

REGIONAL SEGMENTATION OF EUROPEAN SPACE WITH REGARD TO THE LEVEL AND GROWTH RATE OF DEVELOPMENT

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Abstract:

The objective of the hereby study is the analysis of the international development disproportions and segmentation of European Union regions in 2005. The basic characteristics used for the analysis are the level and growth rate of GDP. The study is of empirical nature.

Introduction

The matrix of development and (BCG) market share prepared by the Boston Consulting Group represents one of the commonly applied methods for the assessment of an enterprise competitive position and may become an initial point for preparing its development strategy. It is established on the basis of two indicators: market growth rate and market share [1, 238; 2, 349-351; 3, 48-50]. It is suggested to implement this technique of portfolio analysis in segmentation studies in order to distinguish clusters of regions according to their economic potential and dynamics of their changes. This approach facilitates the division of the analyzed foreign markets into the following groups:

- the over-competitive segment – covering regions - leaders in regional development, characterized by a high share in the international economy;
- the stable segment – characterized by weakening dynamics of development and a high share in an international market;
- the segment “presenting a chance for development” – characterized by a high growth rate and a low share in its environment;
- the non-developmental market segment – includes regions presenting a low speed of development and a shrinking share in the environment, which are in the need of special actions facilitating the change of direction and requiring both development and economic intensity transformations into more modern ones.

The conducted regional segmentation presents an *a priori* approach since it is based on arbitrarily accepted values of segmentation criteria.

The background for regional segmentation

The segmentation procedure was conducted based on the regional division of the European Union countries for which the reference point are administrative units of NUTS 2 level, defined according to NUTS nomenclature (*The Nomenclature of*

Territorial Units for Statistics). Following the modification which took place in February 2007, the NUTS 2 classification covers 271 regions.

For the selection of statistical information the *Eurostat* data base was used. The segmentation of 271 European regions NUTS 2 level turned out impossible owing to the unavailability of statistical information. Therefore, the segmentation procedure was applied to the sample covering 229 European NUTS 2 level regions. The segmentation was implemented both with reference to the level and speed of regions' development as compared to an average level and speed of development in the European Union. Statically oriented segmentation, for 2005, was carried out. The most updated study period was selected, for which the *Eurostat* data base provided statistical data to be applied in segmentation criteria in NUTS 2 regions. The following segmentation criterion, representing regions' development level, was used: Y_1 – GDP / 1 inhabitant in PPS (*Purchasing Power Standards*) (UE-27= 100), Y_2 – GDP growth rate in % (in current prices) in 2005 as compared to 2002. Next, average values of Y_1 and Y_2 for the analyzed regions were specified (respectively y_1^* and y_2^*). The portfolio *a priori* segmentation was conducted in line with the following principles:

- the over-competitive segment includes regions, for which Y_1 and Y_2 variables' values are higher than the respective y_1^* and y_2^* critical values;
- the stable segment includes regions, for which an average value of Y_1 variable is higher than the critical y_1^* value, while an average value of Y_2 variable is lower or equal to y_2^* ;
- the segment "presenting a chance for development" includes regions, for which an average value of Y_1 is lower or equal to the critical y_1^* value, while an average value of Y_2 variable is higher than y_2^* ;
- the non-developmental segment includes regions, for which average values of Y_1 and Y_2 variables are lower or equal to the respective critical y_1^* and y_2^* values.

Detailed characteristics were provided on the basis of the obtained segmentation results.

The segmentation of (NUTS 2) European Union regions

In the analyzed group the variability coefficient for GDP / 1 inhabitant amounted to 39,8%, the GDP growth rate in 2005, as compared to 2002, was characterized by more intensive fluctuations of up to 54,5%.

Threshold values of segmentation criteria accepted at the level of average values in EU regions amounted to, respectively: $y_1^* = 100\%$ and $y_2^* = 12,7\%$. The results of portfolio *a priori* segmentation are presented in table 1 and figure 1. The size and structure of distinguished groups of regions is presented in the contingency table (see tab.2).

The over-competitive segment covering NUTS 2 level regions characterized by higher than EU average level of GDP *per capita* and GPD dynamics turned out to be less numerous. It includes 36 regions which was responsible for 15,7% of the studied sample size. The dominating segments were these constituting the stable segment (GDP per capita exceeded the EU average, but the growth rate was lower than average) made up of 82 regions, which was 35,8% of the studied sample size. The sizes of segments

“presenting a chance for development” and the non-developmental one were similar and included 55 and 56 regions respectively (24% and 24,5%). Table 2 also facilitates the conclusion that the slight majority of NUTS 2 regions under analysis was characterized by a higher than the EU average (51,5%) GDP per 1 inhabitant and the dominating regions were these in which GDP growth rate was lower than average (60,3%).

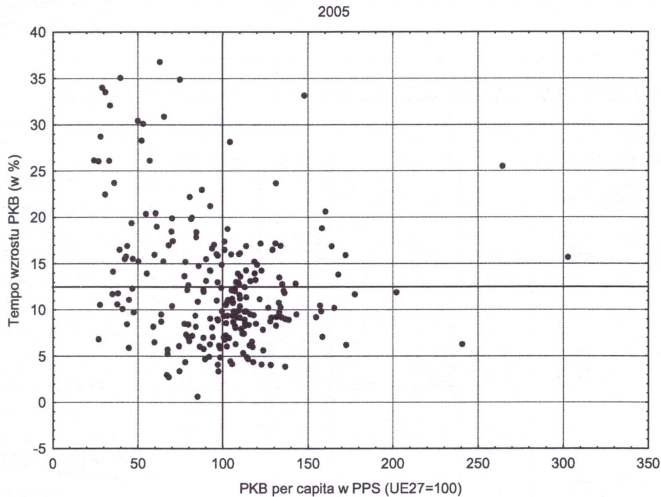
TAB. 1: The segmentation of selected European Union NUTS-2 regions in 2005

Segments	NUTS-2 regions
over-competitive	Prov. Brabant Wallon (BE), Praha (CZ), Saarland (DE), Border, Midlands and Western (IE), Southern and Eastern (IE), Attiki (GR), Cantabria (ES), Pais Vasco (ES), Comunidad Foral de Navarra (ES), La Rioja (ES), Aragón (ES), Comunidad de Madrid (ES), Cataluña (ES), Illes Balears (ES), Luxembourg (Grand-Duché) (LU), Közép-Magyarország (HU), Groningen (NL), Kärnten (AT), Oberösterreich (AT), Salzburg (AT), Tirol (AT), Vorarlberg (AT), Bratislavský kraj (SK), Stockholm (SE), Västsverige (SE), Övre Norrland (SE), Derbyshire and Nottinghamshire (UK), Leicestershire, Rutland and Northants (UK), Herefordshire, Worcestershire and Warks (UK), East Anglia (UK), Inner London (UK), Berkshire, Bucks and Oxfordshire (UK), Hampshire and Isle of Wight (UK), Kent (UK), Dorset and Somerset (UK), Eastern Scotland (UK),
stable	Région de Bruxelles-Capitale (BE), Prov. Antwerpen (BE), Prov. Oost-Vlaanderen (BE), Prov. Vlaams Brabant (BE), Prov. West-Vlaanderen (BE), Stuttgart (DE), Karlsruhe (DE), Freiburg (DE), Tübingen (DE), Oberbayern (DE), Niederbayern (DE), Oberpfalz (DE), Oberfranken (DE), Mittelfranken (DE), Unterfranken (DE), Schwaben (DE), Bremen (DE), Hamburg (DE), Darmstadt (DE), Gießen (DE), Kassel (DE), Braunschweig (DE), Hannover (DE), Düsseldorf (DE), Köln (DE), Detmold (DE), Arnsberg (DE), Rheinhessen-Pfalz (DE), Schleswig-Holstein (DE), Sterea Ellada (GR), Île de France (FR), Champagne-Ardenne (FR), Haute-Normandie (FR), Centre (FR), Alsace (FR), Pays de la Loire (FR), Aquitaine (FR), Midi-Pyrénées (FR), Rhône-Alpes (FR), Provence-Alpes-Côte d'Azur (FR), Piemonte (IT), Liguria (IT), Lombardia (IT), Provincia Autonoma Bolzano-Bozen (IT), Provincia Autonoma Trento (IT), Veneto (IT), Friuli-Venezia Giulia (IT), Emilia-Romagna (IT), Toscana (IT), Marche (IT), Lazio (IT), Friesland (NL), Drenthe (NL), Overijssel (NL), Gelderland (NL), Utrecht (NL), Noord-Holland (NL), Zuid-Holland (NL), Zeeland (NL), Noord-Brabant (NL), Limburg (NL), Niederösterreich (AT), Wien (AT), Lisboa (PT), Etelä-Suomi (FI), Länsi-Suomi (FI), Östra Mellansverige (SE), Småland med öarna (SE), Sydsverige (SE), Norra Mellansverige (SE), Mellersta Norrland (SE), Northumberland, Tyne and Wear (UK), Cheshire (UK), Greater Manchester (UK), West Yorkshire (UK), West Midlands (UK), Bedfordshire, Hertfordshire (UK), Outer London (UK), Surrey, East and West Sussex (UK), Gloucestershire, Wiltshire and Bristol/Bath area (UK), East Wales (UK), South Western Scotland (UK),
“with a chance for development”	Severoiztochen (BG), Yugoiztochen (BG), Yugozapaden (BG), Yuzhen tsentralen (BG), Střední Čechy (CZ), Jihozápad (CZ), Severozápad (CZ), Severovýchod (CZ), Jihovýchod (CZ), Střední Morava (CZ), Moravskoslezsko (CZ), Estonia (EE), Kentriki Makedonia (GR), Peloponnissos (GR), Galicia (ES), Principado de Asturias (ES),

Segments	NUTS-2 regions
“with a chance for development”	Castilla y León (ES), Castilla-la Mancha (ES) Extremadura (ES), Comunidad Valenciana (ES), Andalucía (ES), Región de Murcia (ES), Canarias (ES), Cyprus (CY), Latvia (LV), Lithuania (LT), Közép-Dunántúl (HU), Észak-Magyarország (HU), Flevoland (NL), Łódzkie (PL), Mazowieckie (PL), Małopolskie (PL), Śląskie (PL), Podkarpackie (PL), Wielkopolskie (PL), Lubuskie (PL), Warmińsko-Mazurskie (PL), Pomorskie (PL), Nord-Vest (RO), Centru (RO), Nord-Est (RO), Sud-Est (RO), Sud-Muntenia (RO), București-Ilfov (RO), Sud-Vest Oltenia (RO), Vest (RO), Západné Slovensko (SK), Východné Slovensko (SK), Tees Valley and Durham (UK), Cumbria (UK), South Yorkshire (UK), Essex (UK), Cornwall and Isles of Scilly (UK), Devon (UK), Northern Ireland (UK),
non-developmental	Prov. Limburg (BE), Prov. Hainaut (BE), Prov. Liège (BE), Prov. Namur (BE), Severozapaden (BG), Severen tentralen (BG), Berlin (DE), Brandenburg–Nordost (DE), Brandenburg–Südwest (DE), Mecklenburg-Vorpommern (DE), Lüneburg (DE), Weser-Ems (DE), Münster (DE), Koblenz (DE), Chemnitz (DE), Dytiki Hellada (GR), Picardie (FR), Basse-Normandie (FR), Bourgogne (FR), Nord-Pas-de-Calais (FR), Lorraine (FR), Franche-Comté (FR), Limousin (FR), Auvergne (FR), Languedoc-Roussillon (FR), Umbria (IT), Abruzzo (IT), Molise (IT), Campania (IT), Puglia (IT), Basilicata (IT), Calabria (IT), Sicilia (IT), Sardegna (IT), Nyugat-Dunántúl (HU), Dél-Dunántúl (HU), Észak-Alföld (HU), Dél-Alföld (HU), Malta (MT), Burgenland (AT), Lubelskie (PL), Świętokrzyskie (PL), Podlaskie (PL), Zachodniopomorskie (PL), Kujawsko-Pomorskie, Norte (PT), Algarve (PT), Centro (PT), Alentejo (PT), Stredné Slovensko (SK), Itä-Suomi (FI), Pohjois-Suomi (FI), Lancashire (UK), Lincolnshire (UK), Shropshire and Staffordshire (UK), West Wales and The Valleys (UK)

where: BE – Belgium, BG – Bulgaria, CZ – The Czech Republic, DE – Germany, EE – Estonia, IE – Ireland, GR – Greece, ES – Spain, FR – France, IT – Italy, CY – Cyprus, LV – Latvia, LT – Lithuania, LU – Luxembourg, HU – Hungary, MT – Malta, NL – The Netherlands, AT – Austria, PL – Poland, PT – Portugal, RO – Rumania, SI – Slovenia, SK – Slovakia, FI – Finland, SE – Sweden, UK – Great Britain

Source: Author's compilation based on Eurostat data

FIG. 1: The results of a *a priori* segmentation of selected European Union regions at NUTS 2 level in 2005

Source: Author's compilation based on Eurostat data

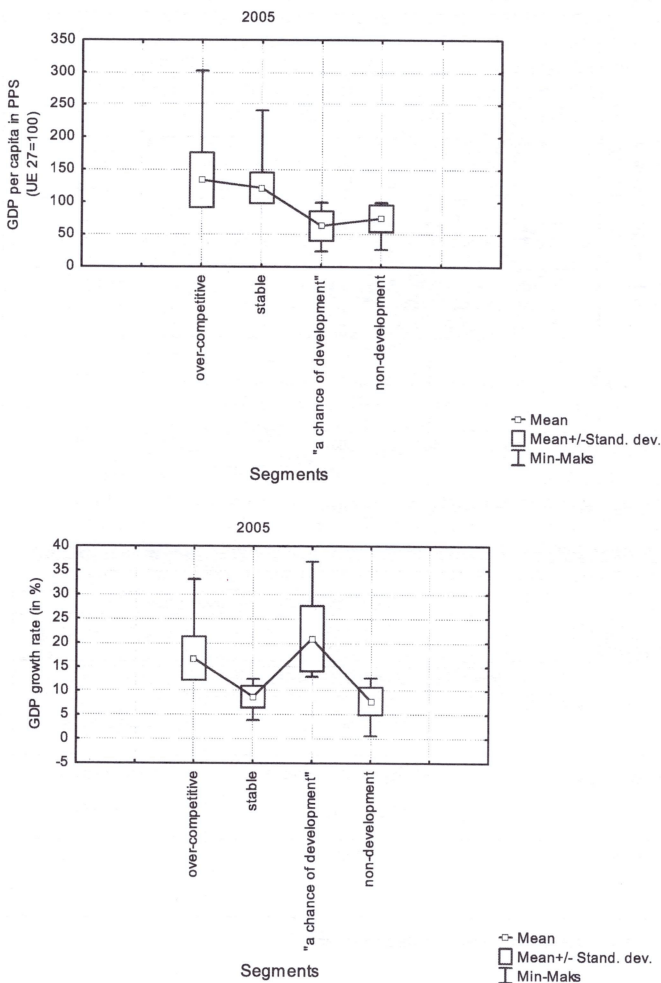
TAB. 2: The table of contingency for the distinguished segments in 2005

Y ₂ growth rate categories	Share categories in Y ₁ environment		Total
	Y ₁ ²⁰⁰⁵ ≤ 100	Y ₁ ²⁰⁰⁵ > 100	
Y ₂ ^{2005/2002} > 12,7	„presenting a chance for development” segment 55 (24,0%)	over-competitive segment 36 (15,7%)	91 (39,7%)
Y ₂ ^{2005/2002} ≤ 12,7	non-developmental segment 56 (24,5%)	stable segment 82 (35,8%)	138 (60,3%)
Total	111 (48,5%)	118 (51,5%)	229 (100%)

Source: Author's compilation based on data from table 1

Figure 2 shows the, so called, frame diagrams with arms presenting descriptive parameters values for both segmentation criteria in the distinguished segments. The ordering of segments according to decreasing values of an average GDP *per capita* is as follows: over-competitive, stable, non-developmental and “presenting a chance for development”.

FIG. 2: Frame diagrams with arms of GDP per capita in PPS (UE27=100) and GDP growth rate (in %) for segments distinguished in 2005



Source: Author's compilation prepared by applying STATISTICA 8 PL statistical package.

Segments' ordering with regard to GDP growth rate is different. The highest average GDP growth rate per 1 inhabitant is characteristic for regions grouped in the segment "presenting a chance for development", so these regions which are the poorest ones.

Next ranking positions are occupied by such segments as: over-competitive, stable and non-developmental.

The descriptive parameters for segmentation criteria regarding the distinguished segments are presented in table 3.

TAB. 3: Descriptive parameters for segmentation criteria in the distinguished segments

Descriptive parameters	GDP per capita level in PPS (UE27=100)				GDP growth rate (in %)			
	1	2	3	4	1	2	3	4
Minimum value	100,90	100,50	24,20	26,90	12,81	3,89	13,00	0,64
Maximum value	302,70	240,50	99,30	99,50	33,16	12,47	36,79	12,68
Maximum value/minimum value	3,00	2,39	4,10	3,70	2,59	3,21	2,83	19,93
Arithmetic mean	133,81	121,84	63,40	74,89	16,73	8,73	20,89	7,86
Standard deviation	42,08	23,74	23,03	20,84	4,52	2,27	6,76	2,90
Arithmetic mean – standard deviation	91,73	98,10	40,37	54,06	12,21	6,46	14,14	4,96
Arithmetic mean + standard deviation	175,89	145,58	86,42	95,73	21,25	11,00	27,65	10,76
Variability coefficient	31,45	19,48	36,32	27,82	27,02	25,96	32,34	36,85
Median	119,70	113,40	62,90	79,60	15,95	9,18	18,48	8,13
Classical coefficient of asymmetry	0,34	0,36	0,02	-0,23	0,17	-0,20	0,36	-0,09

where: segments' names are: 1 – over-competitive, 2 – stable, 3 – “presenting a chance for development”, 4 – non-developmental.

Source: Author's compilation

In the over-competitive segment the average GDP *per capita*, in the due regions, amounted to over 133,81 of the EU average and deviated from this value by 42,1 percent point on average. Half of the regions did not exceed 119,7% GDP *per capita* in EU. There occurred a right-sided asymmetry of empirical spread analyzed by means of segmentation criterion, which proves that most regions from this segment are characterized by lower than average GDP *per capita*. Having specified the typical, classical range of variation one comes to the conclusion that only two regions from this segment were untypical ones: Luxembourg (Grand-Duché) (LU) and Inner London (UK). GDP *per capita* amounted there up to the level of 264,3% and 302,7% respectively, of the EU average. The other regions were included within the typical scope of variability ranging from 91,73 up to 175,89 of EU average. The variability coefficient was 31,45% which proves that the diversification of regions grouped in an over-competitive segment is moderate. The maximum value of GDP *per capita* exceeded the minimum value by three times.

The average GDP growth rate in over-competitive segment amounted to 16,73% and presented an average deviation from this value by 4,5 percent point. The typical variability scope covered the range from 12,21% up to 21,25%. The untypical regions

were: Irish Border, Midlands and Western (28,2%), Greek region of Attiki (23,7%), Luxembourg (Grand-Duché) (25,8%) the Slovak region of Bratislavský kraj (33,2%). Half of the regions were characterized by the growth rate lower than 15,95%, therefore the empirical spread of the analyzed variable presented the right-sided asymmetry and the regions which GDP growth rate was lower than average were in majority. GDP growth rate variability coefficient amounted to 27,02%. Maximum value of GDP growth rate exceeded the minimum value by more than 2,5 times.

The regions grouped in the stable segment were characterized by an average GDP *per capita* level amounting to 121,84% of the EU mean value, with the standard deviation by about 24 percent points. Half of the stable regions showed GDP *per capita* level lower than 113,4% of EU mean value, the majority of regions were characterized by lower than 121,84% EU mean value of GDP *per capita* (right-sided asymmetry).

Within the typical stable regions GDP *per capita* was in the range from 98,1% up to 145,58% of EU mean value. Nine NUTS 2 regions presented an unusually higher, as for a stable segment, GDP *per capita* level. It was the Belgium region of Bruxelles-Capitale (240,5% UE average), four German regions – Oberbayern (165,6%), Bremen (157,1%), Hamburg (202,1%), Darmstadt (157,7%), the French region of Île de France (172,6%), The Netherlands' Utrecht (158,4%) and Noord-Holland (154,7%) and the Austrian region of Wien (177,6%). The variability coefficient was the lowest of all segments and took the value of 19,48%. The maximum value of GDP *per capita* exceeded the minimum value by more than twice.

The average GDP growth rate in 2005, as compared to 2002, in stable regions was 8,73% and deviated from the mean value by 2,27 percent point. The median exceeded the mean value, therefore negative asymmetry occurred, which means that the majority of stable regions was characterized by a higher than average GDP growth rate. Typical stable regions were characterized by the growth rate from 6,46% up to 11%. It turned out that thirty out of 83 regions were untypical ones. The stable regions presented higher variability with regard to GDP growth rate (25,96%) than regarding variability of GDP *per capita* (19,48%). The maximum value of GDP growth rate in stable regions exceeded the minimum value by over three times.

The average GDP *per capita* level in regions "presenting a chance for development" was 63,4% of the EU mean value and deviated, on average, from this value by about 23 percent points. Regions typical for this segment were characterized by GDP *per capita* amounting from 40,37% up to 86,42% of EU average. Twelve regions were characterized by both an untypically low and untypically high GDP *per capita* level. The empirical spread of this segmentation criterion showed slight positive asymmetry. The median was just by half the percent point lower than the arithmetic mean. With reference to GDP *per capita* the regions "presenting a chance for development" showed the highest variability (variability coefficient amounted to 36,32%). The maximum value of GDP *per capita* exceeded the minimum value by over four times.

The regions included in the segment "presenting a chance for development" were characterized by the highest average GDP growth rate amounting to 20,89%, with an average deviation of about 6,8 percent point. In case of typical regions covered by this segment the GDP growth rate was included in the range from 14,14 up to 27,65. Three regions had an untypically low, while eleven an unusually high GDP growth rate. In case of half of the regions the growth rate did not exceed 18,48%. The asymmetry coefficient was at the level of 0,36, so the regions in which the growth rate was lower

than average were in vast majority. The variability coefficient presented the level of 32,34%, while the maximum growth rate value exceeded the minimum value by almost three times.

The non-developmental segment groups these regions in which average GDP *per capita* amounts to 74,89% of EU average and deviates from this value on average by 20,84 percent point. In typical regions this segmentation criterion value ranges from 54,06% up to 95,73%. Twenty one regions presented untypical GDP *per capita* values. In case of half of the regions GDP *per capita* value exceeds 79,6% of EU average. The spread of analyzed attribute shows negative symmetry, which means that non-developmental regions in case of which GDP *per capita* is higher than average are in majority. Variability coefficient amounts to 27,82%, while the maximum value is almost four times higher than the minimum one.

The average GDP growth rate in the regions covered by a non-developmental mezzosegment is the lowest, at the level of 7,86% and deviates, on average, by 2,9 percent point. Typical non-developmental regions are characterized by GDP growth rate ranging from 4,96% up to 10,76%. Twenty one non-developmental regions turned out to be untypical. 50% of regions showed the growth rate below 8,13%. The regions characterized by growth rate higher than average represent the major group of regions. Non-developmental regions, with regard to GDP growth rate, presented the highest variability (36,85%). The maximum GDP growth rate exceeds the minimum value by almost twenty times.

Final remarks

The differences occurring in the level and growth rate of EU regions are to be considered as important. The analyzed regions presented a significantly bigger diversification with regard to the growth rate than to its level. The lowest level and, at the same time, the highest growth rate was characteristic for the segment “presenting a chance for development” in which regions originating from the new EU member countries were the dominating ones. This opens an opportunity for diminishing developmental disproportions of the European space in the future.

The presented segmentation results may constitute the basis for further studies related to, among others, the reasons and nature of changes regarding developmental differences of particular European regions.

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