Relazione finale STM Marco Modica. Newcastle Business School, 02/10/2015 – 25/10/2015

Object

The project provides a study of the hierarchical structure of the cities within the EU aiming at identifying whether drivers as globalization, creation of common area and currency have had an impact on localization of people in EU. More in details, this project provides an accurate: i) description of agglomeration of population over different geographic locations ii) description of population mobility; iii) exploration of the impact of the underlying economic mechanism on localization of people

Attività svolta

In the first week we organized city population data already retrieved from the National Statistics Offices of the Member States. The time windows vary according to the availability of the data from any Statistical Office, however when we present the cross-countries analysis we adopt a unique time span namely from 1991 to 2011. As the results of this first step we report here a table summarizing all the data retrieved from the National Statistical Offices of the selected countries.

Tab. 1: Data description of selected countries

Paese	Periodo	Tipo di dato	# Comuni	Dimensione Paese	Popolazione Totale
Austria	1869 - 2011	Decennale	2,300	83,900	8.4
	2002 -2015	annuale			
Belgium	1990 - 2015	Quinquennale fino al 2004, poi annuale	589	30,528	11.2
	1985 - 2011	Settennale	5301	117,000	7.3
Bulgaria	1934 - 1992	Decennali	-	-	-
	1992 - 2014	annuali	-	-	-
Cyprus	1982 - 2011	Decennale	392	9,251	0.8
Czech Republic	1991 - 2014	Annuali	6,253	78,866	10.5
Denmark	1976 - 2011	Quinquennale fino al 1989, poi biennale fino al 1996 poi annuale (buco nel 2005)	1678	42,915	4.8
Estonia	1989 - 2015	Prima osservazione 1989-2000, poi annuali	231	45,339	1.3
Finland	1990 - 2010	annuale	336	338,424	5.4
France	1962 - 2012	settennale (circa)	36,553	551,695	63.34
Germany	1991 - 2011	decennale	12,000	357,168	67.8

Greece	1991 - 2011	decennale	9,145 settlement e 326 municipality	131,957	10.75
Hungary	1870 - 2011	decennale	3153	93,030	9.85
Ireland	1991 - 2011	5 anni	900	84,421	3.91
Italy	1891 - 2011	10 anni	8092	301,388	58.9
	1982 - 2015	annuali	-	-	-
Lithuania	2001 - 2015	annuali	106	65,200	1.97 (3.33)
Luxembourg	1821-2001	decennali (circa)	116	2,586	0.57
	2001-2015	annuali	-	-	-
Malta	1901 -2000	varia (T=10)	68	316	0.43
	2000 - 2013	annuale	-	-	-
Netherlands	1960 - 2011	annuale	418	41,543	16.11
Poland	1996 - 2014	annuale	946	312,679	23.22(38.48)
Portugal	1991 - 2013	annuale	308	92,391	10.49
Romania	1992 - 2015	annuale	3,181	238,391	22.3
Slovak	1991 - 2011	decennale	2,891	49,037	5.43
Slovenia	1999 - 2015	semstrali	215	20,273	2.01
Spain	1991 - 2011	decennali	8,000	505,990	46.44
Sweden	1990 - 2010	5 anni	2,000 (circa)	450,295	9.82

Summarizing statistics, selection data and other main characteristics of the countries selected have been reported in Table 2 and Table 3.

Between the second and the third week, we have studied the agglomeration of population over different geographic locations by means of the typical tools: rank-size regression (OLS); and Kernel regression (Nadaraya-Watson method). Results on the agglomeration of population are reported in Table 4a and 4b, while the results of the Nadarya- Whatson method are reported in Figg. 1- 5

Table 2: Spatial Economic characteristics of selected countries

Country	Population (thousands)	Surface (km^2)	Population Density (people $*km^2$)	Rural Population	Population in the largest city (% tot urban)*	Agricultural land (% tot)*	Road Density (length *1000 km^2)**	Rail density (length *1000 km^2)**
Austria	8,419	82,430	102	32.3	30.0	38.4	1,278.9	76.3
Belgium	11,008	30,280	364	2.5	18.0	45.0	4,987.4	105.9
Bulgaria	7,476	108,560	69	26.9	22.0	46.3	362.5	37.3
Cyprus	1,117	9,240	121	29.5	31.4	13.5	1,586.1	0
Czech Republic	10,546	77,250	137	26.6	15.1	54.9	1,619.4	122.1
Denmark	5,574	42,430	131	13.1	24.4	62.1	1,698.7	61.9
Estonia	1,340	42,390	32	30.5	42.8	22.0	1,283.1	26.4
Finland	5,387	303,900	18	16.3	32.6	7.6	230.9	17.5
France	65,437	547,660	119	14.3	20.7	53.4	1,870.4	54.5
Germany	81,726	348,610	234	26.1	5.7	48.4	1,805.2	117.6
Greece	11,304	128,900	88	38.5	47.1	63.6	890.7	19.5
Hungary	9,971	90,530	110	30.6	25.0	63.9	2,123.2	99.0
Ireland	4,487	68,890	65	37.8	39.5	60.8	1,366.6	46.1
Italy	60,770	294,140	207	31.6	8.2	47.3	1,618.4	67.2
Latvia	2,220	62,180	36	32.3	46.2	29.5	1,131.4	34.7
Lithuania	3,203	62,670	51	32.9	24.4	42.9	1,240.9	27.1
Luxembourg	517	2,590	200	14.6	21.9	50.6	2,018.2	106.2
Malta	419	320	1309	5.2	50.9	28.1	696	0
Netherlands	16,696	33,730	495	16.9	7.7	56.8	3,294.7	69.7
Poland	38,216	304,200	126	39.1	7.3	53.0	1,356.0	62.1
Portugal	10,637	91,470	116	39.0	44.0	40.3	899.9	36.0
Romania	21,390	230,060	93	47.2	16.5	58.8	342.8	45.2
Slovak Republic	5,440	48,090	113	45.2	14.1	40.1	892.5	73.9
Slovenia	2,052	20,140	102	50.1	26.4	23.2	1,920.3	60.6
Spain	46,235	498,800	93	22.6	16.2	55.5	1,348.1	30.3
Sweden	9,453	410,340	23	14.8	16.3	7.5	1,272.2	25.8
United Kingdom	62,641	241,930	259	20.4	15.5	71.6	1,619.1	67.6

Table 3: Description of the data and estimated threshold of the 27 EU Member States

Country	Population* (thousands)	N. of Localities*	Average population per locality	Threshold*	Population size at truncation*
Austria	8,431	2,357	3,577.00	654	2,497
Belgium	10,928	589	18,553.48	184	17,691
Bulgaria	7,327	5,059	1,448.31	1,405	571
Cyprus	839	388	2,162.37	67	1,966
Czech Republic	10,335	6,216	1,662.64	1,891	728
Denmark	4,832	1,469	3,289.31	392	1,528
Estonia	1,324	226	5,858.41	187	962
Finland	5,375	336	15,997.02	81	14,067
France	64,304	36,674	1,753.39	3,377	3,052
Germany	81,752	11,421	7,158.04	838	17,164
Greece	10,934	1,034	10,574.49	492	4,638
Hungary	9,986	3,153	3,167.14	1,012	1,526
Ireland	2,318	858	2,701.63	293	945
Italy	59,571	8,092	7,361.72	1,170	10,300
Latvia	2,261	523	4,323.14	372	853
Lithuania	2,171	102	21,284.31	30	11,623
Luxembourg	512	115	4,452.17	90	1242
Malta	412	67	6,149.25	13	10,770
Netherlands	14,432	2,025	7,126.91	175	14,885
Poland	38,200	2,478	15,415.66	1,099	8,293
Portugal	10,132	3,867	2,620.12	1,196	1,485
Romania	19,600	3,182	6,159.65	1,659	2,979
Slovak Republic	5,435	2,888	1,881.93	1,051	938
Slovenia	1,915	3,074	622.97	1,496	222
Spain	47,190	8,115	5,815.16	513	15,851
Sweden	8,003	1,912	4,185.67	249	4,518
United Kingdom	52,518	3,121	16,827.30	206	46,357

* The data is referred to the last observation in the sample

Table 4a Rank-size coefficients and city thresholds of the 27 EU Member States (first and last observation available)

Country	Period	Rank-size coefficient (first year available)	Upper Tail	Rank-size coefficient (last year available)	Upper Tail
Austria	1981-2011	1.469 (0.0645)	1036	1.440 (0.0796)	654
Belgium	1990-2011	1.691 (0.1713)	195	1.724 (0.1798)	184
Bulgaria	1985-2011	1.114 (0.0383)	1686	1.021** (0.0385)	1405
Cyprus	2001-2011	0.773 (0.0756)	209	0.994** (0.1717)	69
Czech Republic	1996-2011	1.014** (0.0318)	2025	1.066** (0.0347)	1891
Denmark	1976-2011	0.876 (0.0377)	1078	0.949** (0.0676)	392
Estonia	2001-2011	1.096** (0.1142)	184	1.141** (0.1929)	70
Finland	1990-2010	1.226** (0.1380)	158	1.250** (0.1977)	81
France	1975-2009	1.039** (0.0174)	7167	1.200 (0.0292)	3337
Germany	1991-2011	1.284 (0.0619)	859	1.322 (0.0646)	838
Greece	1991-2001	1.182 (0.0061)	544	1.164 (0.0077)	492
Hungary	1980-2011	1.137 (0.0490)	1075	1.110* (0.0493)	1012
Ireland	1991-2011	0.787 (0.0453)	602	0.987** (0.0815)	293
Italy	1991-2011	1.300 (0.0465)	1563	1.400 (0.0579)	1170
Latvia	2001-2009	1.159* (0.0805)	415	1.079** (0.0791)	372
Lithuania	1989-2011	0.904** (0.2506)	26	0.948** (0.2449)	30
Luxembourg	1821-2011	2.139 (0.4322)	49	1.197** (0.1784)	90
Malta	1901-2011	1.084** (0.2395)	41	4.049 (0.2597)	13
Netherlands	2001	-	-	1.199** (0.1282)	175
Poland	1988-2010	1.351 (0.0485)	1553	1.365 (0.0582)	1099
Portugal	2001-2011	1.159 (0.0466)	1239	1.115* (0.0456)	1196
Romania	2011	-	-	1.402 (0.0487)	1659

* Significant at 1% ** significant at 5%; for rank-size coefficient significantly not different from 1

Table 4b: Rank-size coefficients and city thresholds of the 27 EU Member States (first and last observation available)

Country	Period	Rank-size coefficient (first year available)	Upper Tail	Rank-size coefficient (last year available)	Upper Tail
Slovakia	1991-2010	1.135 (0.0478)	1130	1.169 (0.0510)	938
Slovenia	2001-2011	1.203 (0.0420)	1639	1.204 (0.0440)	1496
Spain	1991-2011	1.110** (0.0615)	651	1.198 (0.0748)	513
Sweden	1990-2010	1.136** (0.1026)	245	1.085** (0.0972)	249
United Kingdom	1991-2001	1.459 (0.1636)	159	1.467 (0.1445)	206
Euro Area	2001	-	-	1.377 (0.00528)	2660
European Union (excluded Romania)	2001	-	-	1.401 (0.0526)	1419

* Significant at 1% ** significant at 5%, for rank-size coefficient significantly not different from 1

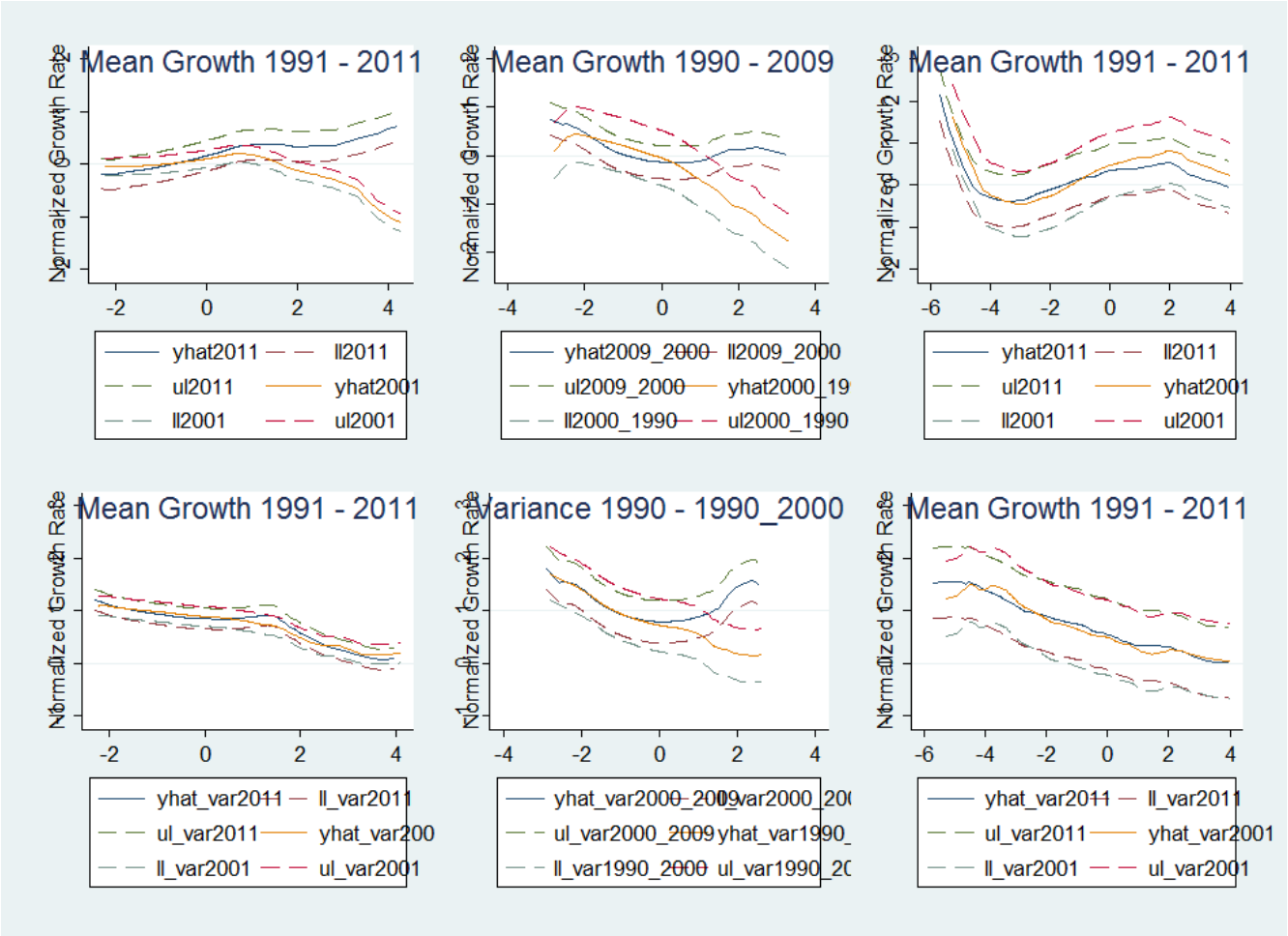

Fig. 1 Nadaraya – Watson –estimate for mean and variance for Austria, Belgium and Cyprus comparison between the population growth 1990-2000 and 2001 – 2011

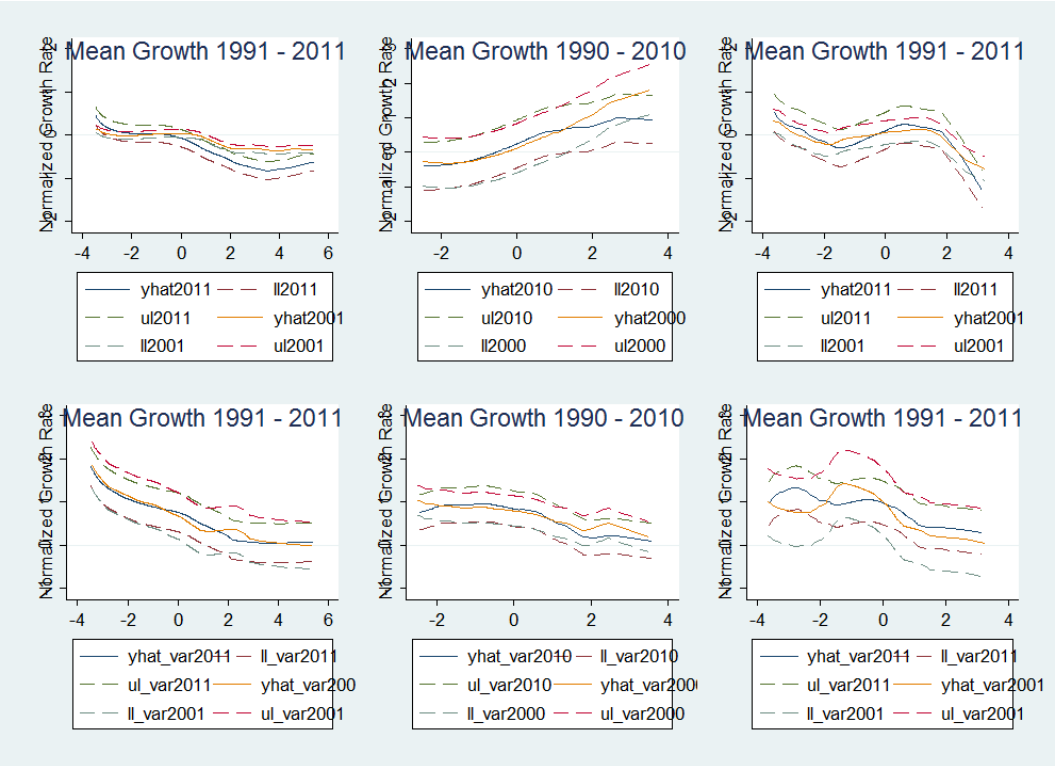

Fig. 2 Nadaraya – Watson –estimate for mean and variance for Czech Republic, Finland and Greece comparison between the population growth 1990-2000 and 2001 – 2011

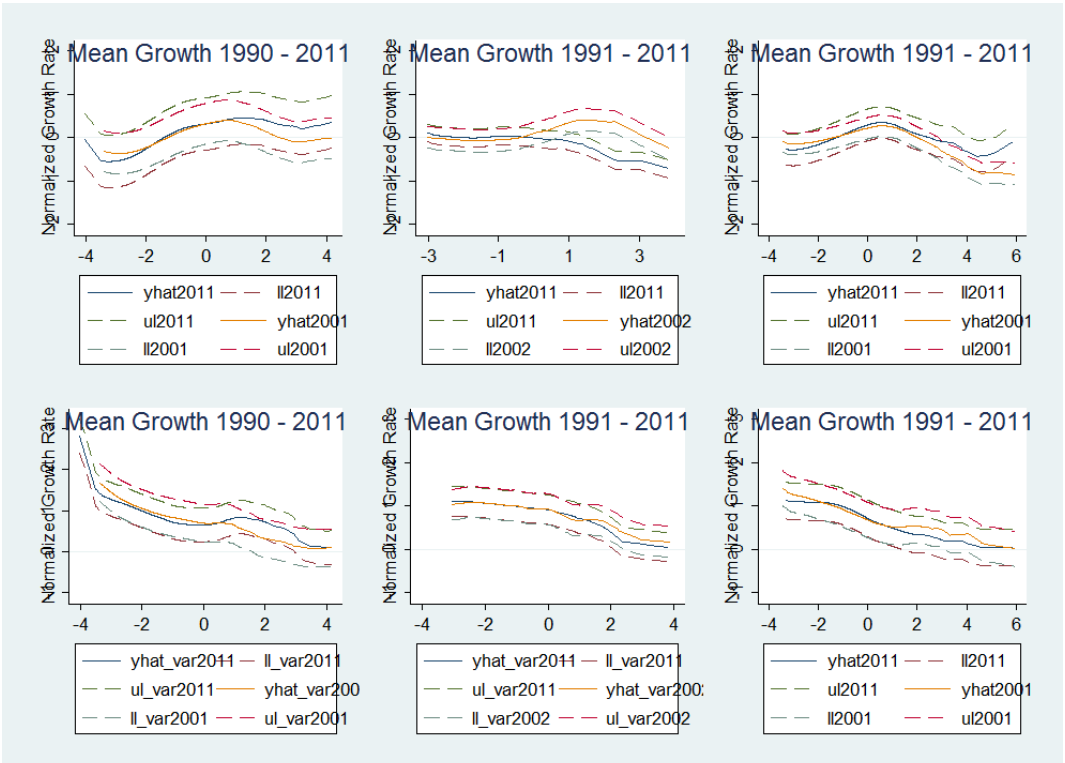

Fig. 3 Nadaraya – Watson –estimate for mean and variance for Hungary, Ireland and Italy comparison between the population growth 1990-2000 and 2001 – 2011

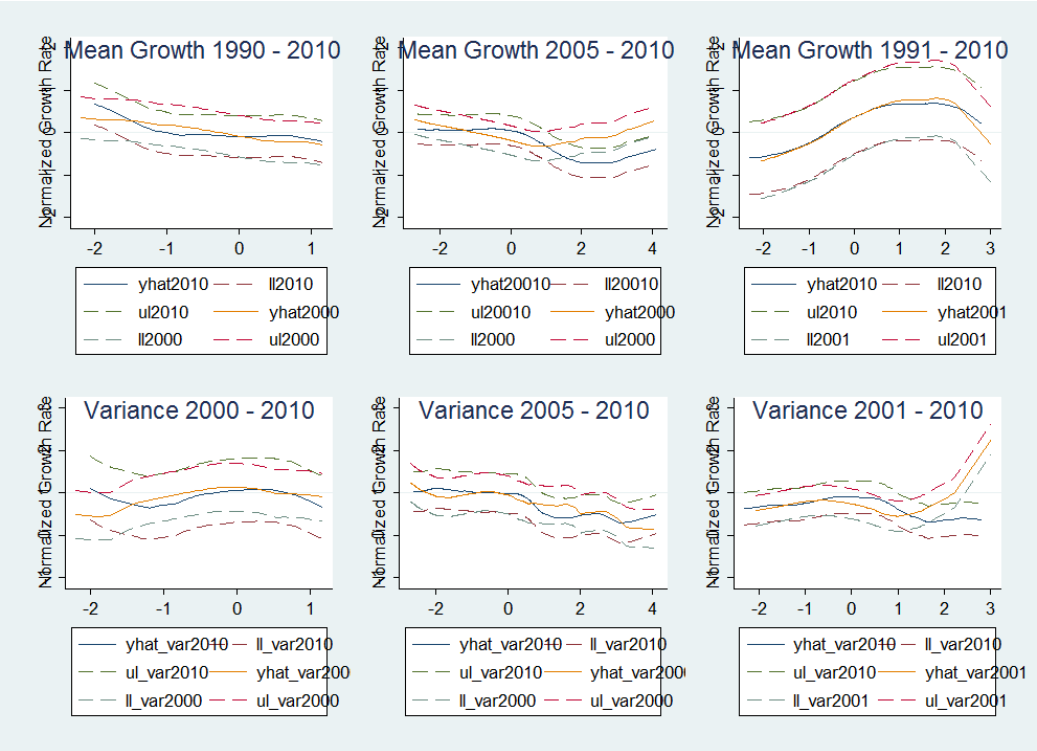

Fig. 4 Nadaraya – Watson –estimate for mean and variance for Malta, Portugal and Romania comparison between the population growth 1990-2000 and 2001 – 2011

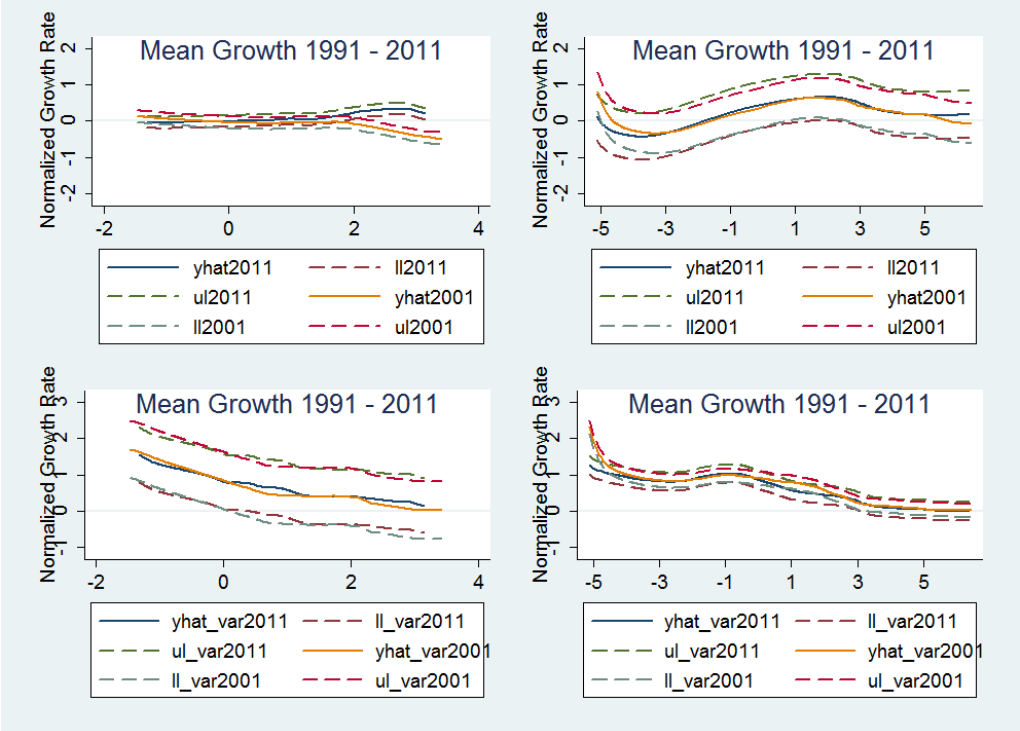

Fig. 5 Nadaraya – Watson –estimate for mean and variance for Netherlands and Spain comparison between the population growth 1990-2000 and 2001 – 2011

Comments

The urban structures between Member States of the EU is very different for historical, geographical and economic reasons. However, the population is spread across geographic areas in a way that, although continuously changing, is not possible to define as random. Indeed, countries have faced a strong tendency toward agglomeration due to factors as liberalization, trade openness and so on. Moreover, European States have faced a political process that might have forced a more depth agglomeration of people. Here, then, we want to study agglomeration of people in EU during the period 1990 -2011. This involves a static analysis, accounting for the way the population is gathered over different geographic locations, and a dynamic analysis accounting for the evolution over time of the distribution of the population over cities. Finally, we explore the impact of the underlying economic mechanism and of the constitution the Euro and the Schengen Area on population localization.

The aim of our research work was to draw the current city system of the Member States of the European Union firstly for any single country and subsequently as a whole state. Given this picture we aim to explore if and how the creation of European Union affects the structure of the system of cities of the Member States and primarily if EU city system can be seen as an integrated area. The main objective was the study of the agglomeration forces within all the Member States and the EU as a whole and for this reason we used two very well-known empirical regularities that address (indirectly) this issue, namely Zipf's law and Gibrat's law.

We started our analysis providing an accurate description of agglomeration. This has involved a static analysis, supported by Zipf's law, accounting for the way the population is gathered over different geographic locations and, a dynamic analysis, supported by Gibrat's law, accounting for the evolution over time of the distribution of the population over different locations.

Further works

Analysis of population growth needs to be carefully examined. Differences in population growth rate before and after introduction of Euro need to be particularly addressed.