Investigating the allocation of development funds as a form of income inequality

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Introduction

In this paper we summarize certain results from our explorative research about the connection between development level and fund absorption inequalities. Our research topic may be interesting as Hungary joined the European Union a longer time ago and became entitled to receive and utilize Structural Funds in order to launch different development programs. We wish to shed some light empirically on the main trends of the fund allocation processes by incorporating different approaches and methods of social sciences including economic sociology, regional science and economics, the sociology of income inequalities[1].

Building on *economic sociology* the system of development policy can be interpreted as a governmental means that intends to help common goods to come into existence (Olson 1997) employing institutional devices (Elster 1995) to enforce different (horizontal) principles (Batterbury 2006) in the central regulation (Stigler 1989) of the resources' allocation (Martin 2000), however these intentions may fail (Tullock 2005) and cause counterproductive effects (Szántó 2006). In *regional studies* and *economics* the Williamson-hypothesis (see Gyuris 2011) is a well-known model about the relation of economic development and inequalities emphasizing that in different phases of development level different measure of inequalities can be expected (Gyuris 2011:5-6) – an idea that is applied in our approach and adopted in the process of the data analysis just like the theory of convergence clubs (Quah 1996). Another important research criteria is borrowed from the *sociology of income inequalities* defining and quantifying the relative poor stratum in a society – also in the EU – as the ones with an income below the 60 percent of median (Havasi-Altorjai 2005:26).

Data and methods

In this analysis our primary aim is to explore the pattern of connection between development fund absorption and inner inequalities therefore we assembled a database containing some basic statistical information on micro-regional level. The main source of our database is a statistical information webpage and into the tables collected at this system we integrated some additional information[2].

[1] As the primary aim here is to introduce the empirical results therefore we only shortly outline some possible elements of a theoretical frame.

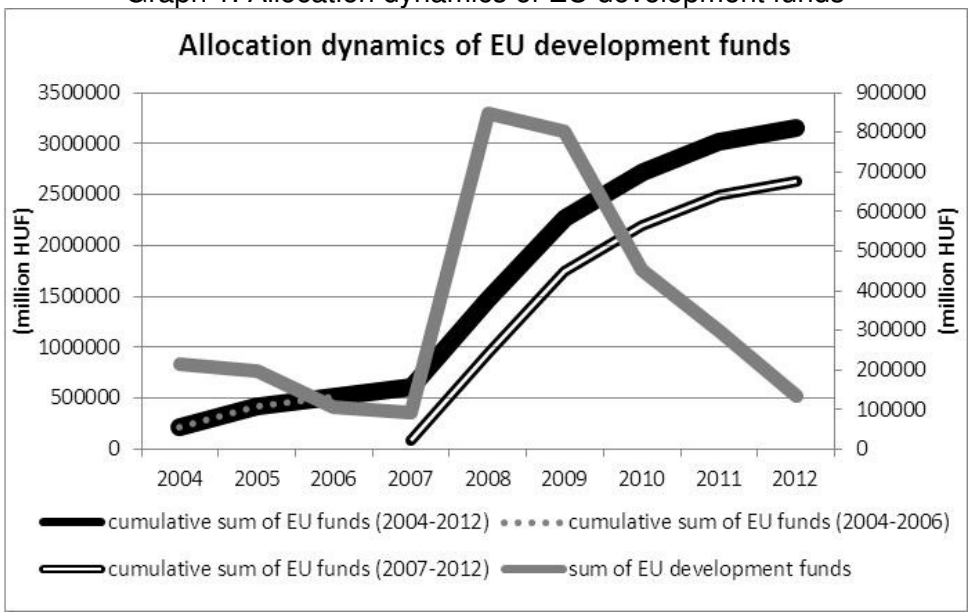
[2] Data source: www.regionaldata.org; the initial variables included in the database (further

In the process of data analysis we calculated and illustrated time-series data for development fund allocation and employed the inequality measure of *relative standard deviation* (TE 2006:6) in order to quantify the extent of inner inequality[3].

Results of data analysis

Considering the amount of European Union development funds allocated in Hungary since the accession (i.e. between 2004 and 2012) it can be stated that the overall sum in these 9 years is 3155817,23 million HUF. The beginning question of our analysis is the dynamics – the temporal aspect – of the allocation of these huge financial resources. Investigating the sum values separately in every year the overall trend of EU fund absorption reveals (see Graph 1: grey line) where remarkable differences can be realized: the highest amount of the EU funds allocated is in 2008; and before that year – from 2004 – a basically decreasing tendency can be seen, followed by a huge growth from 2007 to 2008, and then again – from 2009 – a steady decline.

Graph 1. Allocation dynamics of EU development funds



These distinct phases are also apparent in the case of the cumulative values: substantially a logistic growth can be detected (see Graph 1: black full line) however

description of the constructed variables in the analysis):

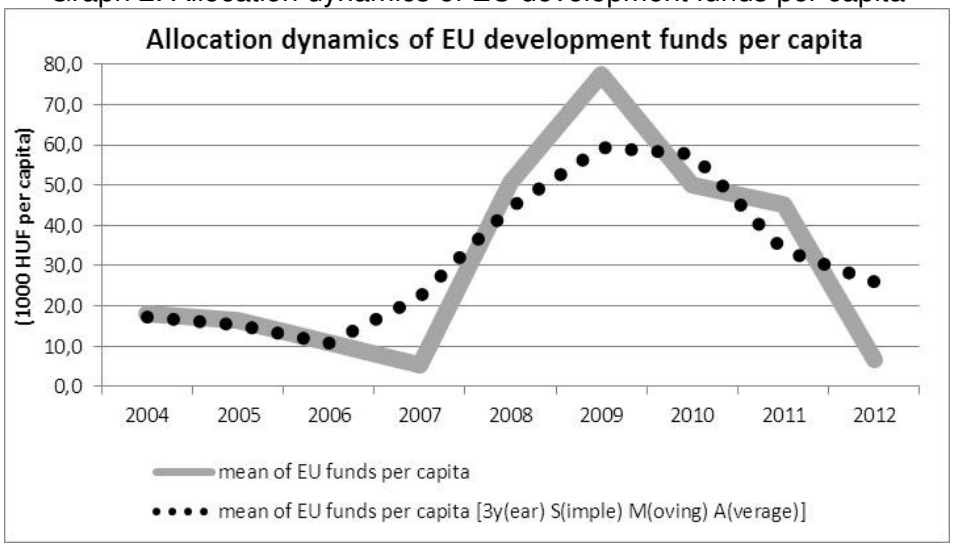
variable description	*territorial level*	*unit of measurement*
sum of EU development funds	micro-regions	million HUF
EU development funds per capita	micro-regions	1000 HUF per capita
GDP per capita	regions	EUR per capita
preferred status	micro-regions	dummy (0=not preferred.; 1=pref.)

[3] As we do not apply sampling methods, that is we consider the data of the analysis to cover the whole population – micro-regions of Hungary –, so it is not needed to generalize the results on a wider sphere than the observation units themselves. In accordance we do not test the significance either.

the saturation process seems to be a kind of two-phase one – a smaller and shorter part at the beginning of the period (see Graph 1: grey dotted line), and a longer and more completed one (see Graph 1: black empty line) from 2007. This kind of interrupted pattern of the fund allocation process in time can be explained obviously by the institutional frame of the official financing periods as in the European Union the actual budgets are planned for 7-year time periods. After the accession of Hungary in 2004 the country joined the already working 2000-2006 planning period, and acquired a relatively smaller – however increasing in time – sum of funds. The other tendency can be traced back to the start of the next programming period of 2007-2013 where a much higher and more intense growth starts in 2007 as in this case Hungary was the part of the whole planning period from the beginning[4].

The per capita values – calculated for one permanent inhabitant on micro-regional level data – show similar tendencies in time (see Graph 2: grey full line): at the beginning period there can be seen a negative trend, and from 2007 a noticeable growth until reaching the peak in 2009, after that a decreasing line[5].

Graph 2. Allocation dynamics of EU development funds per capita

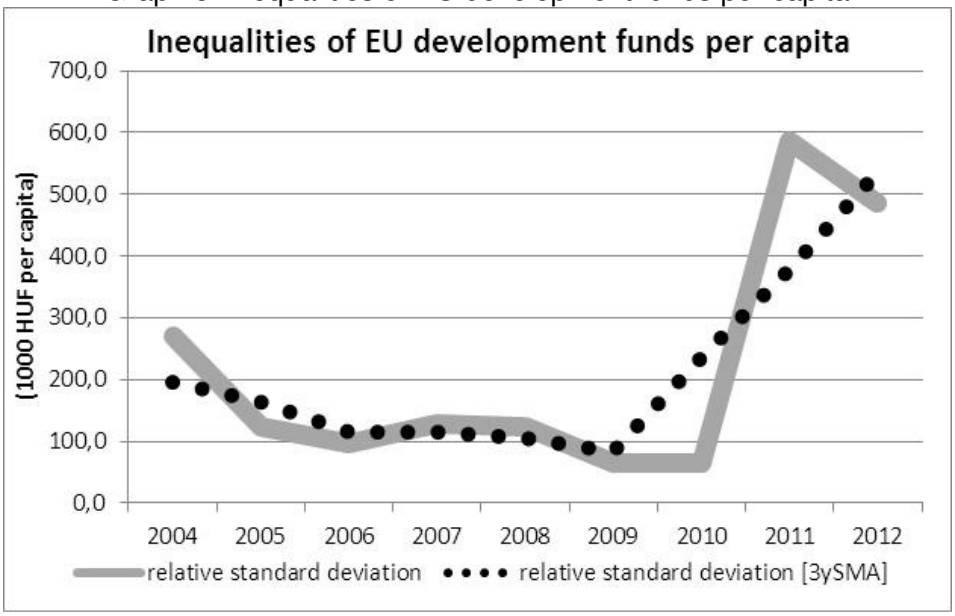


These differences may prove to be important as probably influence the inner patterns of the distribution – primarily the forms and extent of the inequalities.

[4] Data is only available until 2012.

[5] The 3-year simple moving average (3ySMA) values [see Graph 2: black dotted line] also explore clearly these tendencies.

Graph 3. Inequalities of EU development funds per capita



According to the values of the relative standard deviation[6] there seems to be a slight negative connection (R = -0,20): this measure of inequality is higher at the beginning period (see Graph 3: grey and black dotted lines) and an essentially negative trend can be detected until 2009 or 2010, when a rather intense increasing phase starts. These results may be interpreted as in the period of higher rates of development funds allocation the inner inequalities of fund absorption proves to be smaller, and when the intense of fund absorption is lower, higher inequalities appear.

Below we attempt to further explore the possible patterns of inner inequalities by applying different approaches of development level and measuring the extent of inequalities for different aggregated clusters of micro-regions.

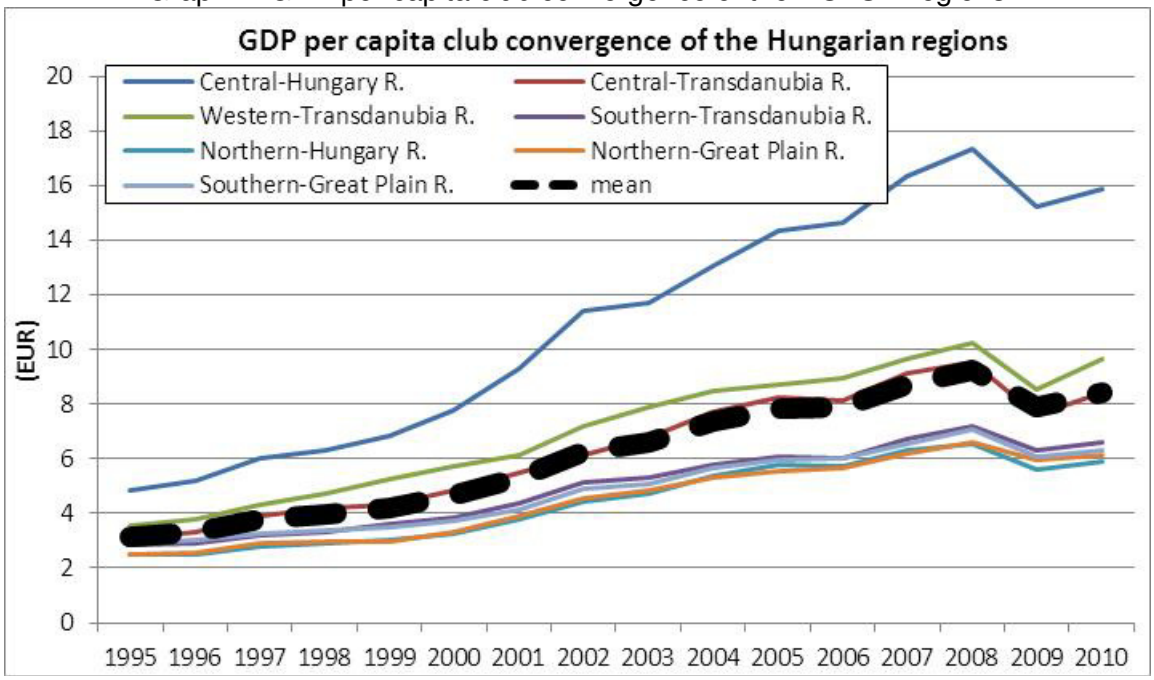
Differences of convergence club regions

The first aspect in comparison of development level may be considered as the initial or obvious interpretation of development: we investigate the differences of inner inequalities in the light of the gross domestic product. Considering the long-term data of GDP – calculated on region (NUTS 2) level per capita – a kind of *club convergence* process can be observed (see Graph 4): from the essentially similar beginning positions in 1995 the per capita GDP values seem to be differentiating in time and by the end of the first decade of the new millennium two separate groups of regions can be detected. One of the groups consist of the far most developed Central-Hungary Region, furthermore Central-Transdanubia Region and Western-Transdanubia Region that at least reach or are positioned above the average level. All the other NUTS 2 regions of Hungary are far below the average level and create the second group of economically underdeveloped ones[7].

[6] Calculated for every year and expressed as the percent value of the mean.

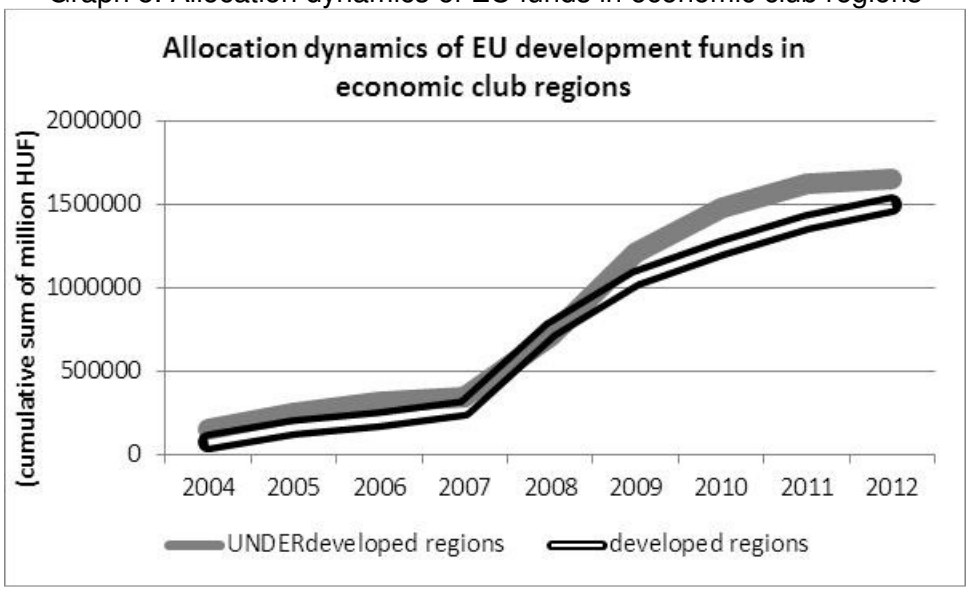
[7] It is also noteworthy that this different development paths manifest both of the two factors regarded as responsible for the territorial inequalities in the country – core-periphery differences (1) and east-west divide (2) –, however in the context of this analysis it is more important that these two groups can be handled as the economically developed and less developed regions.

Graph 4. GDP per capita club convergence of the NUTS 2 regions



The distribution of EU development funds in the period of 2004-2012 shows a clear difference between the groups of economically less developed regions and the ones in better position (see Graph 5): in the latter group the time-series cumulative sum values of the EU funds allocated proves to be smaller from the beginning of the period compared to the values of the other club, between 2007 and 2009 there seems to be a narrowing difference, however the fund allocation gap is deepening in the last years indicating an overall trend that the economically developed regions of Hungary gain a smaller total amount of EU funds[8].

Graph 5. Allocation dynamics of EU funds in economic club regions

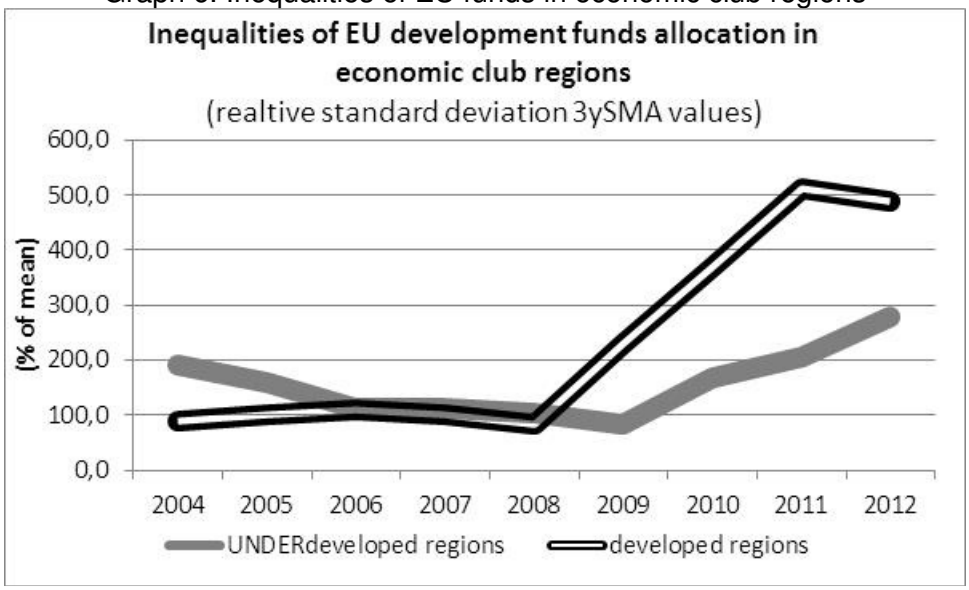


[8] One of the explanation of this outcome may be the regulation of the fund allocation processes – primarily the territorial cohesion principle of the horizontal aspects of development policy.

In the case of the inner inequalities of the EU development funds two different patterns can be detected along economic development level (see Graph 6): in the convergence club of the regions below the average of GDP lower values and a smaller fluctuation and dispersion reveals. Contrary to the previous results in the group of economically developed regions the measure and the range of relative standard deviation proves to be higher by and large indicating that the more developed the territories – NUTS 2 regions – of Hungary are the more unequal the income – development fund – distribution is, what is to say in the less developed regions the inequality of the allocation pattern of EU development funds is lower.

It is also noteworthy that – in this comparison also – there seems to be a kind of inverse connection between the fund allocation processes and the inner inequalities as in the years when the fund absorption values are high the relative standard deviation indexes are lower as a tendency and in turn; in times of low absorption periods higher income inequalities occur. This relation may be interpreted as in the situations when a wide range or higher amount of development funds are accessible to acquire there is a wider potential number of applicants to gain funds and the group of these successful applicants may be more heterogeneous in the sense of development level, inflicting a more equal distribution of the funds. Nevertheless when the amount of the funds are smaller or narrowed – where a scarcity of the resources to be (re)distributed emerges – there might be expected a higher rivalry in the processes of development fund allocation and in this kind of more competitive situation the more disadvantageous applicants might become more unable to procure funds due to their lack of financial and other kind of resources.

Graph 6. Inequalities of EU funds in economic club regions



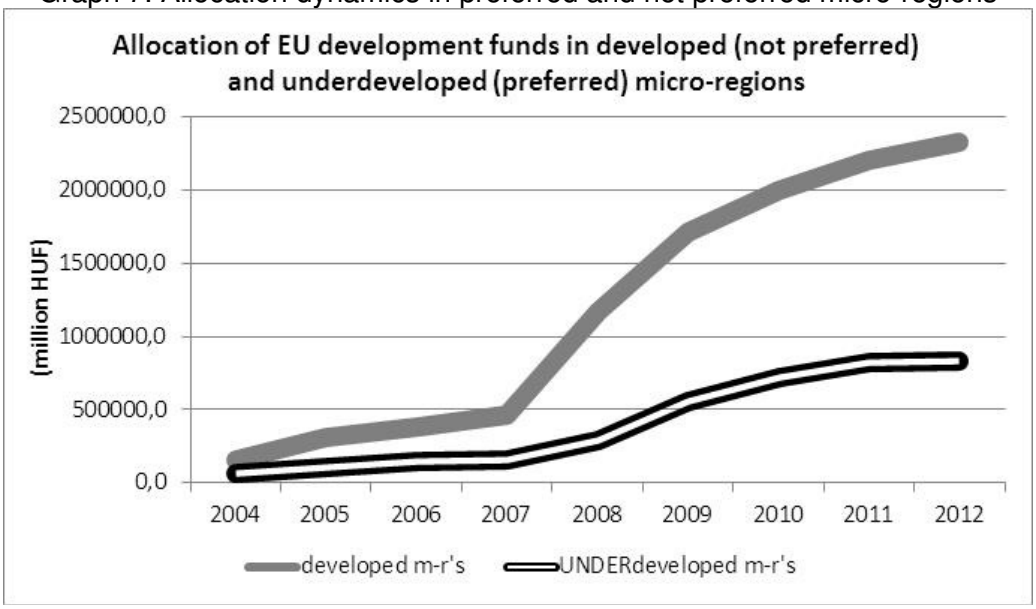
Differences of preferred and not preferred micro-regions

The next aspect of development level is the so-called preferred status of the micro-regions as in the implementation of the EU development policy there has been developed and applied in Hungary – in accordance with the EU guidelines and regulations – the system of this differentiation of territorial units[9]. This special status of these underdeveloped micro-regions can be interpreted as a wider indicator incorporating a broader content of economic but rather socio-demographic development level.

Considering this more complex form of development level there can be measured a remarkably lower and less intense growth of cumulative sum of development funds absorbed in the group of preferred – i.e. less developed – micro-regions compared to the group of developed ones (see Graph 7). In both cases after 2007 the EU funds start to increase with a more rapid saturation phase however this process is more excessive in the latter group of developed micro-regions.

Although the fund absorption processes are more intense in the developed micro-regions that can be interpreted as a favourable trend the inner inequalities also tend to be more significant (see Graph 8), that may not be a positive outcome. While in the underdeveloped group of preferred micro-regions the relative standard deviation values[10] are higher in the beginning period of fund allocation compared to the values in the case of the developed micro-regions, from 2004 a stable decrease can be seen until 2009, and from that time the inequalities of fund absorption start to increase and by the end of the period investigated the measures reach and a bit get above the initial values.

Graph 7. Allocation dynamics in preferred and not preferred micro-regions

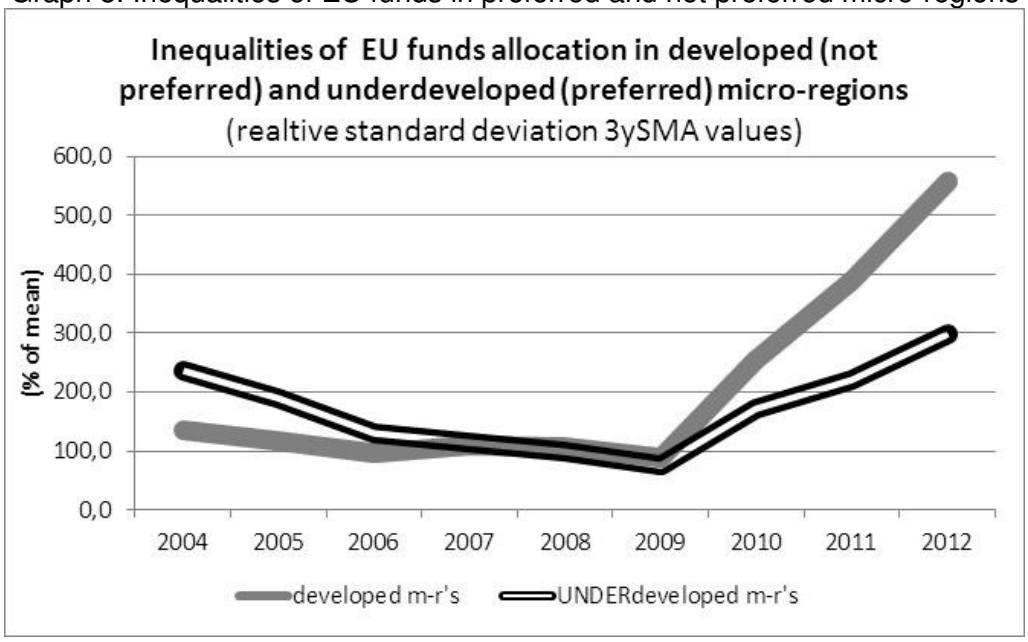


[9] These micro-regions – and settlements as this status is also defined in settlement level however in this analysis we do not use this level of regulation due to the lack of data – are ascertained by multi-variable statistical analysis in several economic, but even – dominantly – socio-demographic dimensions and the less developed ones are granted a preferred status in the development policy (e.g. with a higher support rate) in order to favour these disadvantageous territories to increase development capacity and acquire development funds.

[10] Calculated as a 3 year simple moving average; 3ySMA.

However in the case of the developed micro-regions a more unfavourable trend reveals as an essentially low – lower than the other group – level of inner inequality is changed – after a shorter period of similar conditions between 2006 and 2009 – by a large-scale growth of inequalities. So it can be concluded – again – that in the less developed territories the inequalities seem to be smaller and in the developed micro-regions a higher income inequality of the development funds can be measured.

Graph 8. Inequalities of EU funds in preferred and not preferred micro-regions



Differences of the 'poor' and the other micro-regions

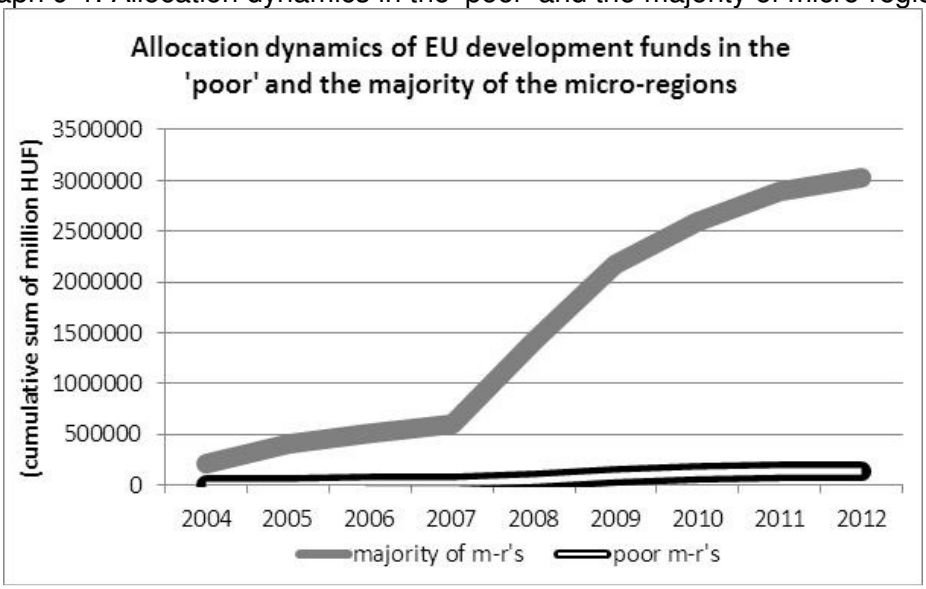
In the last part of this short analysis we investigate the former trends and connections in a specific comparison of the 'poor' and the majority of the micro-regions. We examined in every year separately the median values of per capita development fund allocation (1000 HUF per capita) and calculated a relative measure of poor micro-regions – derived from and defined by the sociological literature of income inequality – as the 60 percent of the median. These values signify those territories that are separated from the majority of the cases in a relatively better 'income' position. The higher number or higher rate of these 'poor' micro-regions can be found at the two endpoints of the examined period (see Table 1); in the first four years approximately one-third of the micro-regions belong to these not wealthy group, furthermore in the last year of our data again more than one-third of them is 'poor'.

Table 1. Median values and the distribution of the 'poor' micro-regions

	median	*median 60%*	*n: below median60%; 'poor micro-regions'*	*% of 'poor' micro-regions*
2004	5,72	3,43	65	37,4
2005	12,12	7,27	65	37,4
2006	8,95	5,37	57	32,8
2007	2,92	1,75	68	39,1
2008	30,84	18,51	54	31,0
2009	68,73	41,24	43	24,7
2010	42,85	25,71	38	21,8
2011	12,43	7,46	50	28,7
2012	2,35	1,41	61	35,1

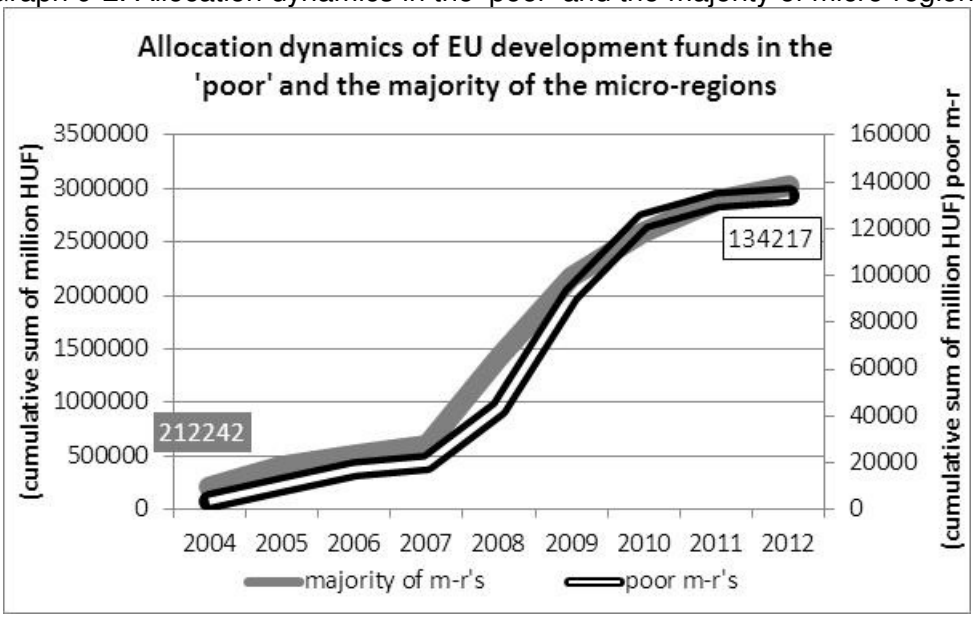
It is almost needless to investigate the fund allocation trends of the two groups as it is obvious to expect the 'poor' micro-regions to be less successful (see Graph 9-1).

Graph 9-1. Allocation dynamics in the 'poor' and the majority of micro-regions



However it may be interesting that the fund absorption process itself proves to be a kind of natural saturation growth (see Graph 9-2) with the *only* (!) specific characteristic that the peak end of the cumulative curve of the 'poor' micro-regions (~134217 million HUF) reaches approximately the amount of development funds where the others, the majority of the micro-regions start (~212242 million HUF) the growth process (consider and compare Graph 9-1 and Graph 9-2, and the values highlighted in the primary and secondary Y axis of Graph 9-2).

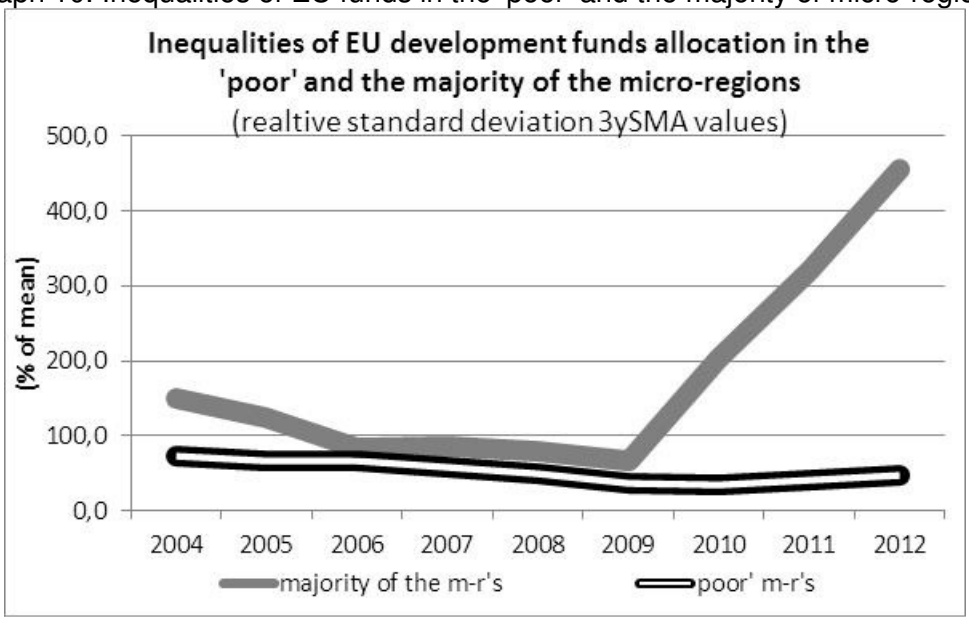
Graph 9-2. Allocation dynamics in the 'poor' and the majority of micro-regions



Although there is a huge gap between the group of the 'poor' and the majority of the micro-regions considering the overall amount of development funds it can also be

stated that the 'poor' micro-regions are characterized by much lower level and more evenly distributed values of relative standard deviation (see Graph 10). In the majority of the micro-regions an essentially identical trend of inner inequality can be measured as in the case of the overall and the other previous trends: in the beginning period of fund allocation decreasing values can be found, thereafter that tendency is changed by a large increase.

Graph 10. Inequalities of EU funds in the 'poor' and the majority of micro-regions



However in the micro-regions below the 60 percent of the median values a clearly declining trend of income inequalities reveals that evidently can be explained by the aspect of grouping itself[11] — and it is not an interesting outcome itself but the results of this kind of comparison may be important as shed some empirical light from another perspective on the (negative) relation – demonstrated above – between the measure of fund allocation and the inequalities of the distribution of them.

Summary of the results

Considering the overall tendencies of the allocation process of EU development funds (1) there seems to be a kind of interrupted or two-phase logistic saturation growth presumably as an effect of the two different planning periods contained in the time-series of the data. The comparison of the fund absorption trends and the measures of inequality reveals furthermore (2) an essentially negative relation on this general level indicating that when the supply of the resources to be acquired is wider the inner inequalities of the distribution of the resources are lower, while in times of narrower abundance a more uneven allocation can be diagnosed. In a sense of economic development level it can be concluded that (3) the more developed regions possess a slightly smaller part of the development funds (4) with an intensive growth of inner inequality. The same inequality pattern can be detected with an opposite fund absorption pattern in the case of the other aspect of development level as (5) in

[11] Note: in each years the micro-regions relatively with the most unfavourable conditions are compared to the other ones.

the not preferred – i.e. developed – micro-regions the overall sum of funds is higher and the inner inequalities are more significantly increasing. Nevertheless – contrary to the 'poor' micro-regions – (6) the majority of the micro-regions – with a higher part of funds – are characterised (also) by greater inequalities.

Concluding remarks, perspectives of further research

As for the initial question of the connection between development level and fund absorption inequalities we may assume *some* conclusions – e.g. the Williamson-hypothesis can not be confirmed as the results imply an inverse relation contrary to the expectations from the model, or the general tendency that in the underdeveloped territories the inequalities are lower – but essentially a rather vague and contradictory setting of empirical outcomes and effects can be registered.

Table 2. Summary of the empirical results and tendencies

Aspects of comparison	*Hypotheses*		
	(H1) higher development level → wider supply of funds	*(H2) wider supply of funds → lower inequalities*	*(H3) higher development level → higher inequalities*
(general trends)	not tested	confirmed	not tested
economic convergence clubs	not confirmed	partially confirmed	partially confirmed
preferred and not preferred micro-regions	confirmed	partially confirmed	partially confirmed
the 'poor' and the majority of the micro-regions	not tested	not confirmed	not tested

In order to clarify this picture we divided the general question, separated three different hypotheses and investigated if these are confirmed by the results (see Table 2), however still it can not be clearly decided which type of the effects can be accepted as the results for each hypotheses in the different comparison prove to be contradictory. More specifically we may suppose a kind of interaction between the effects of the different factors that should be investigated more accurately using extended data – with additional variables –, different research design and more complex statistical tests in order to explore the details. This may be the next stage of the research.

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