1972-1999), and the new constitutional framework (from 1999 on).

Between 1972 and 1999, the local public administration has been involved in a long and complex process of reform of regional self-government.

Law No.142/1990 included a number of provisions aimed at improving the efficiency of the municipalities and provinces. Law No. 81/1993 was a significant step toward raising awareness of local self-government, with the introduction of direct elections for mayors and provincial presidents.

Four non-constitutional laws, the so-called "Bassanini laws" (Law n. 59/1997; 127/1997; 191/1998 and 50/1999), were approved by the centre-left majority, constituting a substantive, if not formal constitutional change, because they redesigned the division of legislative and administrative competencies, enumerating those of the central government and making the regions responsible for the remainder.

The most important constitutional reform after 1948 was introduced in 2001 (Constitutional Law No. 3/2001), when the division of legislative and administrative powers between the central and (ordinary) regional governments was drastically changed: from this time onward, the legislative powers of the central government and the fields of concurrent were listed in the constitution (Art. 117 Const.). All remaining legislation belongs to the regional government in a way that resembles the typical residual power clause of federal constitutions.

Article 116 of the Italian Constitution grants to five regions (namely Sardinia, Sicily, Trentino-Alto Adige/Südtirol, Aosta Valley and Friuli-Venezia Giulia) home rule, acknowledging their powers in relation to legislation, administration and finance. For this reason their spending and revenues functions are very different to those of ordinary regions. Furthermore, Trentino-Alto Adige/Südtirol constitutes a very special case. The region is nearly powerless, and the regional institution plays only a coordinating role of the two autonomous provinces within the region: Trentino and South Tyrol.

APPENDIX B: Tables and figures

Figure 1: The Night-time lights of Italy

Figure 2: List of Italian provinces (15 Ordinary status regions)
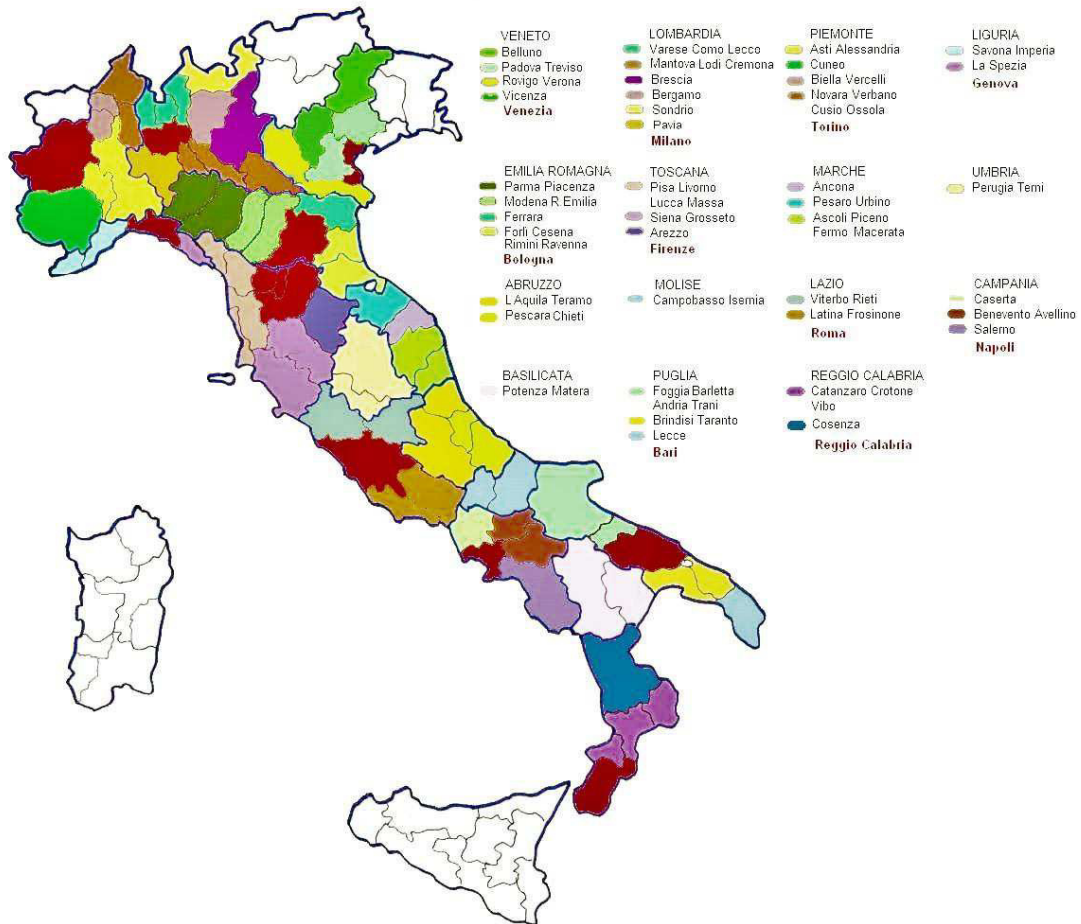
Table 1: Descriptive statistics – year 1996

Variable	N	Mean	SD	P5	P95	Min	Max
Real regional GDP growth rate	0						
Urban Sprawl	15	70.37	11.44	35.18	84.58	35.18	84.58
Government size (Public expenditure/GDP)	15	0.58	0.10	0.39	0.74	0.39	0.74
Expenditure decentralization index (subnational/total expenditure)	15	0.23	0.03	0.17	0.27	0.17	0.27
Inverse measure of vertical fiscal imbalance (total local own revenues/total loc	15	0.26	0.07	0.11	0.39	0.11	0.39
Inflation rate	0						
Export - Extra EU (% GDP)	0						
Import - Extra EU (% GDP)	0						
Centre-Left regional government (dummy)	15	0.60	0.51	0.00	1.00	0.00	1.00
Margin of victory (no. of seats in regional parliament)	15	10.47	4.27	6.00	18.00	6.00	18.00
Population (millions)	15	3.23	2.40	0.32	9.07	0.32	9.07
Population 0-14 (% total population)	15	14.18	2.45	10.99	19.38	10.99	19.38
Population over 65 (% total population)	15	19.14	2.90	13.64	24.35	13.64	24.35
Life expectancy over 65 (no. of years)	0						
Infant mortality rate	0						
Total expenditure CG (% GDP)	15	0.44	0.08	0.30	0.55	0.30	0.55
Total expenditure LG (% GDP)	15	0.06	0.01	0.04	0.08	0.04	0.08
Total expenditure RG (% GDP)	15	0.07	0.03	0.03	0.14	0.03	0.14
Own tax revenue CG (% total local expenditure)	15	0.07	0.02	0.05	0.11	0.05	0.11
Own tax revenue LG (% total local expenditure)	15	0.04	0.02	0.02	0.09	0.02	0.09
Own tax revenue RG (% total local expenditure)	15	0.02	0.01	0.01	0.03	0.01	0.03

Table 2: Descriptive statistics – year 1997

Variable	N	Mean	SD	P5	P95	Min	Max
Real regional GDP growth rate	15	0.03	0.01	0.01	0.05	0.01	0.05
Urban Sprawl	15	70.50	11.39	35.52	84.74	35.52	84.74
Government size (Public expenditure/GDP)	15	0.53	0.09	0.37	0.64	0.37	0.64
Expenditure decentralization index (subnational/total expenditure)	15	0.26	0.04	0.18	0.31	0.18	0.31
Inverse measure of vertical fiscal imbalance (total local own revenues/total loc	15	0.29	0.10	0.12	0.56	0.12	0.56
Inflation rate	15	0.02	0.00	0.02	0.02	0.02	0.02
Export - Extra EU (% GDP)	0						
Import - Extra EU (% GDP)	0						
Centre-Left regional government (dummy)	15	0.60	0.51	0.00	1.00	0.00	1.00
Margin of victory (no. of seats in regional parliament)	15	10.47	4.27	6.00	18.00	6.00	18.00
Population (millions)	15	3.25	2.41	0.32	9.10	0.32	9.10
Population 0-14 (% total population)	15	13.97	2.27	10.59	18.27	10.59	18.27
Population over 65 (% total population)	15	19.15	2.97	13.84	25.05	13.84	25.05
Life expectancy over 65 (no. of years)	0						
Infant mortality rate	0						
Total expenditure CG (% GDP)	15	0.39	0.06	0.27	0.50	0.27	0.50
Total expenditure LG (% GDP)	15	0.06	0.01	0.04	0.08	0.04	0.08
Total expenditure RG (% GDP)	15	0.08	0.03	0.04	0.13	0.04	0.13
Own tax revenue CG (% total local expenditure)	15	0.09	0.02	0.07	0.12	0.07	0.12
Own tax revenue LG (% total local expenditure)	15	0.04	0.01	0.02	0.06	0.02	0.06
Own tax revenue RG (% total local expenditure)	15	0.02	0.01	0.01	0.05	0.01	0.05

Table 3: Descriptive statistics – year 1998

Variable	N	Mean	SD	P5	P95	Min	Max
Real regional GDP growth rate	15	0.02	0.01	0.01	0.03	0.01	0.03
Urban Sprawl	15	70.64	11.34	35.89	84.94	35.89	84.94
Government size (Public expenditure/GDP)	15	0.53	0.08	0.36	0.65	0.36	0.65
Expenditure decentralization index (subnational/total expenditure)	15	0.26	0.03	0.19	0.31	0.19	0.31
Inverse measure of vertical fiscal imbalance (total local own revenues/total loc	15	0.43	0.13	0.19	0.66	0.19	0.66
Inflation rate	15	0.02	0.00	0.02	0.02	0.02	0.02
Export - Extra EU (% GDP)	0						
Import - Extra EU (% GDP)	0						
Centre-Left regional government (dummy)	15	0.60	0.51	0.00	1.00	0.00	1.00
Margin of victory (no. of seats in regional parliament)	15	10.47	4.27	6.00	18.00	6.00	18.00
Population (millions)	15	3.23	2.39	0.32	9.06	0.32	9.06
Population 0-14 (% total population)	15	14.09	2.33	10.46	18.90	10.46	18.90
Population over 65 (% total population)	15	19.33	2.99	13.89	24.75	13.89	24.75
Life expectancy over 65 (no. of years)	15	18.02	0.46	16.77	18.61	16.77	18.61
Infant mortality rate	15	14.49	5.25	7.24	24.70	7.24	24.70
Total expenditure CG (% GDP)	15	0.39	0.06	0.27	0.47	0.27	0.47
Total expenditure LG (% GDP)	15	0.06	0.01	0.04	0.08	0.04	0.08
Total expenditure RG (% GDP)	15	0.08	0.02	0.05	0.13	0.05	0.13
Own tax revenue CG (% total local expenditure)	15	0.09	0.01	0.07	0.12	0.07	0.12
Own tax revenue LG (% total local expenditure)	15	0.04	0.02	0.02	0.10	0.02	0.10
Own tax revenue RG (% total local expenditure)	15	0.04	0.01	0.02	0.06	0.02	0.06

Table 4: Descriptive statistics – year 1999

Variable	N	Mean	SD	P5	P95	Min	Max
Real regional GDP growth rate	15	0.02	0.01	-0.00	0.04	-0.00	0.04
Urban Sprawl	15	70.78	11.32	36.20	85.15	36.20	85.15
Government size (Public expenditure/GDP)	15	0.54	0.09	0.37	0.65	0.37	0.65
Expenditure decentralization index (subnational/total expenditure)	15	0.26	0.04	0.18	0.32	0.18	0.32
Inverse measure of vertical fiscal imbalance (total local own revenues/total loc	15	0.49	0.13	0.26	0.67	0.26	0.67
Inflation rate	15	0.02	0.00	0.02	0.02	0.02	0.02
Export - Extra EU (% GDP)	15	16.60	9.12	0.91	30.90	0.91	30.90
Import - Extra EU (% GDP)	15	13.11	8.17	1.52	33.84	1.52	33.84
Centre-Left regional government (dummy)	15	0.60	0.51	0.00	1.00	0.00	1.00
Margin of victory (no. of seats in regional parliament)	15	10.47	4.27	6.00	18.00	6.00	18.00
Population (millions)	15	3.23	2.38	0.33	9.06	0.33	9.06
Population 0-14 (% total population)	15	13.99	2.30	10.49	18.60	10.49	18.60
Population over 65 (% total population)	15	19.11	2.85	14.05	24.67	14.05	24.67
Life expectancy over 65 (no. of years)	15	18.30	0.48	17.09	19.16	17.09	19.16
Infant mortality rate	15	13.76	5.22	7.20	26.57	7.20	26.57
Total expenditure CG (% GDP)	15	0.40	0.07	0.27	0.53	0.27	0.53
Total expenditure LG (% GDP)	15	0.06	0.01	0.04	0.08	0.04	0.08
Total expenditure RG (% GDP)	15	0.08	0.02	0.05	0.12	0.05	0.12
Own tax revenue CG (% total local expenditure)	15	0.09	0.02	0.07	0.12	0.07	0.12
Own tax revenue LG (% total local expenditure)	15	0.04	0.01	0.02	0.06	0.02	0.06
Own tax revenue RG (% total local expenditure)	15	0.05	0.01	0.02	0.07	0.02	0.07

Table 5: Descriptive statistics – year 2000

Variable	N	Mean	SD	P5	P95	Min	Max
Real regional GDP growth rate	15	0.03	0.01	0.00	0.05	0.00	0.05
Urban Sprawl	15	70.91	11.29	36.45	85.36	36.45	85.36
Government size (Public expenditure/GDP)	15	0.52	0.09	0.36	0.64	0.36	0.64
Expenditure decentralization index (subnational/total expenditure)	15	0.28	0.03	0.20	0.33	0.20	0.33
Inverse measure of vertical fiscal imbalance (total local own revenues/total loc	15	0.47	0.13	0.24	0.65	0.24	0.65
Inflation rate	15	0.03	0.00	0.03	0.03	0.03	0.03
Export - Extra EU (% GDP)	15	18.27	10.02	1.19	33.37	1.19	33.37
Import - Extra EU (% GDP)	15	15.36	9.37	1.72	38.92	1.72	38.92
Centre-Left regional government (dummy)	15	0.47	0.52	0.00	1.00	0.00	1.00
Margin of victory (no. of seats in regional parliament)	15	13.27	5.18	6.00	25.00	6.00	25.00
Population (millions)	15	3.23	2.40	0.32	9.11	0.32	9.11
Population 0-14 (% total population)	15	14.09	2.39	10.70	18.84	10.70	18.84
Population over 65 (% total population)	15	19.19	3.09	13.53	25.04	13.53	25.04
Life expectancy over 65 (no. of years)	15	18.59	0.48	17.22	19.26	17.22	19.26
Infant mortality rate	15	10.20	2.58	5.30	15.01	5.30	15.01
Total expenditure CG (% GDP)	15	0.37	0.06	0.25	0.45	0.25	0.45
Total expenditure LG (% GDP)	15	0.06	0.01	0.04	0.08	0.04	0.08
Total expenditure RG (% GDP)	15	0.08	0.02	0.06	0.13	0.06	0.13
Own tax revenue CG (% total local expenditure)	15	0.09	0.02	0.07	0.13	0.07	0.13
Own tax revenue LG (% total local expenditure)	15	0.05	0.01	0.03	0.07	0.03	0.07
Own tax revenue RG (% total local expenditure)	15	0.04	0.01	0.02	0.06	0.02	0.06

Table 6: Descriptive statistics – year 2001

Variable	N	Mean	SD	P5	P95	Min	Max
Real regional GDP growth rate	15	0.02	0.01	-0.00	0.03	-0.00	0.03
Urban Sprawl	15	71.02	11.24	36.75	85.54	36.75	85.54
Government size (Public expenditure/GDP)	15	0.53	0.10	0.37	0.69	0.37	0.69
Expenditure decentralization index (subnational/total expenditure)	15	0.29	0.04	0.19	0.34	0.19	0.34
Inverse measure of vertical fiscal imbalance (total local own revenues/total loc	15	0.45	0.14	0.20	0.69	0.20	0.69
Inflation rate	15	0.03	0.00	0.03	0.03	0.03	0.03
Export - Extra EU (% GDP)	15	18.48	10.16	1.07	33.89	1.07	33.89
Import - Extra EU (% GDP)	15	15.26	8.94	1.84	38.02	1.84	38.02
Centre-Left regional government (dummy)	15	0.47	0.52	0.00	1.00	0.00	1.00
Margin of victory (no. of seats in regional parliament)	15	13.27	5.18	6.00	25.00	6.00	25.00
Population (millions)	15	3.25	2.42	0.32	9.15	0.32	9.15
Population 0-14 (% total population)	15	13.99	2.42	10.20	18.63	10.20	18.63
Population over 65 (% total population)	15	19.02	3.01	13.62	24.25	13.62	24.25
Life expectancy over 65 (no. of years)	15	18.98	0.49	17.65	19.77	17.65	19.77
Infant mortality rate	15	11.70	4.05	4.44	19.48	4.44	19.48
Total expenditure CG (% GDP)	15	0.38	0.07	0.26	0.48	0.26	0.48
Total expenditure LG (% GDP)	15	0.07	0.02	0.04	0.09	0.04	0.09
Total expenditure RG (% GDP)	15	0.09	0.03	0.06	0.16	0.06	0.16
Own tax revenue CG (% total local expenditure)	15	0.10	0.02	0.07	0.13	0.07	0.13
Own tax revenue LG (% total local expenditure)	15	0.04	0.01	0.02	0.06	0.02	0.06
Own tax revenue RG (% total local expenditure)	15	0.04	0.01	0.02	0.07	0.02	0.07

Table 7: Descriptive statistics – year 2002

Variable	N	Mean	SD	P5	P95	Min	Max
Real regional GDP growth rate	15	0.01	0.01	-0.01	0.03	-0.01	0.03
Urban Sprawl	15	71.16	11.11	37.22	85.53	37.22	85.53
Government size (Public expenditure/GDP)	15	0.53	0.09	0.37	0.70	0.37	0.70
Expenditure decentralization index (subnational/total expenditure)	15	0.28	0.03	0.19	0.34	0.19	0.34
Inverse measure of vertical fiscal imbalance (total local own revenues/total loc	15	0.47	0.12	0.23	0.76	0.23	0.76
Inflation rate	15	0.03	0.00	0.03	0.03	0.03	0.03
Export - Extra EU (% GDP)	15	17.99	9.71	1.02	33.48	1.02	33.48
Import - Extra EU (% GDP)	15	14.72	8.58	1.71	35.65	1.71	35.65
Centre-Left regional government (dummy)	15	0.47	0.52	0.00	1.00	0.00	1.00
Margin of victory (no. of seats in regional parliament)	15	13.27	5.18	6.00	25.00	6.00	25.00
Population (millions)	15	3.24	2.40	0.32	9.13	0.32	9.13
Population 0-14 (% total population)	15	14.05	2.34	10.50	18.84	10.50	18.84
Population over 65 (% total population)	15	19.22	3.12	13.52	25.07	13.52	25.07
Life expectancy over 65 (no. of years)	15	19.01	0.46	17.76	19.82	17.76	19.82
Infant mortality rate	15	10.06	3.88	2.38	18.27	2.38	18.27
Total expenditure CG (% GDP)	15	0.38	0.06	0.26	0.47	0.26	0.47
Total expenditure LG (% GDP)	15	0.06	0.01	0.05	0.09	0.05	0.09
Total expenditure RG (% GDP)	15	0.09	0.03	0.06	0.16	0.06	0.16
Own tax revenue CG (% total local expenditure)	15	0.10	0.02	0.07	0.13	0.07	0.13
Own tax revenue LG (% total local expenditure)	15	0.05	0.01	0.03	0.07	0.03	0.07
Own tax revenue RG (% total local expenditure)	15	0.05	0.02	0.02	0.09	0.02	0.09

Table 8: Descriptive statistics – year 2003

Variable	N	Mean	SD	P5	P95	Min	Max
Real regional GDP growth rate	15	0.00	0.01	-0.01	0.02	-0.01	0.02
Urban Sprawl	15	71.25	10.94	37.89	85.15	37.89	85.15
Government size (Public expenditure/GDP)	15	0.54	0.09	0.37	0.69	0.37	0.69
Expenditure decentralization index (subnational/total expenditure)	15	0.29	0.03	0.20	0.32	0.20	0.32
Inverse measure of vertical fiscal imbalance (total local own revenues/total loc	15	0.48	0.18	0.25	0.86	0.25	0.86
Inflation rate	15	0.03	0.00	0.03	0.03	0.03	0.03
Export - Extra EU (% GDP)	15	17.17	9.41	1.07	30.82	1.07	30.82
Import - Extra EU (% GDP)	15	14.23	8.48	1.85	35.16	1.85	35.16
Centre-Left regional government (dummy)	15	0.47	0.52	0.00	1.00	0.00	1.00
Margin of victory (no. of seats in regional parliament)	15	13.27	5.18	6.00	25.00	6.00	25.00
Population (millions)	15	3.24	2.41	0.32	9.13	0.32	9.13
Population 0-14 (% total population)	15	14.02	2.32	10.93	18.68	10.93	18.68
Population over 65 (% total population)	15	19.27	3.14	13.89	25.72	13.89	25.72
Life expectancy over 65 (no. of years)	15	18.90	0.46	17.65	19.48	17.65	19.48
Infant mortality rate	15	8.60	3.73	1.90	14.35	1.90	14.35
Total expenditure CG (% GDP)	15	0.38	0.07	0.26	0.48	0.26	0.48
Total expenditure LG (% GDP)	15	0.07	0.01	0.05	0.10	0.05	0.10
Total expenditure RG (% GDP)	15	0.09	0.02	0.06	0.14	0.06	0.14
Own tax revenue CG (% total local expenditure)	15	0.10	0.02	0.07	0.14	0.07	0.14
Own tax revenue LG (% total local expenditure)	15	0.05	0.01	0.03	0.07	0.03	0.07
Own tax revenue RG (% total local expenditure)	15	0.05	0.02	0.03	0.09	0.03	0.09

Table 9: Descriptive statistics – year 2004

Variable	N	Mean	SD	P5	P95	Min	Max
Real regional GDP growth rate	15	0.02	0.01	-0.02	0.05	-0.02	0.05
Urban Sprawl	15	71.27	10.83	38.40	85.12	38.40	85.12
Government size (Public expenditure/GDP)	15	0.51	0.09	0.36	0.65	0.36	0.65
Expenditure decentralization index (subnational/total expenditure)	15	0.30	0.03	0.20	0.33	0.20	0.33
Inverse measure of vertical fiscal imbalance (total local own revenues/total loc	15	0.48	0.12	0.33	0.78	0.33	0.78
Inflation rate	15	0.02	0.00	0.02	0.02	0.02	0.02
Export - Extra EU (% GDP)	15	17.24	9.67	1.13	30.75	1.13	30.75
Import - Extra EU (% GDP)	15	14.44	8.60	1.75	36.55	1.75	36.55
Centre-Left regional government (dummy)	15	0.47	0.52	0.00	1.00	0.00	1.00
Margin of victory (no. of seats in regional parliament)	15	13.27	5.18	6.00	25.00	6.00	25.00
Population (millions)	15	3.23	2.39	0.33	9.10	0.33	9.10
Population 0-14 (% total population)	15	14.11	2.38	10.62	19.29	10.62	19.29
Population over 65 (% total population)	15	19.19	3.16	13.30	25.12	13.30	25.12
Life expectancy over 65 (no. of years)	15	19.57	0.45	18.40	20.23	18.40	20.23
Infant mortality rate	15	10.04	3.54	3.73	15.10	3.73	15.10
Total expenditure CG (% GDP)	15	0.36	0.06	0.24	0.44	0.24	0.44
Total expenditure LG (% GDP)	15	0.07	0.01	0.05	0.09	0.05	0.09
Total expenditure RG (% GDP)	15	0.09	0.02	0.05	0.14	0.05	0.14
Own tax revenue CG (% total local expenditure)	15	0.11	0.02	0.08	0.14	0.08	0.14
Own tax revenue LG (% total local expenditure)	15	0.05	0.01	0.03	0.06	0.03	0.06
Own tax revenue RG (% total local expenditure)	15	0.05	0.02	0.03	0.09	0.03	0.09

Table 10: Descriptive statistics – year 2005

Variable	N	Mean	SD	P5	P95	Min	Max
Real regional GDP growth rate	15	0.01	0.01	-0.01	0.03	-0.01	0.03
Urban Sprawl	15	71.37	10.70	38.93	84.88	38.93	84.88
Government size (Public expenditure/GDP)	15	0.51	0.09	0.36	0.66	0.36	0.66
Expenditure decentralization index (subnational/total expenditure)	15	0.29	0.04	0.18	0.34	0.18	0.34
Inverse measure of vertical fiscal imbalance (total local own revenues/total loc	15	0.40	0.13	0.27	0.74	0.27	0.74
Inflation rate	15	0.02	0.00	0.02	0.02	0.02	0.02
Export - Extra EU (% GDP)	15	17.50	9.80	1.01	30.29	1.01	30.29
Import - Extra EU (% GDP)	15	15.25	8.67	1.93	37.38	1.93	37.38
Centre-Left regional government (dummy)	15	0.87	0.35	0.00	1.00	0.00	1.00
Margin of victory (no. of seats in regional parliament)	15	12.93	4.45	6.00	24.00	6.00	24.00
Population (millions)	15	3.24	2.40	0.32	9.08	0.32	9.08
Population 0-14 (% total population)	15	14.17	2.29	11.02	18.99	11.02	18.99
Population over 65 (% total population)	15	19.43	3.07	13.54	25.33	13.54	25.33
Life expectancy over 65 (no. of years)	15	19.47	0.45	18.23	20.32	18.23	20.32
Infant mortality rate	15	9.67	3.78	4.00	16.62	4.00	16.62
Total expenditure CG (% GDP)	15	0.36	0.06	0.25	0.45	0.25	0.45
Total expenditure LG (% GDP)	15	0.07	0.01	0.04	0.09	0.04	0.09
Total expenditure RG (% GDP)	15	0.08	0.03	0.04	0.14	0.04	0.14
Own tax revenue CG (% total local expenditure)	15	0.11	0.02	0.08	0.14	0.08	0.14
Own tax revenue LG (% total local expenditure)	15	0.05	0.01	0.03	0.06	0.03	0.06
Own tax revenue RG (% total local expenditure)	15	0.04	0.02	0.02	0.10	0.02	0.10

Table 11: Descriptive statistics – year 2006

Variable	N	Mean	SD	P5	P95	Min	Max
Real regional GDP growth rate	15	0.02	0.01	0.01	0.04	0.01	0.04
Urban Sprawl	15	71.42	10.92	37.92	84.84	37.92	84.84
Government size (Public expenditure/GDP)	15	0.50	0.09	0.35	0.65	0.35	0.65
Expenditure decentralization index (subnational/total expenditure)	15	0.30	0.04	0.19	0.34	0.19	0.34
Inverse measure of vertical fiscal imbalance (total local own revenues/total loc	15	0.50	0.12	0.30	0.70	0.30	0.70
Inflation rate	15	0.02	0.00	0.02	0.02	0.02	0.02
Export - Extra EU (% GDP)	15	18.80	10.57	1.00	33.25	1.00	33.25
Import - Extra EU (% GDP)	15	16.60	8.93	1.83	38.71	1.83	38.71
Centre-Left regional government (dummy)	15	0.80	0.41	0.00	1.00	0.00	1.00
Margin of victory (no. of seats in regional parliament)	15	12.93	4.45	6.00	24.00	6.00	24.00
Population (millions)	15	3.24	2.40	0.33	9.13	0.33	9.13
Population 0-14 (% total population)	15	13.95	2.39	10.30	18.23	10.30	18.23
Population over 65 (% total population)	15	19.06	2.98	14.04	24.57	14.04	24.57
Life expectancy over 65 (no. of years)	15	19.77	0.39	18.67	20.34	18.67	20.34
Infant mortality rate	15	9.17	3.19	3.92	14.37	3.92	14.37
Total expenditure CG (% GDP)	15	0.35	0.06	0.24	0.44	0.24	0.44
Total expenditure LG (% GDP)	15	0.06	0.01	0.04	0.08	0.04	0.08
Total expenditure RG (% GDP)	15	0.09	0.02	0.04	0.13	0.04	0.13
Own tax revenue CG (% total local expenditure)	15	0.11	0.02	0.08	0.15	0.08	0.15
Own tax revenue LG (% total local expenditure)	15	0.05	0.01	0.03	0.07	0.03	0.07
Own tax revenue RG (% total local expenditure)	15	0.06	0.01	0.04	0.09	0.04	0.09

Table 12: Descriptive statistics – year 2007

Variable	N	Mean	SD	P5	P95	Min	Max
Real regional GDP growth rate	15	0.03	0.02	-0.01	0.08	-0.01	0.08
Urban Sprawl	15	71.58	10.81	38.37	84.83	38.37	84.83
Government size (Public expenditure/GDP)	15	0.49	0.09	0.34	0.67	0.34	0.67
Expenditure decentralization index (subnational/total expenditure)	15	0.30	0.04	0.19	0.36	0.19	0.36
Inverse measure of vertical fiscal imbalance (total local own revenues/total loc	15	0.53	0.19	0.27	1.01	0.27	1.01
Inflation rate	15	0.02	0.00	0.02	0.02	0.02	0.02
Export - Extra EU (% GDP)	15	19.69	10.99	1.29	34.39	1.29	34.39
Import - Extra EU (% GDP)	15	16.94	9.03	2.23	39.08	2.23	39.08
Centre-Left regional government (dummy)	15	0.80	0.41	0.00	1.00	0.00	1.00
Margin of victory (no. of seats in regional parliament)	15	12.93	4.45	6.00	24.00	6.00	24.00
Population (millions)	15	3.25	2.41	0.32	9.12	0.32	9.12
Population 0-14 (% total population)	15	14.02	2.31	10.49	18.60	10.49	18.60
Population over 65 (% total population)	15	19.27	2.81	14.17	24.02	14.17	24.02
Life expectancy over 65 (no. of years)	15	19.82	0.41	18.62	20.42	18.62	20.42
Infant mortality rate	15	7.67	3.35	0.00	13.97	0.00	13.97
Total expenditure CG (% GDP)	15	0.34	0.06	0.24	0.45	0.24	0.45
Total expenditure LG (% GDP)	15	0.06	0.01	0.04	0.09	0.04	0.09
Total expenditure RG (% GDP)	15	0.09	0.03	0.03	0.15	0.03	0.15
Own tax revenue CG (% total local expenditure)	15	0.12	0.02	0.08	0.17	0.08	0.17
Own tax revenue LG (% total local expenditure)	15	0.06	0.01	0.03	0.08	0.03	0.08
Own tax revenue RG (% total local expenditure)	15	0.06	0.03	0.03	0.12	0.03	0.12

Table 13: Descriptive statistics – year 2008

Variable	N	Mean	SD	P5	P95	Min	Max
Real regional GDP growth rate	15	-0.02	0.01	-0.05	-0.00	-0.05	-0.00
Urban Sprawl	15	71.72	10.68	38.96	84.82	38.96	84.82
Government size (Public expenditure/GDP)	15	0.51	0.09	0.37	0.65	0.37	0.65
Expenditure decentralization index (subnational/total expenditure)	15	0.30	0.05	0.14	0.36	0.14	0.36
Inverse measure of vertical fiscal imbalance (total local own revenues/total loc	15	0.41	0.20	0.26	0.89	0.26	0.89
Inflation rate	15	0.03	0.00	0.03	0.03	0.03	0.03
Export - Extra EU (% GDP)	0						
Import - Extra EU (% GDP)	0						
Centre-Left regional government (dummy)	15	0.73	0.46	0.00	1.00	0.00	1.00
Margin of victory (no. of seats in regional parliament)	15	12.60	4.55	6.00	24.00	6.00	24.00
Population (millions)	15	3.24	2.40	0.32	9.11	0.32	9.11
Population 0-14 (% total population)	15	14.03	2.41	10.48	19.13	10.48	19.13
Population over 65 (% total population)	15	18.98	2.97	13.76	24.83	13.76	24.83
Life expectancy over 65 (no. of years)	15	19.87	0.39	18.67	20.47	18.67	20.47
Infant mortality rate	15	8.77	2.45	4.02	12.03	4.02	12.03
Total expenditure CG (% GDP)	15	0.35	0.06	0.26	0.45	0.26	0.45
Total expenditure LG (% GDP)	15	0.06	0.02	0.04	0.09	0.04	0.09
Total expenditure RG (% GDP)	15	0.09	0.03	0.04	0.13	0.04	0.13
Own tax revenue CG (% total local expenditure)	15	0.12	0.02	0.09	0.17	0.09	0.17
Own tax revenue LG (% total local expenditure)	15	0.06	0.02	0.03	0.09	0.03	0.09
Own tax revenue RG (% total local expenditure)	15	0.05	0.03	0.02	0.12	0.02	0.12

Table 14: Descriptive statistics – year 2009

Variable	N	Mean	SD	P5	P95	Min	Max
Real regional GDP growth rate	15	-0.04	0.01	-0.06	-0.02	-0.06	-0.02
Urban Sprawl	15	70.67	10.51	45.98	79.11	45.98	79.11
Government size (Public expenditure/GDP)	15	0.53	0.09	0.39	0.69	0.39	0.69
Expenditure decentralization index (subnational/total expenditure)	15	0.29	0.04	0.18	0.36	0.18	0.36
Inverse measure of vertical fiscal imbalance (total local own revenues/total loc	15	0.46	0.14	0.30	0.76	0.30	0.76
Inflation rate	15	0.01	0.00	0.01	0.01	0.01	0.01
Export - Extra EU (% GDP)	0						
Import - Extra EU (% GDP)	0						
Centre-Left regional government (dummy)	15	0.73	0.46	0.00	1.00	0.00	1.00
Margin of victory (no. of seats in regional parliament)	15	12.60	4.55	6.00	24.00	6.00	24.00
Population (millions)	15	3.40	2.57	0.32	9.80	0.32	9.80
Population 0-14 (% total population)	0						
Population over 65 (% total population)	0						
Life expectancy over 65 (no. of years)	0						
Infant mortality rate	0						
Total expenditure CG (% GDP)	15	0.38	0.06	0.29	0.48	0.29	0.48
Total expenditure LG (% GDP)	15	0.06	0.02	0.04	0.09	0.04	0.09
Total expenditure RG (% GDP)	15	0.09	0.03	0.05	0.13	0.05	0.13
Own tax revenue CG (% total local expenditure)	15	0.12	0.02	0.08	0.16	0.08	0.16
Own tax revenue LG (% total local expenditure)	15	0.05	0.01	0.03	0.08	0.03	0.08
Own tax revenue RG (% total local expenditure)	15	0.05	0.02	0.03	0.09	0.03	0.09

Table 15: Dynamic estimates (Dependent variable: regional real GDP growth rate, GMM-Diff estimator)

VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(7)
GDP Growth rate lag	-0.120196 (0.110)	-0.113309 (0.107)	-0.066952 (0.126)	-0.110343 (0.159)	-0.029646 (0.128)	-0.014074 (0.135)	-0.015339 (0.137)
Urban Sprawl	-0.008503 (0.005)	-0.008606 (0.005)	-0.008411 (0.005)	-0.010610* (0.005)	-0.011819** (0.005)	-0.013208** (0.006)	-0.013088** (0.006)
Gov. Size lag	0.207871 (0.129)	1.000216 (0.662)	0.638037 (0.646)	1.345712 (1.017)	11.457533*** (3.836)	13.275617*** (3.653)	13.313956*** (3.705)
Squared Gov. Size lag		-0.690302 (0.563)	-0.360205 (0.543)	-1.135953 (0.954)	-10.732333*** (3.470)	-2.716329*** (3.439)	-2.769748*** (3.496)
Gov. Size*VFI lag				-2.047294 (1.898)		-3.478488 (1.989)	-3.515956 (2.010)
Squared Gov. Size*VFI lag				2.078718 (1.860)		3.591092* (2.002)	3.679813* (2.040)
Gov. Size*Dec. lag					-36.233921** (12.959)	-7.177588*** (12.369)	-37.179057*** (12.509)
Sq. Gov. Size*Dec. lag					34.829346** (11.581)	36.278145*** (11.171)	36.352909*** (11.338)
Gov. Size*VFI*Dec. lag							-0.219765 (0.586)
Population log	0.171083 (0.186)	0.163005 (0.197)	0.228276 (0.175)	0.260331 (0.170)	0.014288 (0.196)	0.049995 (0.166)	0.054528 (0.168)
CL reg. government	0.001855 (0.008)	0.001924 (0.007)	-0.000148 (0.007)	-0.000024 (0.007)	0.000770 (0.007)	0.001256 (0.007)	0.001089 (0.007)
Margin of victory lag	0.000200 (0.001)	0.000125 (0.001)	0.000243 (0.001)	0.000042 (0.001)	0.000177 (0.001)	-0.000038 (0.001)	-0.000020 (0.001)
Inflation rate lag	-2.128706*** (0.471)	-2.066645*** (0.455)	-2.445682*** (0.489)	-2.204887*** (0.689)	-2.471081*** (0.669)	-2.418318*** (0.590)	-2.449254*** (0.573)
Economic openness lag	0.067713 (0.079)	0.091503 (0.080)	0.130650 (0.092)	0.126330 (0.111)	0.165203 (0.104)	0.160093 (0.102)	0.163138 (0.101)
Dec. Index			0.342384** (0.138)	0.891589 (0.998)	11.047830*** (3.612)	11.050220*** (3.560)	11.208919*** (3.646)
VFI Measure			0.059676** (0.020)	0.648503 (0.487)	0.191465** (0.073)	0.988933* (0.494)	1.024121* (0.502)
Squared VFI measure				-0.097850 (0.082)	-0.125825* (0.067)	-0.113473 (0.082)	-0.122180 (0.075)
Squared Dec. Index				-0.992125 (1.712)	-2.681842 (1.576)	-2.563023 (1.736)	-2.777901 (1.585)
Population +65 years %				0.254751 (0.560)	0.007647 (0.514)	0.068311 (0.554)	0.075972 (0.559)
Population 0-14 years %				0.268628 (0.642)	0.696471 (0.692)	0.719113 (0.650)	0.697364 (0.627)
Year	3.316629*** (1.058)	3.070605** (1.197)	3.559719** (1.257)	2.721774 (1.663)	2.033821 (1.947)	2.163175 (1.764)	2.206731 (1.771)
Squared Year	-0.000828*** (0.000)	-0.000767** (0.000)	-0.000889** (0.000)	-0.000680 (0.000)	-0.000508 (0.000)	-0.000540 (0.000)	-0.000551 (0.000)
Observations	120	120	120	120	120	120	120
Number of regions	15	15	15	15	15	15	15
AR(1) test statistic	-3.219	-3.263	-3.008	-2.975	-3.016	-2.970	-2.946
p-value of AR(1) statistic	0.00129	0.00110	0.00263	0.00293	0.00256	0.00297	0.00322
AR(2) test statistic	-1.992	-1.775	-1.365	-1.735	-1.773	-1.598	-1.622
p-value of AR(2) statistic	0.0464	0.0759	0.172	0.0828	0.0763	0.110	0.105
Sargan statistic	106.6	106.5	99.12	101.2	100.9	100.3	100.4
Degrees of fr. for Sargan	95	94	92	86	86	84	83
p-value of Sargan statistic	0.195	0.178	0.288	0.125	0.130	0.108	0.0942

Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Table 16: Static estimates (Dependent variable: regional GDP growth rate, Fixed Effect estimator)

VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(7)
GDP Growth rate lag	-0.119890	-0.114570	-0.068272	-0.102436	-0.043636	-0.028616	-0.029851
	(0.110)	(0.108)	(0.125)	(0.142)	(0.120)	(0.130)	(0.132)
Urban Sprawl	-0.005935	-0.005740	-0.005996	-0.006474	-0.008954*	-0.009219*	-0.009095*
	(0.005)	(0.004)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)
Gov. Size lag	0.123950	0.805032	0.584386	0.044159	10.824048***	12.223845***	12.263207***
	(0.105)	(0.603)	(0.547)	(0.961)	(3.345)	(3.723)	(3.725)
Squared Gov. Size lag		-0.594997	-0.395585	0.015607	-10.311322***	-11.863938***	-11.914654***
		(0.517)	(0.466)	(0.900)	(2.990)	(3.482)	(3.482)
Gov. Size*VFI lag				0.500153		-1.972379	-2.026279
				(1.666)		(2.098)	(2.133)
Squared Gov. Size*VFI lag				-0.427546		2.105292	2.211527
				(1.650)		(2.147)	(2.216)
Gov. Size*Dec. lag					-34.791014***	-36.646006***	-36.632962***
					(10.825)	(10.959)	(11.027)
Sq. Gov. Size*Dec. lag					33.740109***	35.944258***	35.992307***
					(9.680)	(10.056)	(10.099)
Gov. Size*VFI*Dec. lag							-0.224749
							(0.681)
Population log	0.157294	0.158459	0.203062	0.220351	-0.027617	-0.003897	0.001196
	(0.169)	(0.177)	(0.169)	(0.147)	(0.173)	(0.137)	(0.137)
CL reg. government	0.001547	0.001399	0.000550	-0.000065	0.000212	0.000750	0.000593
	(0.007)	(0.007)	(0.007)	(0.006)	(0.007)	(0.007)	(0.007)
Margin of victory lag	0.000325	0.000252	0.000180	0.000199	0.000217	0.000169	0.000185
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Inflation rate lag	-2.210901***	-2.147875***	-2.394716***	-2.311169***	-2.458366***	-2.470758***	-2.498412***
	(0.423)	(0.414)	(0.431)	(0.599)	(0.578)	(0.505)	(0.476)
Economic openness lag	0.066702	0.083346	0.112674	0.109430	0.138509*	0.133342*	0.135799*
	(0.053)	(0.056)	(0.066)	(0.082)	(0.066)	(0.067)	(0.066)
Dec. Index			0.266469*	0.995183	10.634826***	10.957546***	11.112197***
			(0.133)	(0.714)	(2.947)	(2.948)	(2.927)
VFI measure			0.048643***	0.019691	0.193913**	0.622537	0.662862
			(0.016)	(0.413)	(0.074)	(0.496)	(0.515)
Squared VFI measure				-0.097453	-0.134135*	-0.118940	-0.128302
				(0.076)	(0.064)	(0.078)	(0.074)
Squared Dec. Index				-1.229629	-2.762231**	-2.723334**	-2.930114**
				(1.269)	(0.969)	(1.049)	(0.986)
Population +65 years %				0.037850	-0.141315	-0.123327	-0.115350
				(0.456)	(0.463)	(0.442)	(0.469)
Population 0-14 years %				0.334002	0.616343	0.671346	0.652089
				(0.640)	(0.665)	(0.643)	(0.638)
Year	3.719194***	3.476909***	3.909419***	3.289137**	2.316576	2.480136*	2.518863*
	(0.795)	(0.912)	(0.991)	(1.377)	(1.526)	(1.340)	(1.329)
Squared Year	-0.000929***	-0.000868***	-0.000976***	-0.000821**	-0.000579	-0.000619*	-0.000629*
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Constant	-3725.797005***	-3483.502476***	-3916.633550***	-3295.381714**	-2320.774018	-2485.173107*	-2524.076444*
	(795.803)	(912.998)	(991.524)	(1,379.767)	(1,528.811)	(1,341.795)	(1,331.090)
Observations	135	135	135	135	135	135	135
R^2	0.220	0.226	0.307	0.333	0.385	0.390	0.390
Number of regions	15	15	15	15	15	15	15

Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1