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## **Regional inequality and economic growth: interactions of the relationship with the level of economic development and speed of growth<sup>\*</sup>**

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The interaction of inequality and growth and the direction of causality in this relationship have been an extensively discussed topic with several questions but without clear answers both in the theoretical and empirical literature. The current paper contributes into the literature by focusing on the member states of the European Union. The purpose of the paper is to shed light on the effect of the economic development level on the relationship between economic growth and regional inequality. The research hypothesis of a significant interrelation between regional inequality and economic growth is discussed based on the models of new economic geography (NEG). The empirical part of the paper relies on the data of the European Union (EU) member states over the period 1996–2006. The results of the empirical analysis allow concluding that regional inequality has a pro-cyclical character: regional inequality is as a rule higher in countries and time periods when economic growth is faster. However, this relationship varies between the countries of the EU during the period under observation, depending on the development level. While in the Western European countries regional inequality and economic growth are negatively related, in the Eastern European countries regional inequality increases in the periods of fast economic growth. Relying on the NEG models, such differences can be explained by a different weight of internal and foreign markets in trade relations of countries and regions. Possibly the result also refers to disparities in congestion costs in Western and Eastern European core regions. We conclude that growth enhancing policy measures should be implemented at a different regional scale, depending on the level of economic development and growth of the countries. Growth supporting policies in poor countries should first of all concentrate on achieving sustainable national growth, not on reducing regional disparities.

*Keywords:* regional disparities, speed of growth, regional policy, European Union

*JEL:* E30, O18, R12

### **1. Introduction**

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The interaction of economic growth and inequality, whether at the households' or a regional level, has been a widely discussed topic among both theoretical and empirical economists. However, there is no unambiguous answer to the question whether these two phenomena are positively or negatively related (Kanbur 2000). Further, the causal impact can run in both directions. The different and counteracting forces that influence the interaction of economic growth and inequality are therefore also empirically difficult to capture, such that their relationship tends to be weak (Barro 2000).

There are several factors that can influence the direction of the relationship between inequality and growth. According to the Kuznets hypothesis (Kuznets 1955) inequality tends to rise in the course of economic growth in countries at a low development level, while the two phenomena are negatively related if the observed country is well developed. While Kuznets discussed income inequality at the individual level, the question is also of interest in a regional context. First, if in relatively poor countries national economic growth is associated with rising regional disparities without harming the poorer regions in absolute terms, it can be recommendable to concentrate on enhancing the national growth. This helps to improve the living standards in all regions, though the poor regions might perceive a deepening relative impoverishment. Second, if economic growth and regional disparities are associated negatively above a certain development level, it is reasonable to counteract regional disparities. Whether this also enhances economic growth depends naturally on the direction of the causality.

The interactions of economic growth and regional disparities can be related to the literature on economic growth and new economic geography. The neoclassical growth theories (Solow 1956) predict convergence and a decrease of the growth speed in the course of development — a negative relationship between growth and regional disparities. The endogenous growth theories (Romer 1986, 1990) predict that higher growth rates can be achieved by accumulating production factors in one region and, thus, regional disparities might rise during the growth process. The growth theories underlie the empirical convergence analysis as for example in the collections of Cuadrado-Roura and Parellada (2002) and Fingleton (2003).

The new economic geography (NEG) models (starting with Krugman 1991) do not give a clear answer to the interaction of growth and regional disparities. These models enable to differentiate between the long and short term economic growth. The respective conclusions on

the direction of the relationship between growth and regional disparities can differ depending on the observed time horizon.

In this paper the relationship between economic growth and regional disparities is analysed in the countries of the European Union (EU), taking into account the different development levels in the western and eastern part of it. Understanding the relationship and its interaction with the development level helps to design appropriate development and regional policies.

In the empirical analysis it is found that economic growth and regional disparities are related negatively to each other in the Western European countries. In the Eastern European countries regional inequality increases in the periods of fast economic growth. Relying on the NEG models, such differences can be explained by a different weight of internal and foreign markets in trade relations of countries and regions. Possibly the results also refer to disparities in congestion costs in Western and Eastern European core regions.

The rest of the paper is organised as follows. First, the interaction of economic growth and regional disparities is discussed in the context of the NEG models, bringing out the factors that might influence the direction of the relationship. After that, a simple model is estimated based on the EU countries, differentiating between the well developed Western and less developed Eastern European economies. The final section concludes, presents policy implications and suggestions for further research.

## **2. Regional disparities and economic growth in the NEG models**

The NEG models aim to explain why identical regions or countries might develop to have completely different industrial structures when trade costs change. For now, a wide variety of NEG models is available. The models differ with respect to the interregional and intersectoral mobility of the production factors and their composition, the structure of consumer preferences, the relative strength of agglomeration and dispersion forces. An overview of the basic types of the NEG models is available in Baldwin et al. (2003).

In general the NEG models have a two region set up with two production factors and two sectors. In one of the sectors, the modern or manufacturing sector an increasing returns to

scale production technology is used for producing differentiated consumer goods. Trading those goods in the other region than the region in which the goods are produced is associated with trade costs. Therefore, the consumers have to pay an higher price for a good that is not produced in their region of residence. A reduction in the trade costs lowers the price index and the average real income increases.

The modern firms are engaged in monopolistic competition and can set the prices at a mark up over the marginal costs. The firms prefer to locate closer to a large market but prefer to locate far away from their competitors. The consumers, in turn, like to reside in the region with a large number of firms as in this case the consumer price index is lower due to the small share of imported goods. Due to these forces there starts an endogenous agglomeration process below a certain level of trade costs. As the result, one of the regions has an over-proportionate share of the modern firms and also its share of consumption expenditures exceeds that of the other region.

During this process there is economic growth in the gaining region and economic decline in the other region, measured in terms of real income and the modern sector's output. If the amount of production factors is fixed, the total output of the economy does not change, but the average real income rises under certain conditions. For example, Charlot et al. (2006) have shown for the Krugman (1991) model that agglomeration of economic activity can raise the average real income, resulting from the decrease of the average price index — not only because of a decrease in trade costs. Thus, in the course of the transition from the symmetric to a core-periphery equilibrium the increase in regional disparities is associated with the growth of national real income.

In addition to the models where growth is achieved only through changes in the average price index models with an expansion in the number of firms and, thus, products have been developed. The simplest among them is the constructed capital model due to Baldwin (1999). In this model the stock of the production factors is not pre-determined. Instead, the capital stock is assumed to depreciate at a certain rate, but can also be constructed newly. Replacement or additional capital is constructed only if the present value of the expected flow of return to a capital unit (henceforth: expected return to capital) covers at least its construction costs and a capital unit can be employed only in the region where it was

constructed. If the capital construction costs are exactly covered by its expected return the capital stock does not expand further and output growth comes to a stop.

For identical regions the model predicts a symmetric distribution of economic activity over a wide range of trade costs. Only if they decrease sufficiently and one of the regions gets an initial advantage the stability of the symmetric equilibrium is broken. After a transitional adjustment process all modern production takes place in one region. Again, during this transitional process there is growth in the gaining and decline in the losing region. The average price index declines, increasing the national real income. The effects are stronger if the regions are already initially of unequal size, though in that case also partial agglomeration can occur as the spatial equilibrium.

Obviously, growth and inequality interact in both directions in the constructed capital model: inequality has growth effects (increases the disparities in the growth rates of the regions) and growth in one and recession in the other region increases of course regional inequality. Thus, differently from the neoclassical growth theory in this model the richer region grows faster as also described by Myrdal (1957) with the concept of cumulative causation. However, once full agglomeration in the core has been achieved, its growth (considering also the real income) comes to a halt. However, if trade is further liberalised there will be gradual growth in the real income in the other, peripheral region due to lower import prices. This implies also the growth of the national real income. Still, even when trade is fully liberalised, there remain differences in the real and nominal per capita incomes across the two regions. Considering the whole economy's income per capita, the degree of regional inequality has according to the model no effect in the long run if trade costs do not change.

In the spillovers model, a NEG model with endogenous growth (Martin and Ottaviano 1999), inequality and national growth are interrelated not only in the short, but also in the long run. The model of Martin and Ottaviano (1999) is an upgrade of the constructed capital model. For achieving endogeneity of growth, they assume spillovers in the capital construction sector: the more capital there is in the economy, the cheaper it is to construct new. Such spillovers can be spatially restricted or unrestricted. In case of local spillovers it is assumed that the spillovers from the other region are not captured as easily as those from the home region. Thus, the local capital stock has a larger impact on the capital construction efficiency than the capital stock in the foreign region.

The conclusions from the spillovers models coincide largely with those from the constructed capital model (Baldwin et al. 2003), but give also new insights to the interplay of regional inequality and growth. Differently from the constructed capital model there is a continuous growth in the national real per capita income also in the long run equilibrium. However, as in the constructed capital model the income levels differ if the capital stock and modern sector firms are distributed unevenly in the space, also in case of completely free trade. The most important result reveals that the national growth rate is highest if the capital construction activity and thus, the production of the increasing returns goods are present only in one region given that the spillovers are spatially restricted and trade costs are low enough. Moreover, if the share of the modern goods is sufficiently high in the consumption expenditures, the welfare level is higher in the peripheral region than it would be under a symmetric distribution of firms. If trade is gradually liberalised, the relative real incomes of the two regions change similarly to those in the constructed capital model.

The described NEG models imply a positive correlation between regional inequality and the speed of economic growth. Naturally, the models have some drawbacks, that might influence the outcomes of testing this conclusion empirically. First, the models are constructed for a two region economy, but in the reality countries consist of several regions and have interactions with regions from other countries. However, it has been shown for the simple NEG models that agglomerations of economic activity emerge also in a multiregional context (Fujita et al., 1999). For the interaction with a foreign region, Krugman and Livas Elizondo (1996) have shown that integration with a region from abroad motivates a relocation within the home economy towards the border, especially if the foreign region has a large market. As the result, the economic disparities decrease if the core of the economy was before the integration in the other region. A better access to foreign markets can also boost economic growth.

The second issue considers the negligence of congestion cost. If lots of economic activity concentrates in just one region, the housing and land prices are driven up, there can occur environmental problems and the loss of efficiency, for example due to traffic jams. Adding such aspects to the model would motivate the firms to move out of the core regions and enhance a decrease in regional disparities, as shown for example by Helpman (1998). Such congestion costs can also inhibit growth. Thus, in economies with congested centres economic growth and regional disparities can be negatively related.

Third, the models do not consider the effect of an exogenous increase in the production factors, for example additional capital in the form of foreign direct investments (FDI). FDI help to boost growth if the economy is short of capital. The FDI are directed most probably to regions which have good access to markets, including the foreign ones. This is especially relevant in the case of countries that have a labour cost advantage.

### **3. Regional disparities and economic growth in the EU**

Relying on the predictions of the NEG models, we aim to test the hypothesis that regional disparities and economic growth are positively correlated. The hypothesis is tested based on the regional data of the 27 European Union (EU) member states at the classification levels NUTS 2 and NUTS 3 over the period 1996–2006.<sup>‡</sup> Naturally, the countries with no regional divisions have been omitted (at NUTS 3 classification level Malta, Cyprus, Luxembourg; at NUTS 2 level in addition Estonia, Ireland, Latvia, Lithuania, Slovenia). Moreover, for some countries the data is available only for a few years. For measuring regional disparities, weighted average relative distance from the national GDP per capita has been used. The regional population has been used as the weight. The data is drawn from the Eurostat's database. The exact definitions of the indicators are presented in Appendix A.

In the full sample there is a highly significant correlation between the speed of growth and extent of regional disparities (see Table 1). However, if the Eastern and Western European countries are considered separately, the correlation weakens in case of the former and turns to insignificant in case of the more advanced economies. Therefore, the strong correlation in the full sample is probably a result of differences in the two groups' average growth rates and extent of regional disparities. During the period under observation economic growth was faster and regional disparities in the eastern part of Europe.

As the significant correlation in the full sample can be a result in the differences in the characteristics of the two groups, the same applies within these groups across countries. To

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<sup>‡</sup> NUTS — Nomenclature of Territorial Units for Statistics, the classification system of territorial units for statistical purposes used in the EU. The population thresholds for the NUTS 2 territorial units are 800000 – 3 million and for the NUTS 3 territorial units 150000–800000 inhabitants. Due to changes in the regional division of some countries, not all countries are represented during the whole period.



consider this possible distortion, simple fixed effects models have been estimated for the full sample and the two groups separately. The country fixed effects control for factors that do not change in time.

**Table 1.** The correlation between growth of national real GDP per capita and regional disparities.

Sample	Disparities between NUTS 2 regions	Number of observations	Disparities between NUTS 3 regions	Number of observations
Full sample	0.248***	192	0.315***	243
Western European countries	-0.143	130	-0.113	141
Eastern European countries	0.225*	62	0.208**	102

Source: own calculations based on the data from Eurostat.

\*, \*\* and \*\*\* mark significance at 0.1, 0.05 and 0.01 level, respectively.

The estimation results are documented in Table 2. Clearly, the models have a very low descriptive power and are not suitable for explaining economic growth. However, they give additional information on the interactions of economic growth and regional disparities, concentrating on the time dimension. Adding time fixed effects (not reported) improves in some cases the descriptive power of the models considerably as they capture the business cycle effects.

**Table 2.** The relationship between national economic growth and regional disparities.

Sample	Disparities between NUTS 2 regions	Adjusted R <sup>2</sup>	Disparities between NUTS 3 regions	Adjusted R <sup>2</sup>
EU-27	0.305** (0.130)	0.075	0.082 (0.057)	0.012
Western European countries	-0.077 (0.093)	-0.004	-0.355*** (0.108)	0.096
Eastern European countries	0.405** (0.161)	0.139	0.124** (0.064)	0.035

Source: own calculations based on the data from Eurostat.

Dependent variable: Growth rate of the real GDP per capita. Robust standard deviations in parenthesis. All models include country fixed effects.

\*, \*\* and \*\*\* mark significance at 0.1, 0.05 and 0.01 level, respectively.

Obviously the results depend somewhat on the regional level at which the regional disparities are measured, as evidenced by the changes in the significance of the parameter estimates. In spite of that, the signs of the estimates do not change. In general, the results of a simple correlation analysis are confirmed. As an important difference, the negative relationship of

economic growth and regional disparities in the Western European countries is highly significant if the disparities are measured at a low level of regional aggregation.

In the Eastern European countries periods of fast growth are associated with increasing regional disparities. However, this effect turns insignificant if the time period fixed effects are added into the model (in case of the other sample, such changes do not occur). This indicates no causal relationship between the phenomena of interest. These results confirm the findings of convergence analyses: Paas and Schlitte (2008) have shown that at the NUTS 3 regional level there is a slow convergence process taking place in the Western European countries, while in the Eastern Europe regional disparities in GDP per capita increase.

#### **4. Discussion and conclusions**

The interaction of economic growth and regional disparities is complicated. The questions of causality and the direction of the co-movement of these phenomena are still controversial. This paper, concentrating on the latter question, shows that the type of interaction can depend on the development level of the country. Specifically, conforming with the Kuznetz hypothesis, in the well developed Western European countries economic growth and regional inequalities are rather negatively related, while a positive relationship is detected for the Eastern European countries.

The question why this interaction has different direction in the two groups of countries is still unanswered. Besides the development level, there are other factors that can affect the direction of the relationship: differences in regional policies, but also characteristics of an economy that are discussed in the NEG models. For example, transportation networks are more developed in the Western Europe than in the Eastern European countries. Moreover, in general the former have larger domestic markets and are surrounded with countries at a relatively homogeneous development level. These aspects enhance spatial dispersion of economic activities also in times of economic growth.

Another factor influencing the relationship of economic growth and regional disparities is congestion. High congestions costs and real estate prices in agglomeration of economic activity hamper further economic growth in these regions. If for this reason economic

expansion takes rather place in regions with less economic activity and thus, lower GDP per capita, the regional disparities decrease, associated with national economic growth.

Considering regional policies, the policymakers and those who evaluate the success of regional policies should be aware that the conclusions might depend on the time point at which they are drawn. The estimated model implies for the Eastern European countries that it would be wrong to praise regional policies for a decrease in regional disparities if this is observed in the time of economic slowdown or decline. As the Eastern European countries have acted as a low cost production site during the analysed period, the production has concentrated into regions with good access to European markets (Traistaru et al. 2003). Therefore, if export demand decreases, mostly these regions are affected — the same regions which show the highest growth rates during economic booms.

In this analysis it stays unclear whether the regional disparities increase only due to fast economic growth in economically successful regions or whether there are also regions which face an economic decline in absolute terms. If the former holds, our results suggest that growth supporting policies in poor countries should first of all concentrate on achieving sustainable national growth, not on reducing regional disparities. According to the NEG models concentration of economic activity and acceptance of regional disparities can be preconditions for improving the growth prospects of an economy. Also the regional policy of the EU should aim first of all national growth in the poorer countries and only after surpassing a threshold convergence within the countries should come to the forefront.

The analysis in this paper is very simple and therefore, several improvements could be introduced. First, in grouping countries to well and less developed the East-West divide might not be the most appropriate for Europe anymore. There is no big difference in the economic development level of some Southern “old” EU members and the most advanced Eastern European countries. In further research it is therefore recommendable to consider alternative criteria for grouping the countries. Moreover, also changes in the development status could be accounted for.

Second, more specific controls are necessary for understanding the interaction of economic growth and regional disparities. In this analysis country fixed effects were used to control for country-specific factors. Therefore, the effects of factors that are constant in time are difficult

to detect. Of special interest, considering also the implications from the NEG models would be differences in congestion costs or access to markets, or more exactly, the differences in the variation of them within countries. A constraining factor for extending the analysis with such variables is data unavailability.

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## **Appendix A.**

GDP growth is measured as the percentage growth rate of the real GDP per capita compared to previous year.

The regional disparities are measured with the Eurostat indicator reg\_e0digdp

(DI\_PPS\_NUTS2 or \_NUTS3). The indicator is defined in Eurostat (2010, p. 90) as follows:

“For a given country the dispersion of regional GDP of the level 2 / 3 regions is defined as the sum of the absolute differences between regional and national GDP per inhabitant, weighted

with the regional share of population and expressed in percent of the national GDP per inhabitant.”

The control in the model, the population density and its variation correspond to the Eurostat indicator `reg_d3dens`. Again, its variation is calculated as variation coefficient, taking population as the weight