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# REVIEW ARTICLES AND REPORTS

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## REGIONAL INEQUALITIES IN THE NEW EUROPEAN UNION MEMBER-STATES: IS THERE A 'POPULATION SIZE' EFFECT?

### 1. INTRODUCTION

The new European Union member-states (EU NMS),[1] that were formerly planned economies of the Eastern bloc, provide a quasi laboratory environment (natural experiment-like conditions) for the empirical examination of spatial inequalities. The experience of the EU NMS is a unique situation, where relatively closed economic systems opened, almost at once, to the world economy and, at the same time, market mechanisms replaced central planning (Petrakos, 2008; Kallioras and Petrakos, 2009). Thus, understanding the driving forces that configure the spatial pattern of development in the EU NMS may provide valuable insight for theory and policy.

The paper evaluates regional inequalities in the EU NMS, in terms of *per capita* Gross Domestic Product (GDP), trying to detect a 'population size' effect. Population size is considered to be one of the driving forces of spatial inequality. Traditionally, small countries were considered to be almost 'dimensionless' or 'one-region economies' (Petrakos *et al*., 2005a) and, thus, intuitively, spatial inequality in small countries was expected to be diminutive (Felsenstein and Portnov, 2005). The spatial variation of income is considered to be rather insignificant in small countries, which affects the mix of development policies disproportionately against spatial policies and in favour of sectoral policies (Petrakos *et al*., 2005a).

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[1] The classification EU NMS includes Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Slovakia and Slovenia that became EU member-states in May 2004, and Bulgaria and Romania that became EU member-states in January 2007.

The analysis covers the period 1990–2005, incorporating not only the shocks of the early transition period but also more recent trends, and is based on, disaggregated at the Nomenclature of Territorial Units for Statistics (NUTS) 3 spatial level,[2] data derived from European Regional Database (Cambridge Econometrics, 2008). The next section of the paper presents the basic demographic and economic characteristics of the EU NMS at both the country and the regional level. The third section discusses the findings concerning the level and the evolution of regional inequalities in the EU NMS and the role of population size. The last section offers the conclusions.

## 2. BASIC DEMOGRAPHIC AND ECONOMIC CHARACTERISTICS OF THE NEW EUROPEAN UNION MEMBER-STATES

Covering an area from the Balkan Peninsula to the Baltic Sea, the EU NMS present high degree of heterogeneity.

Table 1 presents the basic demographic and economic characteristics (year 2005) of each EU NMS at the country level (NUTS 0 spatial level). The great majority of the EU NMS can be considered small or very small, in terms of area and population size. Exceptions are Poland and Romania that are, by far, the largest EU NMS. Concerning population density, a 'core-periphery' pattern seems to emerge, as the EU NMS coming from Central Europe (i.e. Czech Rep., Poland, Slovakia, Hungary and Slovenia) are more densely populated comparing to the EU NMS coming from the Balkans (i.e. Romania and Bulgaria) and the Baltic (i.e. Lithuania, Latvia and Estonia). Notable is the case of Romania since it possesses barely the 6th place in the ranking, despite being 2nd in the corresponding rankings of area and population size. In terms of GDP, the EU NMS classification is extremely interesting. Poland has, by far, the largest economy. Czech Rep., however, holds the 2nd place, recording GDP levels higher than that of Romania, even though it is smaller in terms of area and population size. Analogous are the cases of Slovakia, Slovenia and Lithuania that have GDP levels greater than that of Bulgaria. In terms of GDP *per capita*, Slovenia presents the highest level of development, having a figure that reaches the respective figures of the EU member-states coming from the European South (i.e. Portugal and Greece) (Petrakos *et al.*, 2005b). Bulgaria and Romania are far worse and, unavoidably, possess the lowest places in the ranking.

[2] The choice of the spatial level of analysis may have some impact on the results. This has to do with the well-known modifiable areal unit problem (MAUP) (Arbia 1989). Even though NUTS 2 is the spatial level adopted by the EU for the allocation of the structural funds, the choice of the NUTS 3 spatial level appears to be the most appropriate in the case of the EU NMS since many of them (i.e. Estonia, Latvia, Lithuania and Slovenia) do not have NUTS 2 regions (i.e. the whole country constitutes one NUTS 2 region).

Table 1. Basic demographic and economic characteristics, NUTS 0 spatial level, 2005

| Country | Area ($km^2$) | Population (inh.) | Population density (inh./$km^2$) | GDP (€) (2000 prices) | GDP *per capita* (€/inh.) (2000 prices) |
|---|---|---|---|---|---|
| Bulgaria | 111,002 | 7,740,000 | 70 | 17,506,000,000 | 2,262 |
| Czech Rep. | 78,860 | 10,247,000 | 130 | 73,524,000,000 | 7,175 |
| Estonia | 45,228 | 1,345,000 | 30 | 9,086,000,000 | 6,755 |
| Hungary | 93,029 | 10,087,000 | 108 | 65,511,000,000 | 6,495 |
| Latvia | 64,589 | 2,300,000 | 36 | 12,560,000,000 | 5,461 |
| Lithuania | 65,300 | 3,414,000 | 52 | 18,010,000,000 | 5,275 |
| Poland | 312,685 | 38,169,000 | 122 | 215,701,000,000 | 5,651 |
| Romania | 238,391 | 21,632,000 | 91 | 53,286,000,000 | 2,463 |
| Slovakia | 49,035 | 5,401,000 | 110 | 27,625,000,000 | 5,115 |
| Slovenia | 20,273 | 2,000,000 | 99 | 24,769,000,000 | 12,381 |

Source: Cambridge Econometrics (2008).

Table 2 presents the basic demographic and economic characteristics (year 2005) of each EU NMS at the regional level (NUTS 3 spatial level). Particularly, it shows the minimum, average, and maximum figures in terms of population and GDP *per capita*. To begin with, there is no general rule concerning the number of regions in each EU NMS. National particularities and (possible) policy objectives seem to prevail (Petrakos *et al.*, 2005a, b). However, the 5 largest EU NMS in terms of area and population (i.e. Poland, Romania, Czech Rep., Hungary and Bulgaria) have more regions than the 5 smallest (i.e. Slovakia, Lithuania, Latvia, Slovenia and Estonia). Of course, the rankings in terms of area and population size do not correlate perfectly with the ranking in terms of number of regions. Slovenia is a characteristic case since it has more regions than Slovakia, Lithuania, and Latvia, even though it is smaller in terms of area and population. Comparing the average regional populations in the EU NMS, it emerges that Poland, Czech Rep. and Slovakia have the highest figures, whereas Slovenia, Estonia and Bulgaria have the lowest ones. Internal differences between the largest and the smallest region in each EU NMS depend mainly on the size of the capital region (in most of the cases this is the largest region). The smallest differences between the minimum and the maximum regional population figures are observed in Slovakia, Estonia and Latvia. Concerning the average regional GDP *per capita* in EU NMS, it emerges that Slovenia, Czech Rep. and Estonia have the highest figures, whereas Bulgaria and Romania have, by far, the lowest ones. Notable is the fact that the average regional GDP *per capita* figures of Bulgaria and Romania are lower than the minimum regional GDP *per capita* figures of the other EU NMS.

Table 2. Basic demographic and economic characteristics, NUTS 3 spatial level, 2005

| Country (number of regions) | Population (inh.) | | | GDP *per capita* (€/inh.) (2000 prices) | | |
|---|---|---|---|---|---|---|
| | minimum | average | maximum | minimum | average | maximum |
| Bulgaria (28) | 60,879 (Vildin) | 276,421 | 1,225,131 (Sofia Stolitsa) | 1,154 (Targovishte) | 2,160 | 4,508 (Vratsa) |
| Czech Rep. (14) | 304,714 (Karlovarský) | 731,893 | 1,256,425 (Mravskoslezko) | 5,489 (Karlovarský) | 6,719 | 15,268 (Praha) |
| Estonia (5) | 141,591 (Kesk-Eesti) | 269,007 | 519,244 (Põhja-Eesti) | 4,115 (Kirde-Eesti) | 5,664 | 10,321 (Põhja-Eesti) |
| Hungary (20) | 215,565 (Nógrád) | 504,353 | 1,693,279 (Budapest) | 3,581 (Nógrád) | 5,523 | 13,308 (Budapest) |
| Lativa (6) | 244,750 (Vidzeme) | 383,348 | 729,748 (Riga) | 2,641 (Latgale) | 4,485 | 9,872 (Riga) |
| Lithuania (10) | 131,042 (Taurages Apskritis) | 341,389 | 845,723 (Vilniaus Apskritis) | 2,632 (Taurages Apskritis) | 4,528 | 7,654 (Vilniaus Apskritis) |
| Poland (45) | 284,182 (Ełcki) | 848,205 | 2,867,593 (Centralny Śląski) | 3,219 (Bialskopodlaski) | 5,371 | 16,608 (Miasto Warszawa) |
| Romania (42) | 223,551 (Covasna) | 515,053 | 1,928,103 (Bucuresti) | 1,205 (Botosani) | 2,244 | 5,124 (Bucuresti) |
| Slovakia (8) | 554,920 (Trnavský Kraj) | 675,065 | 800,022 (Presovský Kraj) | 3,064 (Presovský Kraj) | 5,266 | 11,867 (Bratislavský Kraj) |
| Slovenia (12) | 45,629 (Zasavska) | 166,706 | 497,645 (Osrednjeslovenska) | 8,435 (Pomurska) | 10,980 | 17,753 (Osrednjeslovenska) |

Source: Cambridge Econometrics (2008).

Figure 1 depicts the geography of regional inequalities in EU NMS, presenting cartographically the GDP *per capita* figures (year 2005) of the EU NMS regions as a percentage of the relative country average. Even though each EU NMS seems to develop its own spatial pattern of economic performance, evident is the prevalence of the metropolitan regions (i.e. capital and major urban regions). However, the remark that it should be made concerns the Central European EU NMS regions situated along the 'east-west' borderline. These regions record relatively high levels of economic performance, indicating that border regions are not lagging-behind regions by definition since the advantages of centrality at the EU level may be stronger and offset the disadvantages of

peripherality at the respective national level (Topaloglou *et al.*, 2005; Kallioras, 2006). The EU NMS spatial pattern of economic performance confirms the early predictions of the literature (Petrakos, 1996, 2000), indicating the significance of agglomeration economies[3] (that favour metropolitan regions) and geography (that favours western border regions).

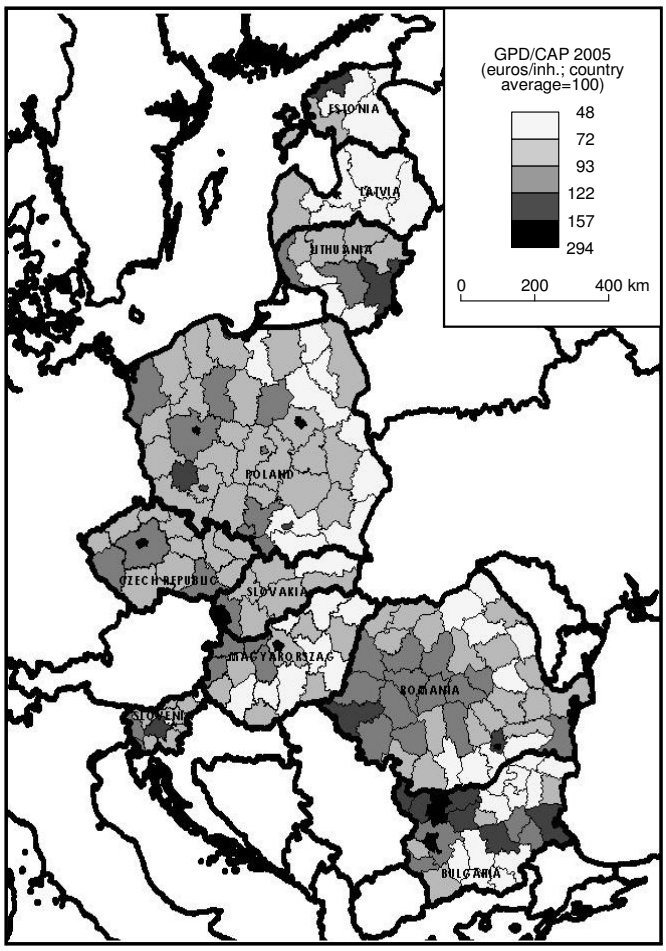


Fig. 1. Economic performance (country average = 100) in *per capita* GDP terms, NUTS 3 spatial level, 2005
Source: Cambridge Econometrics (2008)

[3] These are the cost-related benefits (such as spillovers of know-how and tacit knowledge, forward and backward linkages, efficient labour market pooling) arising from the external environment of firms due to the expansion of their economic sector (localisation economies) and/or due to the expansion of the city services (urbanisation economies) (Segal, 1976; Moomaw, 1981).

## 3. LEVEL AND EVOLUTION OF REGIONAL INEQUALITIES IN THE NEW EUROPEAN UNION MEMBER-STATES: THE ROLE OF POPULATION SIZE

The level and the evolution of regional inequalities is a topic of great importance for both theory and policy (Sala-i-Martin, 1996; Petrakos and Artelaris, 2009). From the policy viewpoint, the level of regional inequalities can be seen as an evaluation of the effectiveness of regional policy measures. From the theoretical viewpoint, the evolution of regional inequalities can serve as an empirical test among alternative growth theories.

The most commonly used index of inequality is the coefficient of variation (CV) or $\sigma$-convergence coefficient defined as the ratio of the standard deviation of a given variable over its mean value (Friedman, 1992; Quah, 1993). The weighted version of the CV (CVw) can, consequently, be defined as the ratio of the weighted standard deviation of a given variable over its mean value (Petrakos *et al.*, 2005a, b). The CVw can be expressed by the formula: $CVw_{c,t} = \sqrt{\sum_{r} (X_r - X_c^{avr})^2 * (W_{r/c})} / X_c^{avr}$, where $t$ denotes the year under consideration, $c$ denotes the country under consideration, $r$ ($\in c$) denotes the region under consideration, $X$ is the variable under consideration (i.e. *per capita* GDP), $X^{avr}$ is the average figure of the variable under consideration, and $W$ is the weighting variable (i.e. relative population). The CVw is a dimensionless index that allows cross-country and over time comparisons of the level of regional inequalities. The value of the CVw is basically determined by the value of the weighted standard deviation of a given variable and, as a result, is affected by all observations. The CVw takes values greater than 0, ranging from lower to higher inequality. Convergence occurs if the CVw falls over time (Barro and Sala-i-Martin, 1995).

Figure 2 depicts the level and the evolution of regional inequalities, according to the CVw, in *per capita* GDP terms, in the EU NMS in selected years (i.e. 1990, 1995, 2000, and 2005) during the period 1990–2005. This is a period of extreme significance since it includes not only the shocks of the early transition (and pre-accession to the EU) period but also the more recent trends that the EU NMS regions have experienced.

The evolution of regional inequalities in the EU NMS indicates that the market-based process of the EU economic integration has been accompanied by a significantly increasing trend. This trend, which was evident from the early pre-accession (to the EU) period (Petrakos, 2001), has continued to prevail in the late 1990s and the early 2000s with an undiminished pace (Petrakos *et al.*, 2005b).

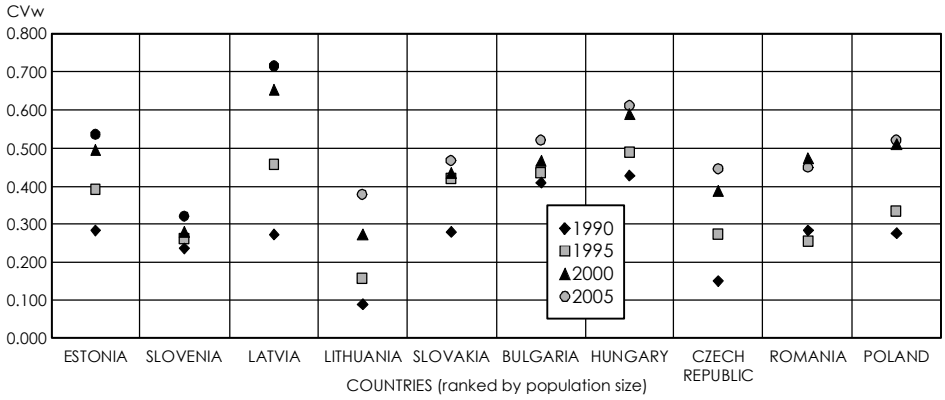


Fig. 2. Level and evolution of regional inequalities in the EU NMS, NUTS 3 spatial level, CVw (GDP *per capita*), years 1990, 1995, 2000 and 2005
Source: Cambridge Econometrics (2008)

The highest levels of regional inequalities (CVw > 0.500) are recorded in Latvia, Estonia, Hungary, Poland, and Bulgaria. This finding allows two very important remarks to be made. The first remark is that in a rather short period, after the collapse of the socialist regime, regional inequalities in many EU NMS have reached levels comparable to (or, even, greater than) the respective levels of many old EU member-states (Petrakos *et al*., 2005b). The second remark is that regional heterogeneity, and not population size by itself, is the criterion for the magnitude of regional inequalities (Beenstock, 2005; Petrakos *et al*., 2005a).

Table 3 presents the econometric relations between the figures of the CVw in the EU NMS and the respective population (POP) figures (at the country level), in selected years (i.e. 1990, 1995, 2000, and 2005) during the period 1990–2005. Though positive, for the majority of the years considered, the relations between the CVw and the population figures in the EU NMS are not statistically significant.[4] These relations provide a clear indication against the detection of a 'population size' effect in the level and the evolution of regional inequalities in the EU NMS.[5]

[4] One possible explanation for the non-statistically significant relation between the CVw and the population figures in the EU NMS is the high levels of volatility that the CVw exhibits among the small-sized EU NMS (for example, see the CVw figures of Latvia and Estonia and the respective values of Slovenia and Lithuania).

[5] The findings of the paper can be set against the findings of a previous article in the field (Petrakos *et al*., 2005a). Studying regional inequalities in the EU NMS for the period 1995–2000 the authors of the aforementioned study concluded, also, against the existence of a 'population size' effect.

Table 3. Economic relation between the CVw and the population (POP) figures in the EU NMS, NUTS 3 spatial level, years 1990, 1995, 2000 and 2005

| |
|---|
| $CVw1990 = 0.259 + 1.20*10^{-9}POP1990$<br>(0.001)*** (0.704) |
| $CVw1995 = 0.357 - 1.01*10^{-9}POP1995$<br>(0.000)*** (0.762) |
| $CVw2000 = 0.434 + 2.11*10^{-9}POP2000$<br>(0.000)*** (0.573) |
| $CVw2005 = 0.492 + 3.23*10^{-10}POP2005$<br>(0.000)*** (0.927) |

*** statistically significant at the 1% level.
Source: Cambridge Econometrics (2008).

## 4. CONCLUSIONS

The EU NMS, that were formerly planned economies of the Eastern bloc, provide a quasi laboratory environment (natural experiment-like conditions) for the empirical examination of spatial inequalities. The paper has evaluated the level and the evolution of regional inequalities, in terms of *per capita* GDP and for the period 1990–2005, in the EU NMS, trying to detect a 'population size' effect. Towards this direction, the CVw has been estimated for each EU NMS, at the NUTS 3 spatial level.

The findings indicate that the market-based process of the EU economic integration has been accompanied by a significantly increasing trend of regional inequalities in the EU NMS. This means that the increasing trend of regional inequalities in the EU NMS, which was evident from the early pre-accession (to the EU) period, has continued to prevail in the late 1990s and the early 2000s with an undiminished pace.

The findings of the paper indicate, also, that the smaller EU NMS have exhibited similarly high levels of regional inequalities with the larger ones. The econometric investigation provides non-statistically significant evidence in favour of a positive relationship between the level of regional inequalities (proxied by the CVw figures) and the size of population (at the country level). Verifying earlier findings in the literature, the findings of the paper provide a clear indication against the detection of a 'population size' effect in the level and the evolution of regional inequalities in the EU NMS.

Hence, it seems that regional heterogeneity, and not population size by itself, is the criterion for the magnitude of regional inequalities. As a result (domestic and EU), policy-makers must realise (be assured) that the implementation of regional (spatial) policies is *sine qua non* for the success of the development policies, overall.

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