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The winner takes it all ? Multidimensional assessment of economic growth factors in Bundesländer

Abstract

This paper seeks to offer a thorough assessment of current state of the play as well as developments taking place in 1989-2008 with respect to various determinants of economic growth in Germany. The primary aim is to evaluate the growth potential by constructing and consequently calculating the summary index encompassing various dimensions of economy. In order to take a holistic and comprehensive view on economic growth factors, conceptual framework of five modules encapsulating numerous factors and thus incorporating various growth aspects has been put forward. Competitiveness (production function), Sectors (output approach), Business cycle (expenditure approach), General economic condition (main macroindices) and Catalysts (residual - all other factors) are taken into account. Preliminary results confirm to some extent earlier studies pointing to existing West-East Germany's discrepancies. It seems particularly visible when taking into account elements of the first module and - key for long term growth - factors of the fifth unit.

1. Introduction

Germany's reunification offers an unique research laboratory. Fall of the Berlin Wall and subsequent unification of previously divided BRD and DDR

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can be regarded as a special type of EU enlargement and an example of EU integration (Neal, 2007: 201-229). Right from the start public opinion and policy makers were optimistic about speedy "knitting together" of two artificially separated countries. Against the background of expectations ignited in early 1990s, deliveries might be assessed as somewhat mediocre (Ragnitz, Scharfe, Schwirtz, 2009). Though, one has to remember the humble beginnings of DDR economy in united Germany. Obsolete infrastructure, hidden unemployment, dominance of state ownership, and other - shared by so many Eastern and Central Europe Economies – deficiencies (Paque, 2009). Germany's economy continues to be perceived by many as the "tale of two countries". This paper seeks to offer a thorough assessment of current state of the play as well as developments taking place in 1989-2008 with respect to various determinants of economic growth in Germany.

The primary aim is to evaluate the growth potential by constructing and consequently calculating the summary index encompassing various dimensions of economy. Research and assessment process is reflected in paper's sections. The first one setting the stage outlines the main inspirations influencing the index creations and the whole methodological process. The next one describes methodology and sources used in calculations. It also briefly sketches the main stylized facts of German economy with respect to selected modules. Third part details the sequences of creating summary index. Some possible advantages are listed next. The last sections discuses results obtained and draws some general tentative conclusions.

2. Inspiration

- The idea of constructing following index was inspired mainly by three well-known indices.
- Bundesländerranking established by Neue Soziale Marktwirtschaft (INSM) evaluating both current growth potential as measured in 5 dimensions: labour market, enterprises, economic structure, regional attractiveness and welfare and dynamic expressed in terms of changes in these selected areas (http://www.bundeslaenderranking.de/methodik.html accessed 02.11.2009).
- Global Competitiveness Index (GCI) by World Economic Forum (Geneva) encompassing 12 pillars and grouping countries according to their main competitiveness's drivers in one of three distinguished groups: factor driven; efficiency driven or innovation driven (Sala-i-Martin, 2009). Elements taken into account include: institutions, infrastructure, macroeconomic stability,

health and primary education, higher education and training, goods market efficiency, labor market efficiency, financial market sophistication, technological readiness, market size, business sophistication and innovation. The actual construction of GCI involves the aggregation of the 12 pillars into a single index, measures are reported for the 12 pillars separately offering a more disaggregated analysis useful to countries and practitioners. The hard data indicators used in the GCI are normalized on a 1-to-7 scale (in order to align them with the Executive Opinion Survey's results). The computation of the GCI is based on successive aggregations of scores, from the lowest level all the way up to the overall GCI score (i.e., the highest level), using the weights.

- European Innovation Scoreboard – up until 2009 overall innovation performance was calculated on the basis of 25 indicators covering five dimensions of innovation: innovation drivers measuring the structural conditions required for innovation potential; knowledge creation measuring the investments in R&D activities; innovation & entrepreneurship measuring the efforts towards innovation at the firm level; applications measuring the performance expressed in terms of labour and business activities and their value added in innovative sectors; and intellectual property measuring the achieved results in terms of successful know-how (European Innovation Scoreboard 2007). For the EIS 2008-2010, the number of dimensions will be increased to 7 and grouped into 3 main blocks of dimensions (Hollanders, Tarantola, Loschky, 2009). The purpose of this revision is to have dimensions that bring together a set of related indicators in order to give a balanced assessment of the innovation performance in that dimension. The blocks and dimensions have been designed to accommodate the diversity of different innovation processes.

3. Methodology

Following steps have been undertaken in order to calculate a synthetic index.

1. Creation of conceptual scaffolding synthesizing various growth determinants. Five (I-V) modules have been distinguished, each encompasses specific factors contributing directly or indirectly to economic growth.
2. Selection of indicators being proxies of distinguished categories within pillars I-V.

3. Analysis of current situation as well as of changes happening so far in each category based on available statistics. Figures have been retrieved from databases of 16 Bundesländer provided by *Volskwirtschaftliche Gesamtrechnungen der Länder* VRGL Destatis, years 1989-2008.

4. Estimation of partial indices by the way of including both current levels as well as earlier decreases/ increases and subsequently assigning weights to all factors

5. Calculation of summary index of growth potential (SG).

The intention was to take a holistic and comprehensive view on economic growth factors, accommodating both business and political dimensions prevailing in media with scientific approach drawing on specific methodology (Hausmann, Klinger, Wagner, 2008: 2). A conceptual framework - "navigation tool" - incorporating various aspects enabling analysis of economic growth factors has been put forward. Creating conceptual scaffolding synthesizing yet differentiating among various growth determinants was the first step of such endeavor.

Table 1. Outline of proposed conceptual framework

Pillars / modules	I Competitiveness	II Sectors ("output approach")	III Business cycle ("expenditure approach")	IV General economic condition ("macroeconomic stabilization pentagon")	V Catalysts (all other factors)
Factors to be taken into account	Basic elements as in production function: capital, labor, total factor productivity (TFP)	Traditional approach distinguishing: Agriculture Industry Services	Components of macroeconomic equation: export/import, government expenditures, investment, consumption	Inflation Unemployment GDP growth Current account deficit Fiscal stability	R&D human capital entrepreneurship SMEs

Source: Own elaboration.

Each of the pillars looks at growth determinants from different perspective.

I.   First module refers to macroeconomic production function and growth accounting, as well as analyses of European Union datasets AMECO, German "wise men" Sachverständigenrat (*Sachverständigenrat Jahresgutachten* 2007/2008: 443), Project KLEMS (Timmer, O'Mahony, van Ark, 2007), and OECD. As it is believed, the source of modern growth are predominately TFP and ICT investments. Stylized facts about Germany indicate however, certain deficiencies in this respect and still significant negative impact of labour factor (Mc Morrow, Roeger, 2007: 83; Eicher, Strobel, 2008: 39; OECD 2009).

II.   Second pillar reflects the contributions of various sectors to global production. It refers not only to traditional agriculture, industry and services, but also high or low tech industries; or division of ICT producing versus ICT using branches. Stylized facts about Germany point to: relative importance of ICT producing rather that more valuable ICT using branches and that construction boost soon after reunification has not been so far compensated by another, well performing though rare *cleantech* (Eicher, Strobel, 2009).

III. Third module stands for basic components of business cycles variables included in fundamental macroeconomics equation (Sinn, 2008). Seen this way, German's economy reveals strengths as well as weaknesses – impressive exports values, mediocre investments volumes and persistent low domestic consumption (*Rebalancing the world economy*: *Germany The lives of others*, The Economist, 2009).

IV.   Fourth pillar encompasses basic figures describing how fit the economy is. It draws on more indirect factors of economic growth - peaks (prongs) of so called magic economic pentagon (Misala, 2007). Data confirm, Germany performs well in terms of current account deficit thanks to export phenomenal results or inflation. Unemployment levels as well as budget growing deficits are however matter of concern (*20 Jahre Deutsche Einheit – Rückblick und Ausblick*, IWH Halle, 2009: 90).

V.   Last but not least, fifth module being of residual character encompasses all other factors not included in I-IV pillars affecting growth more indirectly, rather in the long run, though not necessarily. Elements such as R&D expenditures, education quality, clusters, SMEs, taxes, etc. can be taken into account. According to latest EU Innovation Scoreboard Germany belongs to top three innovative EU members – following Sweden and Finland (European Innovation, Scoreboard (EIS) 2009).

Selection of the most appropriate variables has been hampered by data availability at regional level. Due to this limitations (e.g. no growth accounting statistics for regional level) following indices have been singled out as proxies of variables mentioned earlier:

I.   productivity (GDP per worker); employment (head counts), working hours (million hours in Bundesland),

II.   value added in agriculture, industry and services,

III.   export, domestic consumption, public expenditures, investments,

IV.   unemployment rate, inflation, current account balance (differences export and import), budget deficit or surplus, GDP growth rate,

V.   R&D expenditures, patent applications, employment in knowledge intensive sectors and population of students.

4. Procedure

Heading for synthetic (encompassing I-V units) and dynamic (including both current levels and changes recorded between years 1989-2008) indicator the first step was to rank Bundesländer in ascending order, from the worst in a given category to the best one (i.e. from the one with highest inflation rate, unemployment or lowest GDP growth to the one with highest GDP growth, lowest unemployment and inflation levels) in both current values and in terms of changes happened when comparing the last and first years of analysis. With the exception of deficits - current account or public finance, debt level or inflation and unemployment, increases in all remaining categories have been regarded as positive development. However, interpretation of public spending (government expenditures) may raise some doubts (Rzońca 2005; Krawczyk 2009). For depending on the perspective taken (long versus short run) or type (structural rigid social transfers or R&D expenditures) the increases may in fact indicate positive as well as negative changes. In this study raising values has been regarded as favorable development. Next, the best performer (Bundesland with best scores) has been defined as the reference point. This enables assigning value of all other units by relating their respective first hand figures to the levels of best performers. Weights have been ascribed to all factors based on the literature

review, so they have discretional (arbitrary chosen) character[1]. Fractions of 1 attached to selected variables shall reflect certain "stylized facts" linked with them. Following weights have been ascertained[2]:

I.   Productivity; employment, and working hours each has got 0,3. Equal distribution of weights reflect the ambiguity of German economy – one the one hand it is TFP which is supposed to be the key driver of growth in highly developed countries (Eicher, Strobel, 2008: 39; Eicher, Strobel 2009: 17), on the other hand it is labour input which keeps negatively and strongly influencing economic growth in Germany (Niemcy szykują się na najgorsze, Rzeczpospolita, 2009).

II.   Since in the post-industrial, service economies, as the name indicates, services play decisive role for growth following weight have been assigned: value added in agriculture – 0,1, industry – 0,4 and services – 0,5 (Gramke 2007: 11).

III. The total value of weight one has been divided in a following way to give account of the role played by four elements of global demand: 0,4 for export (Garbicz 2008, 260) since it reflects country's competitiveness and do not restrict economy to domestic market; 0,3 for investment (Back above the bar again, The Economist, 2007; Rebalancing the world economy: Germany The lives of others, The Economist, 2009) crucial in the long run, however in Germany lagging behind as a result of lack of interesting opportunities to invest money home instead of transferring it abroad; 0,2 for domestic consumption (Rebalancing the world economy: Germany The lives of others, The Economist, 2009; Short work of it, Financial Times, 2009) permanently dubbed as Achilles' heel of German economy reflecting traditional societal inclination for savings; and 0,1 for government expenditures (Siebert 2006, 10) since in Germany it unfortunately stands mainly for social transfers rather than so needed R&D expenditures or innovation support.

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[1] For instance for Global Competitiveness Index to obtain the precise weights, a maximum likelihood regression of GDP per capita was run against each subindex for past years, allowing for different coefficients for each stage of development. The Global Competitiveness Report 2009–2010; World Economic Forum Geneva, Switzerland 2009; Xavier Sala-i-Martin.

[2] *if there are some particular information missing for a given Bundesland weights for partial indices have been modified – for instance lack of data on inflation rate resulted in only four instead of five elements taken into account thus 4*0,25 and not 5*0,2.

IV.   Due to heterogonous character of this module all elements namely: unemployment rate, inflation, current account balance, budget deficit or surplus, and GDP growth rate have been ascribed the value of 0,2.

V.   Since the literature review does not give any clear cut basis as to which factor shall be recognized as the most important one, similarly all factors within fifth module: R&D expenditures, patent applications, employment in knowledge intensive services and population of students have been described as equally important and given equal values of 0,25. They all influence social capital and innovativeness – key determinants for future growth.

6. Prospect advantages

Proposed summary index seems to have an all embracing character and thus offering a comprehensive view on growth potential.

- It takes into account various aspects of growth: long / short run, direct / indirect influence.
- It reflects current levels and recent developments (reveals similarity to Neue Social Market Inititave Bundesländerranking including both Bestandsranking and Dynamikranking).
- It refers to absolute values (import, export) and relative ones (inflation rate, productivity per employee) which on the one hand shows where exactly (in which Land) the real potential of Germany resides and on the other hand rank Bundesländer allowing for more precise and comparable estimates (for instance not biased due to population size).

Obviously, it reveals some shortcomings these however may be presumably reflect the broader weaknesses of any rankings or synthetic indices (Hausmann, Klinger, Wagner, 2008: 11; Heilemann, Lehmann, Ragnitz, 2006).

Formula for summary index of growth potential is following one (average of five modules):

$$SG = (I+II+III+IV+V)/5$$

Theoretically, the maximum value of SG is 1. It can be obtained by the Bundesländer if it scores in all categories maximum = 1. Minimum, however, standing for the bottom of ranking cannot be defined *apriori* since it depends on values ascribed in first step (in relation to the first top region).

7. Results

Preliminary results, including both previous dynamic as well as current levels and ascribing (on the basis of literature review - theories and empirical studies) weights to selected elements in order to reflect their importance, point to following findings.

I. In terms of traditional production factors Bayer is the best performing Land, followed by Baden Württemberg and Nordrhein Westfalen.

Figure 1. Federal States' results in terms of traditional production factors (in ascending order)
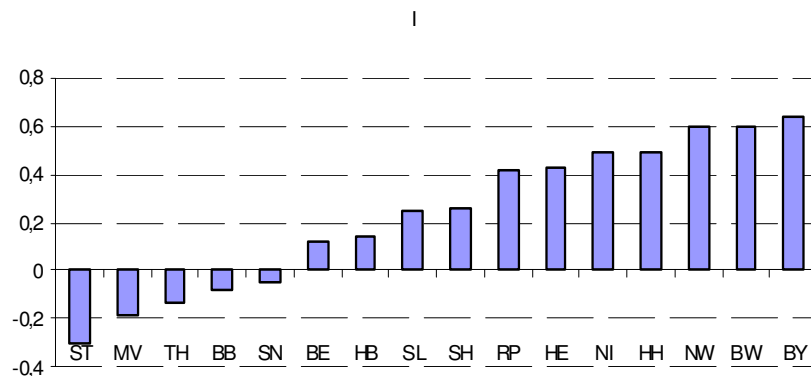
Source: Own calculations based on VRGL data.

Key: BW = Baden Württemberg, BY = Bayer, BE = Berlin, BB = Brandenburg, HB = Bremen, HH = Hamburg, HE = Hessen, MV = Meklemburg Vorpommern, NI = Niedersachsen, NW = Nordrhein Westfalen, RP = Rheinland Pfalz, SL = Saarland, SN = Sachsen, ST =Sachsen Anhalt, SH = Schleswig - Holstein, TH = Thüringen

Specifically, the highest volume of working population is in NW, BY and BW, whereas NI, RP and BY recorded most favorable developments in this respect as compared to year 1991.

HH, HE and HB revealed the highest productivity in 2008, however in terms of increases compared to 1991 most successful were T, ST and BB. In absolute terms citizens of NW, BY and BW worked most hours and these two southern Bundesländer along with HH recorded most favorable developments in this respect when compared to 1998 results.

II. Sectoral analyses indicate that the best results have been achieved in Nordrhein Westfalen, Bayer and Thüringen.

Figure 2. Federal States' results in terms of sectors' activity (in ascending order)
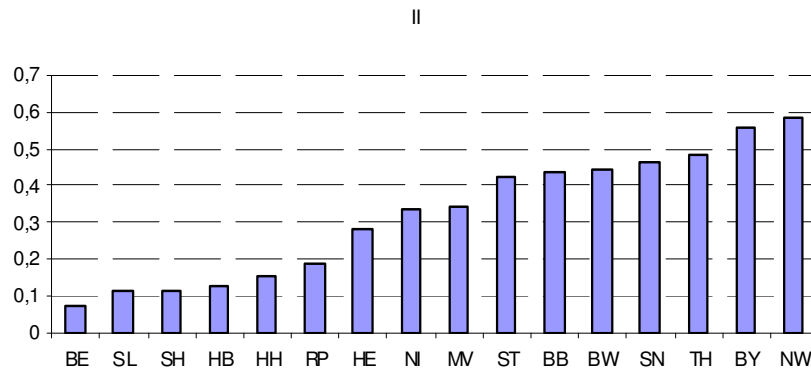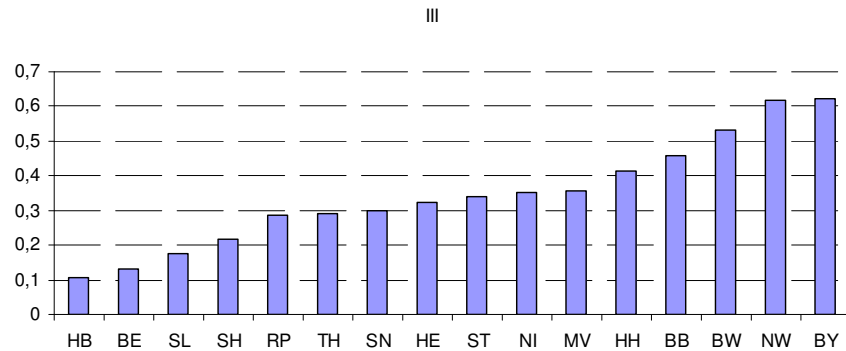

Source: Own calculations based on VRGL data.

Specifically, in 2008 the value added originating from agriculture sector comes mainly from BY, NI and NW, whereas new Bundesländer SN, ST and BB recorded highest rises in this category as compared to year 1991. Industry contribution to value added in Germany in 2008 stems mainly from industrial activities carried out in NW, BW and BY. Nevertheless it was TH, SN and ST which recorded highest increases in this respect as compared to 1991.

Services contribution to German value added in 2008 can be traced back mainly to NW, BY and BW. In terms of changes highest increase of services' value added was reported in BB, MV and TH.

III. Reference to business cycles and elements of global demand shows that the best performing regions are Bayer, Baden Württemberg and Nordrhein Westfalen.

Figure 3. Federal States' results in terms of "business cycles" (in ascending order)

III

Source: Own calculations based on VRGL data.

Specifically, in 2007 consumers from NW, BY and BW spent most, whereas most radical changes in this respect in relation to 1991 were diagnosed in new Bundesländer BB, MV and SN. Highest investments levels in Germany in 2006 were recorded in BY, BW and NW, though it was HH, BB and BY where investments increased most significantly over last 16 years. Highest export volumes in 2008 were recorded in NW, BY and BW. East Bundesländer BB, ST and MV witnessed greatest rises of this category as compared to 2004.

IV. Saarland, Rheinland Pfalz and Bayer are in best shape since the level of factors all together suggest there are the most favorable conditions as measured by inflation or unemployment.

Figure 4. Federal States' results in terms of macroeconomic condition (in ascending order)
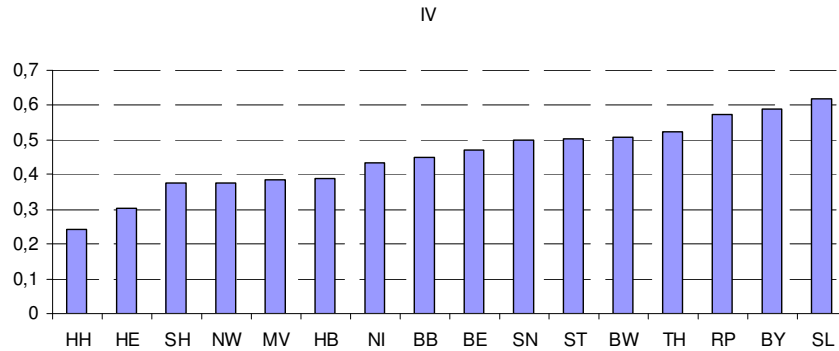
Source: Own calculations based on VRGL data.

Specifically, in 2008 BW, BY and NW reported lowest unemployment levels, though this rate fell most significantly as compared to 2001 in SN, ST and TH.

In 2008 GDP grew at the fastest rate in ST, HH and HB. When comparing to 1991, the dynamic best performers (witnessing smallest GDP% drops) were HB, HH and SL.

In terms of foreign trade in 2008, best results (trade surpluses) were achieved in BY, BW and NW. Most favorable developments (increase of surplus, or decrease of deficit) of this category as compared to 2004 were observed in SL, NW and TH.

Best price stability (lowest inflation rate) in years 2008-2005 was recorded in RP, BE and TH. HB, SL, HH had in 2006 the lowest fiscal debts. SL, HH along with BE revealed also the most significant decrease of this category, comparing to 1992.

V. In the last group of residual factors best results are achieved in Baden Württemberg, Bayer and Nordrhein Pfalz.

Figure 5. Federal States' results in terms of other economic climate factors (in ascending order)

V
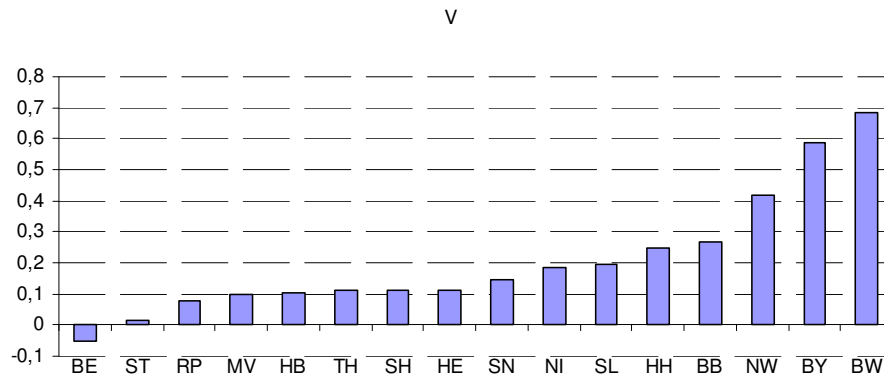
Source: Own calculations based on VRGL data.

Specifically, BW, BY and NW scored best in 2007 in terms of patent application. Similarly, these two southern Bundesländer and SL recorded most significant rise in this respect as compared to year 1998.

Highest R&D expenditures were in 2005 in BY, BW and NW. However, MV, BB and SN witnessed most favorable developments of this category as compared to 1995.

Largest personnel in technology advanced and knowledge intensive sectors was employed in 2007 in NW, BY and BW. Comparing to 1996, RP, HH and BW witnessed most significant increases in these terms.

In 2009 NW, BY and BW recorded highest students population, though biggest rise in this category as compared to 1999 was achieved in BB, ST and MV.

Spider web figures below reflect situation for all distinguished 5 modules.

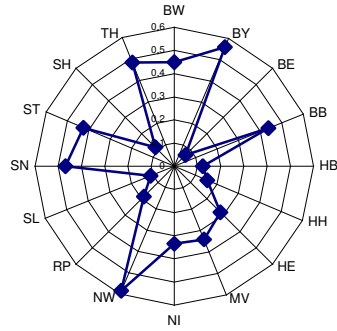**Figure 6. Competitiveness – factors of production function (I)**
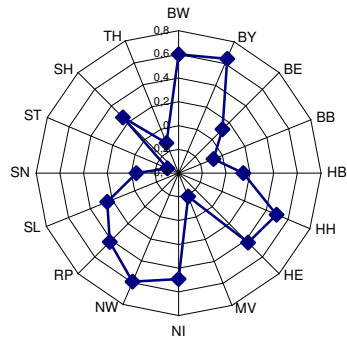
The Top Three

BY	BW	NW
0,64	0,60	0,59

Source: Own calculations based on VRGL data.

Figure 7. Sectors – output approach (II)

The Top Three

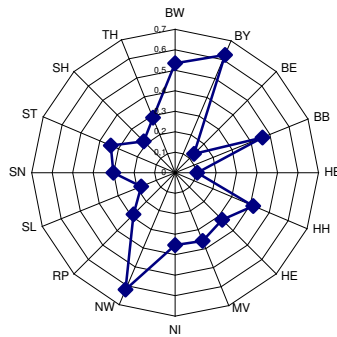| NW	BY	TH
0,58	0,56	0,48

Source: Own calculations based on VRGL data.

Figure 8. Business cycle - "expenditure approach" (III)

The Top Three

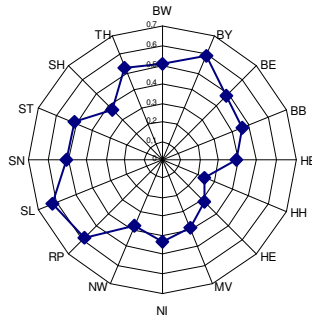| BY	NW	BW
0,62	0,61	0,53

Source: Own calculations based on VRGL data.

Figure 9. General economic condition - "magic macroeconomic pentagon" (IV)

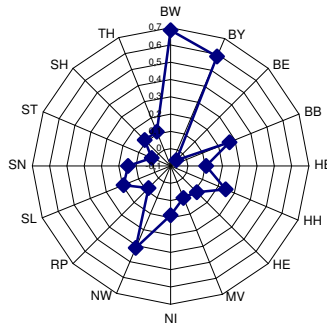
The Top Three

SL	BY	RP
0,62	0,59	0,57

Source: Own calculations based on VRGL data.

Figure 10. Catalysts - all other factors (V)

The Top Three

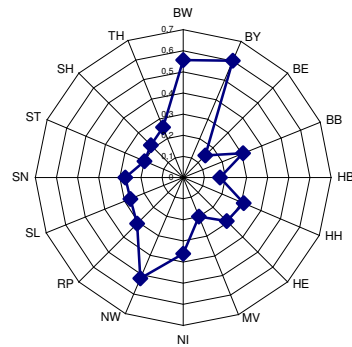| BW	BY	NW
0,69	0,59	0,42

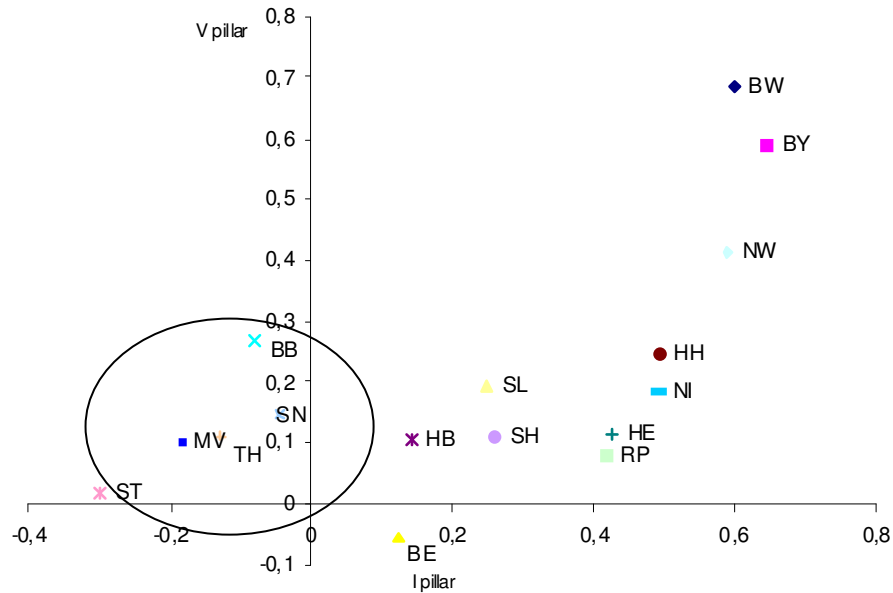Source: Own calculations based on VRGL data.

The synthetic value of growth potential as measured by SG is depicted on the graph below.

Figure 11. Values of synthetic index for each Federal State

Source: Own calculations based on VRGL data.

Totally, Bayer achieved highest value of the synthetic index SG and shows highest economic growth potential followed by Baden Württemberg and Nordrhein Westfalen.

Results obtained confirm to some extent earlier studies pointing to existing West-East Germany's discrepancies. It is particularly visible when taking into account elements of the first module and key for long term growth factors of fifth pillar.

Figure 12. Federal States' performance in terms of I and V pillars

Source: Own calculations based on VRGL data.

There is a certain "leader monotony" in the results obtained. However, one must not ignore the achievements obtained and progress made by new Bundesländer as measured by positive time developments.

8. Conclusions

Proposed index, calculated in this paper for Germany federal states, aims at offering a synthetic insight into any economy growth potential. Multidimensional yet simple it shall be developed in the future, so it might be applied for other countries. Possible improvements may include more frequent statistical figures (e.g. quarterly not annual) used for calculations. Weights shall be adjusted and customized for the economy under consideration since they reflect importance of certain factors for this country. Some refinements may be also needed for indicators selection.

20 years of German Reunification offers a good opportunity to take a stock of progress done so far, however the opinions in this respect differ significantly. Whereas J. Ragnitz from Ifo Dresden (2009) or H. Flassbeck from UN (2009) claim that East regions still need some special attention and assistance; U. Blum from IWH Halle (*Aufbau Ost, IWH-Chef: Osten braucht keinen neuen Solidarpakt*, 2009) and former member of Sachverständigerrat R. Pohl (2009) argue that such support is superfluous. Either because it's not working or because it has already fulfilled its role. More balanced view on this topic offer analysts from influential economic weekly *Wirtschaftswoche* (Schnaas 2009) or IW Köln (2009) according to whom the economic landscape of Germany does not any more fit into simple dichotomy East-West. Instead it s more subtle and reflects patchwork of prosperous and lagging behind regions scattered all over the country. Though Bayer and Baden Württemberg stands out clearly, such moderate approach seems most appropriate one when assessing economic growth potential in Germany.

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Streszczenie

ZWYCIĘZCA BIERZE WSZYSTKO? SYNTETYCZNA I WIELOASPEKTOWA OCENA CZYNNIKÓW WZROSTU W NIEMIECKICH KRAJACH ZWIĄZKOWYCH.

Artykuł stara się dokonać kompleksowej oceny obecnej sytuacji i zmian, jakie zaszły w latach 1991-2009 w zakresie różnych elementów wzrostu gospodarczego w niemieckich krajach związkowych. W tym celu zaproponowano pięciomodułowy schemat syntetyzujący najważniejsze czynniki i umożliwiający opracowanie cząstkowych, a następnie syntetycznego wskaźnika oceniającego potencjał wzrostu w poszczególnych regionach. Wyróżniono: 1) konkurencyjność, czyli ujęcie podażowe, nawiązujące do makroekonomicznej funkcji produkcji, 2) podział branżowy dotyczący udziału sektorów we wzroście gospodarczym, 3) koniunkturę, czyli ujęcie popytowe odwołujące się do kardynalnego równanie makroekonomii, 4) kondycję gospodarczą wyznaczoną kształtowaniem się głównych wskaźników makroekonomicznych oraz 5) klimat gospodarczy obejmujący pozostałe potencjalne determinanty wzrostu gospodarczego. Schemat stanowiący eklektyczne podejście do czynników wzrostu jest próbą wypełnienia luki między wysoce zmatematyzowanym modelowym i abstrakcyjnym ujęciem kwestii wzrostu, jaki przeważa w literaturze akademickiej, a podejściem praktycznym obecnym w prasie biznesowej, czy bieżących analizach politycznych. Otrzymane wyniki wskazują, że najwyższy potencjał wzrostu gospodarczego osiągnęły Bawaria, Badenia Wirtembergia i Nadrenia Północna Westfalia; najsłabszy - Berlin, Brema, Saksonia Anhalt i Meklemburgia Pomorze Przednie. Rezultaty te potwierdzają po części wcześniejsze wnioski innych badań o wciąż utrzymujących się dysproporcjach Wschód -Zachód, ale wskazują też na postęp, jaki wschodnie Landy osiągnęły od momentu Zjednoczenia.