Regional Competitiveness Under New Perspectives

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Authors: Karl Aiginger, Matthias Firgo (WIFO)

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Karl Aiginger and Matthias Firgo*

Abstract

The term "competitiveness" has been used in conceptually distinct ways at the firm, regional and national levels. After primarily reviewing existing concepts at the national level, we introduce a new definition of regional competitiveness adapting definitions used in the academic literature. Specifically, we connect "outcome competitiveness" with new perspectives on a more socially inclusive and ecologically sustainable growth path, as envisaged in the WWWforEurope research program, in which 33 European research groups are taking part. Evaluating competitiveness requires both an input assessment (costs, productivity, economic structure, capabilities) and an outcome assessment. We define regional outcome competitiveness as the ability of a region to deliver Beyond GDP goals. For regions in industrialized countries, this ability depends on innovation, education, institutions, social cohesion and ecological ambition. Given this new perspective (of broader Beyond GDP goals), social investments and ecological ambitions should not be considered costs, but rather drivers of competitiveness. This is compatible with a new innovation policy fostering non-technical innovations and a new industrial policy supporting societal goals. Applying this concept to European regions, we show which regions take the "high road" to competitiveness and compare our results with the existing literature.

Keywords: regional competitiveness, Beyond GDP goals, composite index, European Union

JEL-Codes: I31, O47, Q56, R11, R58

*Karl Aiginger, Austrian Institute of Economic Research (WIFO), Arsenal Objekt 20, 1030 Wien, Austria. Email: karl.aiginger@wifo.ac.at. Matthias Firgo, Austrian Institute of Economic Research (WIFO), Arsenal Objekt 20, 1030 Wien, Austria, Email: matthias.firgo@wifo.ac.at. A shorter version of this paper was prepared for the Handbook of Regions and Competitiveness edited by Robert Huggins and Piers Thompson (Cheltenham, UK: Edward Elgar,, forthcoming). The authors thank David Bailey, Lewis Dijkstra, Jan Fagerberg, Geoffrey J.D. Hewings, Peter Huber, Christian Ketels, Peter Mayerhofer, Gianmarco Ottaviano, Gunther Tichy, Johanna Vogel, and the participants of the 8th WIFO Workshop on Regional Economics for their helpful comments, Lewis Dijkstra, Felix Kienast, and Sergiy Protsiv for the provision of data, and Andrea Grabmayer, Dagmar Guttmann, Birgit Schuster, and Eva Sokoll for their assistance.

1. Introduction

The quest for "competitiveness" is a top agenda item for firms, politicians and the media. It is often used to describe a problem or a fear (competitiveness lost or endangered) and sometimes a defensive goal (regaining or sustaining competitiveness under globalisation). The mainstream use of the term in economic policy and media persistently sticks to the specific aspect of cost competitiveness, resulting in the call for low wages, taxes, and social and ecological standards. This happens despite a bulk of literature[1] emphasising that for nations as well as regions productivity and technology are at least as important as costs, and that the performance of firms in sophisticated, heterogeneous markets is determined by capabilities, unique selling propositions and the ability to permanently upgrade the user value of products (*Aiginger*, 2006).

The aim of this paper is to first provide an overview of the development of the concept of competitiveness from the firm level to the national level and from the cost perspective to the outcome perspective (including the new perspectives of broader Beyond GDP goals as proposed in the WWWforEurope Project[2]). These changes – as shown in section 2 – in the meaning of competitiveness are not only a theoretical exercise; they have deeply changed the policy conclusions derived from the concept. Secondly, in the remaining sections we present a concept of regional competitiveness that is compatible with the drivers of performance of firms and regions, and with the goals of delivering welfare as specified by the Beyond GDP goals. We also introduce a set of indicators for input and outcome competitiveness. The data allow a descriptive analysis as well as some econometrics for evaluating regional performance and its drivers.

Section 3 discusses competitiveness at the regional level. The term *regional competitiveness* refers to the relation between regions within and between countries (including issues of core and periphery), as well as to the performance of countries within larger, integrated areas such as the European Union or the US. Section 4 applies the proposed concept to European NUTS 2 regions, reporting outcome competitiveness under new perspectives (New Perspectives Outcome, henceforth *NPO*) as well as its drivers. We rank regions according to the new concept and illustrate the dynamics over time as well as differences between regions. We investigate how the outcomes are related to their individual

[1] See *Aiginger – Bärenthaler-Sieber – Vogel* (ABSV, 2013) and *Aiginger – Vogel* (2015) for a review.

[2] Welfare, Wealth and Work for Europe: Europe moving towards a new path of economic growth and social development. See the project website http://www.foreurope.eu.

"pillars". We focus on a descriptive analysis, but also present econometric results on the drivers of *NPO*. Section 5 relates the result to other recent attempts to measure regional outcome competitiveness, and section 6 concludes.

2. National level: from a cost perspective to the ability to deliver goals

The concept of competitiveness originated at the firm level (*Krugman,* 1994A,B, 1996A; *Porter,* 1990, 2004). In a homogenous market with many competitors (perfect competition), productivity is given and a firm has to match the average costs of other firms. Otherwise, it is not "competitive" and has to exit. Changing to the dynamic perspective, neither productivity nor costs are given. Furthermore, in heterogeneous (differentiated) markets, costs across firms may differ and firms can go for a cost advantage, productivity lead or quality advantage. The Strategic Management Theory stresses that firm performance is based on competitive advantages. It investigates characteristics allowing firms to sustain advantages over time (see the literature on persistent profit differences, e.g. *Mueller*, 1983; *Gschwandtner*, 2005). That this is not pure theory can be seen in the "road shows" held by large enterprises trying to sell their stocks: they very seldom convince buyers that they are low-cost suppliers, by some fortuitous circumstance have lower energy and labour costs, or that their government has set low ecological standards. They instead emphasise the uniqueness of their capabilities, asserting that they are producing ever-increasing consumer value and offering solutions for tomorrow's problems.

2.1 Cost competitiveness: the narrow and enlightened versions

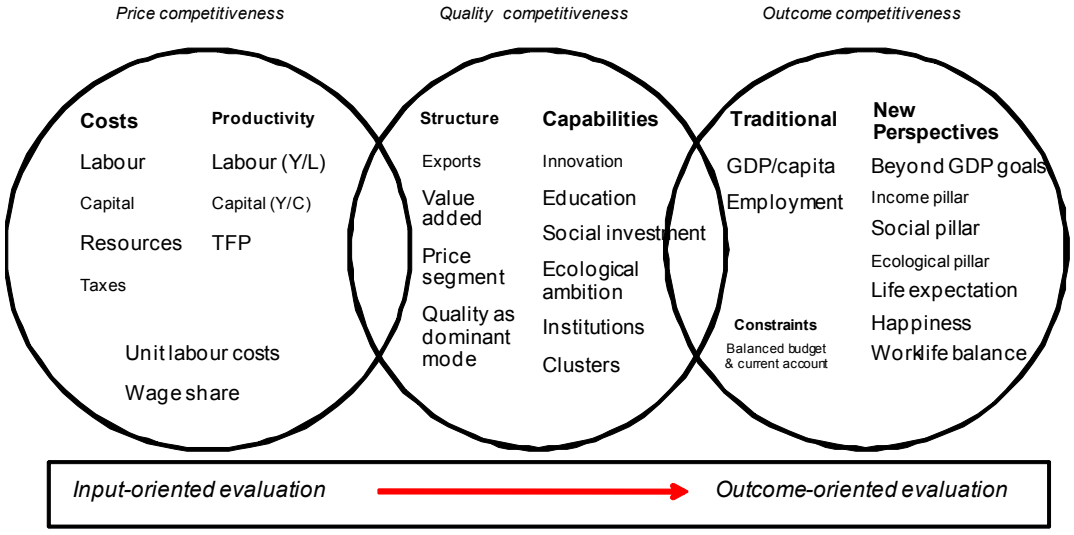
The narrowest definition of cost competitiveness is "low absolute wages per worker or per hour". A slightly broader definition includes other cost components such as capital costs (including subsidies), costs of energy and raw materials, and taxes. Irrespective of whether labour costs only or also other cost positions are considered, we call a definition looking at costs only the "narrow concept" of cost competitiveness.

In the "enlightened version", productivity is added and cost competitiveness refers to a balance between wages and productivity per unit. If costs are higher, but the same holds for productivity, then a firm or economy can still compete successfully. Catching-up countries often grow faster, as the cost difference is larger than the productivity lag. Germany rebuilt its large export surplus (which it had temporarily lost after unification) by exercising wage restraint relative to its high productivity. The role of productivity is sometimes emphasised to

the extent that authors consider productivity the only meaningful measure of competitiveness (*Porter*, 1990; *Kohler*, 2006). This may de-emphasise costs too much. It distracts from quality components, as well as the role of institutions as drivers of competitiveness.

Concepts of cost competitiveness in the narrow sense (costs only) or the more balanced approach (looking at costs and productivity simultaneously) are complicated when all cost components (labour, capital, energy, taxes) and/or all productivity components (labour, capital and resource productivity, government efficiency) have to be addressed (see the first circle in Figure 1). These extensions are usually implemented in cost benchmark studies that sequentially examine individual cost components or in studies on total factor productivity (TFP), which use a production function approach.

Figure 1: Towards a concept of competitiveness under new perspectives



Source: *ABSV* (2013).

2.2 Structural change and capabilities

Over time the literature has incorporated structural change, the quality of products, and technology (*Grupp*, 1995; *Janger et al.*, 2011) into the assessment of competitiveness (see the second circle in Figure 1). Specifically, rich countries are analysed with respect to their technological competitiveness (*Fagerberg*, 1988, 1994; *Unterlass et al.*, 2015), such as excellence in leading technologies or high-tech products. It is determined whether a country offers products in the higher price segments or adds consumer value to its products, and whether firms can charge a "quality premium". Trade theory tells us that the relative

importance and price of production factors change with rising income and that countries therefore have to climb up the "quality ladder". Structural change from price-sensitive industries to industries with other competitive advantages becomes important for qualitative competitiveness (*Aiginger*, 1997, 1998).[3]

Aiginger – Bärenthaler-Sieber – Vogel (2013; henceforce ABSV) use the term "capabilities"[4] to define five drivers of competitiveness: innovation, education, institutions, social capital and ecological ambition. While innovation and education are closely related to quality, as seen in the discussion on technological competitiveness, the other three capabilities are not as common. In growth theory, the term "institutions" describes the importance of a set of institutions in establishing rule of law, corruption control, democracy and trust in growth. In the literature on national competitiveness the role of government in supporting industries is well-discussed, along with its impact on *Porter's* (1990, 2004) four determinants of competitiveness (firm strategy, factor conditions, demand conditions, related industries). At the regional level institutional quality is also crucial to development (*Rodriguez-Pose*, 2013) and is found to be an important determinant in the migration decisions of highly mobile, highly skilled human capital (*Nifo – Vecchione*, 2014).

The role of clusters and university-firm relations, and finally that of smart specialisation is related to institutions, and will play a specific role if we switch from the national to the regional perspective (see e.g. *Thissen et al.*, 2013). Investments in social capital are related to a new approach toward social welfare – for instance, so-called activation or active labour market policies. Ecological ambition is related to Porter's idea that sophisticated environmental standards in regulation and consumer behaviour may create a first-mover advantage for firms (see also *Porter – van der Linde*, 1995A,B).[5]

The latter two capabilities are specifically important in shifting the perspective of economies from the goal of maximising GDP (and maybe "GDP plus employment" as in *Delgado et al.*, 2012) to the broader goals of the "Beyond GDP" approach (*Stiglitz et al.*, 2009). They directly support the social and ecological pillars of outcome competitiveness. The inclusion of social investment and ecological ambition as capabilities challenges the old view

[3] See *Peneder* (2001, 2010) for a measure of structural change by "taxonomies" of technology driven or skill intensive sectors.

[4] The term "capability" was introduced by *Amartya Sen* (1980, 1985, 1987, 1993) as a person's provided capacity to use life chances and create an own design of life. At the regional or national level capabilities point toward enablers of very different types and dimensions (*Maskell – Malmberg*, 1999), which – in certain combinations chosen by firms – may offer a good description of the available choices for creating and sustaining competitive advantages.

[5] However, the empirical evidence on this hypothesis is mixed (*Ambec et al*., 2013).

that social expenditures and ecological standards invoke costs and therefore reduce (cost) competitiveness.[6]

2.3 Outcome competitiveness under new perspectives (NPO)

Costs (narrowly defined or including productivity) and quality competitiveness (structure and capabilities) are inputs to the economy and are the core of an input-oriented evaluation of competitiveness. This is shown in the first two circles in Figure 1 and labelled "input competitiveness". Other evaluations concentrate on the outcomes of the processes. Outcome competitiveness was initially measured using trade or current account balances, with deficit countries deemed uncompetitive.[7] However, balancing external accounts is not the ultimate goal of a society. The goal is to enable high and rising incomes, to provide employment opportunities and to improve living conditions.[8] This was reflected in defining competitiveness as the "ability to sell" (*Orlowski*, 1982) and in using GDP plus employment as indicators of outcome competitiveness (*Delgado et al.*, 2012). We call this latter approach the "traditional" view of outcome competitiveness. This concept dominated the assessments of the OECD and the European Commission in the 1990s (*European Commission*, 1995; *OECD*, 1995; *Aiginger*, 1997, 1998; *Oughton*, 1997).

Finally, the WWWforEurope project that seeks to delineate a new growth path for Europe proposes to define outcome competitiveness in a broader way, as "the ability to deliver Beyond GDP goals".[9] To make this task operational, WWWforEurope proposes to cluster the numerous indicators available to measure performance and well being into three pillars: an income pillar, a social pillar, and an ecological pillar. The social pillar includes poverty reduction through transfers, limiting differences in net incomes through progressive

[6] Their inclusion also requires that we divide the so-called social and ecological indicators into one subset which defines drivers of competitiveness, such as the share of green innovations in patenting activities, and another subset which measures the outcome of competitiveness (i.e. the extent to which welfare goals are attained as indicated by low poverty or emission levels in an economy).

[7] In an early paper *Fagerberg* (1988) had put the current account goal in perspective in proposing to define competitiveness as the ability of a nation to realize important (economic) policy goals without coming into balance of payments difficulties. Later, the importance of external balances with respect to competitiveness declined, as fast-growing countries tended to have trade deficits; at the same time, the current accounts of member countries were seen as meaningless in a currency union. The total negligence of current accounts proved a mistake, as revealed during the financial crisis, since differences in the depth of the crisis in individual countries were found to correlate with their current account positions in the upcoming period (see *Aiginger*, 2010; Aiginger – Guger, 2014).

[8] A typical definition of outcome competitiveness is offered by the *European Commission* (2001): "... the ability of an economy to provide its population with high and rising standards of living and high rates of employment on a sustainable basis."

[9] See *ABSV* (2013) for the first use of this definition. See *Stiglitz et al*. (2009) for the theoretical background of Beyond GDP goals, as well as the Better Life indicators by the OECD (2011, 2013A, 2014) for an operationalisation.

taxation, guaranteeing pensions above the poverty level, achieving gender equality and providing broad access to the health system. Ecological sustainability can be evaluated in terms of low CO_2 emissions and energy intensity or a high share of renewable energy production. The traditional as well as this new perspective of outcome competitiveness is shown in the third circle of Figure 1.

Defining competitiveness as the ability to deliver welfare as measured by Beyond GDP goals is certainly unusual from the point of view of the firm or industry, and it differs from popularly used definitions in policy discussions.[10] We follow this approach, as it connects a formerly "dangerous" and "misleading" concept based primarily on costs (*Krugman*, 1994A) to the goal of an economy, namely to provide welfare ("outcome competitiveness"). In contrast to the theoretical literature on welfare, the framework delineated in Figure 1 enables also policy conclusions focusing on drivers of competitiveness (capabilities, institutions), as stressed in the theory of the firm and in growth theory. This new framework indicates that competitiveness is created at the firm level but is also influenced by economic policy and framework conditions. Competitiveness indices ranking countries or regions, such as by *IMD* (1994), *World Economic Forum (2000)*, or the European (Regional) Competitiveness Indices (e.g. *Huggins et al.*, 2004; *Annoni – Kozovska*, 2010; *Annoni – Dijkstra*, 2013), have always used a wide set of Beyond GDP indicators, but have not differentiated between drivers and outcomes of competitiveness and are often not related to a theoretical or macroeconomic perspective. Furthermore, they usually do not consider the environmental dimension of competitiveness.

3. From national to regional competitiveness

3.1 Conceptual differences at the regional level

Regional competitiveness differs from concepts at the national level in two main aspects: First, absolute (dis)advantages are more important than relative ones compared to the national level (*Camagni*, 2002). Secondly, spatial interrelations are particularly significant

[10] A legitimate question that arises is why we do not simply speak of "welfare analysis" and abandon the term "competitiveness" when comparing economies. The answer has different dimensions (see *ABSV*, 2013). First, the notion of competitiveness (instead of welfare or living standards) engenders a focus on market processes. Second, competitiveness emphasises the bottom-up character of welfare creation. Third, using the term competitiveness to assess the contribution of firms and industries to the ultimate aims of society could help reduce the misuse of the term in describing only cost factors (such as a call for cheap gas, even if its extraction is linked to environmental problems).

at this "meso" level (*Cellino – Soci*, 2002). The latter may also influence national performance, but are usually not addressed in a comparison of countries.

With respect to the first aspect, at the national level absolute costs may be relevant to welfare, while differences present no obstacle to trade and competitiveness, as they can be adjusted via exchange rates and factor prices (*Krugman*, 1996B). At the regional level, mechanisms to adjust absolute cost differences are available to a very limited extent, if at all.[11] Consequently, if a region lacks price competitiveness, its exports may approach zero at exogenously given exchange rates. Furthermore, a region may also "exit" from the market for highly mobile production factors such as highly skilled creative labour or foreign direct investments.

As for the second aspect, regional competitiveness is neither a spatial disaggregation of national competitiveness nor the sum of the productivities of individual firms within a spatial unit. Instead, regional competitiveness is regarded as successful competition among extremely open "spaces of flows" (*Doel – Hubbard*, 2002) in attracting and retaining production factors in order to become or remain hubs ("sticky places", *Markusen*, 1996) of (inter)national trade, investment and knowledge flows.

Still, the term "regional competitiveness"[12] shares the critique found at the national level: (i) a lack of clear meaning, (ii) whether the concept of competing units – in this case regions – makes sense at all, (iii) how much it should focus on productivity in the tradition of *Porter* (1995, 1998, 2000) or on regarding productivity as a necessary yet insufficient condition for positive development (*Reinert*, 1995) alongside the analysis of capabilities. *Bristow* (2005) criticizes the tendency to analyse regions at the "micro" level as directly competing, internally coherent, atomistic and bounded spatial entities (equivalent to firms each possessing a specific competitive advantage), arguing that regions should instead be regarded as social aggregations with specific economic and political structures. This "meso level" implies that productive assets can be delimited as the specific characters and combinations which co-determine the performance of firms within a region and thus the region as a whole (*Begg*, 1999). Consequently, a region's competitiveness crucially depends on its ability to provide a favourable entrepreneurial, institutional, social, technological framework and infrastructure that local firms can use as "external advantages" (*Camagni*,

[11] The same logic applies to countries within the European Monetary Union. Thus, in analyzing competitiveness these countries should be regarded as regions rather than nations. See *Aiginger et al. (2012, 2013)*, *Aiginger* (2013), and *Firgo – Huber* (2014) for further details on this issue.

[12] See *Martin* (2011) for a review of different concepts.

2002; *Bristow*, 2005). The *OECD* (2001), *Camagni* (2008) and *Camagni and Capello* (2013) – among others – use the term "territorial capital" to describe the wide set of tangible and intangible, private, public or mixed territorial assets that help to enhance the efficiency and productivity of local activities. Especially in a globalized economy such specific local qualities in a business environment may contribute to maintaining long-run competitive advantages, because they are harder to imitate by other regions (*Storper*, 1997; *Porter*, 1998; Boschma, 2004).

The relevance of absolute local (dis)advantages in the absence of national adjustment mechanisms is empirically corroborated by findings for within-country developments in *Crespo Cuaresma et al.* (2014). They show that, while regional convergence in economic growth between EU countries is driven by the catching-up of the new member states, evidence for convergence within countries is only found for the old member states. *Firgo – Huber* (2014) illustrate that GDP per capita levels diverged in nearly half of all NUTS 2 regions of the EU with respect to their national average during the last two decades. Both studies identify the infrastructure associated with a national capital city as well as high education levels of the local population – both of which indicate absolute regional advantages – as the main predictors for regional performance within countries.

The World Bank (2009) and *Glaeser* (2011) highlight the absolute competitive advantage of large city regions due to the increasing returns to agglomeration. *Thissen et al*. (2013) name innovation, human resources and creativity, specialization as well as clusters, networks and transportation capabilities as the most fundamental means of influencing competitiveness also available to smaller regions. Economic structure and structural change matter, but structural policies fostering specialization and clustering in sophisticated or high-tech sectors do not necessarily increase a region's outcome competitiveness. Rather, policies have to be adapted to a specific territorial context ("smart specialization")[13] and have to focus on the embeddedness, relatedness (*Frenken et al*., 2007) or connectivity of their actions (*Thissen et al.*, 2013).

Thissen et al. (2013, p.101) emphasize that, beyond commonly measurable indicators, a region's competitiveness is also determined by its trade connections with other regions ("revealed competition"): "A situation in which too many regions compete for the clustering of the same sector may result in a disastrous waste of public resources." While a number of studies find positive effects of sectoral clustering (*Falck et al.*, 2010; *Delgado et al.*, 2010;

[13] See *David et al.* (2009) and *McCann – Ortega-Argiles* (2013), among others.

2014A; *Ketels - Protsiv*, 2013), others point toward poor cost-benefit relations (*McDonald et al.*, 2007; *Yu – Jackson*, 2011). There is also evidence that clusters which build on existing strengths with respect to regional economic structure are more successful than others (*Duranton*, 2011; *Martin - Sunley*, 2011; *Delgado et al.*, 2014B). New cluster initiatives should therefore focus on diversification in sectors ("smart diversification"; e.g. *Unterlass et al.*, 2015) related to existing strengths, rather than creating new sectors associated with high growth potential (*Ketels*, 2013).

Martin (2011) cautions that rapid growth and development can impose strains and pressure on the environmental, social and physical resources of a region. This could give rise to negative externalities and erosion in the quality of local fundamentals. The author thus calls for an evolutionary view of regional competitiveness. Also, with respect to Beyond GDP goals, policy efforts that place too much emphasis on high (quality) productivity and innovation intensity may increase aggregate prosperity, but also raise the gap between different skill groups in the population. Additionally, high innovation rates lead neither automatically to social inclusion nor to environmental sustainability (*Lee – Rodriguez-Pose*, 2013; *OECD*, 2013A, 2015). In line with these arguments, social and environmental outcomes play a key role in the evaluation of a region's overall competitiveness in the present approach.

3.2 Indicators to proxy the specifics of capabilities at the regional level

While the dimensions and indicators on outcome competitiveness relevant at the national level are rather similar, some input dimensions (capabilities) are more relevant at the regional level.[14] First, we emphasize (in)tangible infrastructure and amenities. *Camagni and Capello* (2013) use indicators on entrepreneurship, creativity, density of transport infrastructure and growth receptivity to proxy "territorial capital". *Kienast et al.* (2009) provide a set of variables on (intangible) amenities that determine a region's potential to attract highly mobile, high-skilled human capital (*Rodriguez-Pose – Ketterer*, 2012). Quality-of-life considerations become increasingly important in Europe with the deepening of the economic integration and declining information costs in migration (*Partridge*, 2010). Thus, the potential to provide good life conditions can be regarded as an absolute competitive advantage in regional outcome competitiveness.

[14] For a set of potential indicators and data sources to measure regional competitiveness in outcomes and inputs, see Table A in the Appendix.

Apart from infrastructure and amenities, the share of high-skilled labour and employment in knowledge-intensive sectors as well as the share of creative workforce are relevant indicators. While the latter group of the population is regarded as a necessary asset in a region's ability to be a "hotbed" of new ideas (*Florida*, 2002), the former are also key to creating new knowledge and re-combining existing knowledge leading to innovation. The share of employment in creative industries or knowledge-intensive business service clusters[15] can help to proxy the potential positive effects of clusters in sectors regularly associated with high innovation and growth potential. Since the seminal paper by *Frenken et al.* (2007), numerous studies have provided evidence of the importance of the relatedness of diversified economic activities with respect to their potential in generating (growth inducing) inter-sectoral knowledge spillovers. Measures of entropy such as the Shannon index (*Shannon*, 1948) on the (un)related variety of sectoral employment (*Frenken et al*., 2007) can proxy the structural embeddedness of a region's economic activities.

Thissen et al. (2013) emphasize the importance of regional interconnectivity in evaluating a region's potential for high competitiveness based on given structural and other capabilities. The authors provide a concept for measuring the economically valued relations between regions, which is supposed to support regions in developing place-based smart specialization strategies.[16] While such place-based concepts are – by definition – beyond measurable benchmarks comparing regions' competitive capabilities, there are still a number of spatial indicators that may proxy differences in regional interconnectedness and market access, and thus absolute spatial (dis)advantages. Regions at the core of Europe benefit from a dense network of interaction with their neighbours (*Thissen et al.*, 2013) that accelerates the flow and recombination of knowledge. Thus, in the absence of regional trade data, indicators for international (distance to other regions) and national (distance to the national capital) remoteness can serve as proxies for the access to markets (*OECD*, 2009A) and the intensity of interactions with neighbouring regions. Moreover, the potential for high competitiveness is also influenced by interregional spillovers. As open spaces, the

[15] As provided by the European Cluster Observatory.

[16] See *Barca* (2009), *OECD* (2009A,B), *Barca et al.*, (2012) for reports and papers on 'placed-based' policy approaches and *Hildreth – Bailey* (2013) for a summary of contrasts to 'space-neutral' approaches.

regions' own capabilities and outcomes may depend on the capabilities and performance of other economically and/or spatially close regions.[17]

3.3 Recent attempts to measure regional outcome competitiveness

A more traditional concept of outcome competitiveness than suggested by the NPO approach was defined in a recent paper by *Delgado et al.* (2012) at the national level, which can also be applied to the regional level. The authors define GDP per working-age individual (GDP per active population) as "foundational competitiveness" that includes two dimensions of prosperity: First, the ability to achieve high productivity; Second, the ability to mobilize a high share of the available working force. Thus, their definition embodies a measure that relates to the NPO income pillar as well as to the social pillar but in contrast to the number of variables in the respective NPO pillars only covers one aspect of outcomes in each pillar. Additionally it completely leaves out the dimension of ecological outcomes.

Since the first European Competitiveness Index published by *Huggins et al.* (2004) several indices have been developed to measure the competitiveness of EU regions apart from traditional outcomes such as GDP. While such comparisons rely on benchmarks and rankings that face difficulties in incorporating the fit between capabilities and the economic structure as criticized by *Boschma* (2004) and *Thissen et al*. (2013), among others, recent indices such as the Regional Competitiveness Index (RCI) and the Europe 2020 Regional Index are useful attempts to quantify the many dimensions incorporated in Beyond GDP goals. However, while including Beyond GDP goals, these indices do not distinguish between outcomes and their drivers (capabilities)[18], nor do they consider the environmental dimension in evaluating the performance of European regions. The most recent RCI by *Annoni – Dijkstra* (2013) defines regional competitiveness as "the ability to offer an attractive and sustainable environment for firms and residents to live and work". This definition seems to be quite close to our concept but differences arise with respect to the application of the definition. While the RCI includes a large number of indicators on Beyond GDP goals such as institutional quality, health, labour market efficiency and social inclusion, it completely lacks ecological indicators.

[17] At least for spatial distance inter-regional spillovers can be accounted for by using the spatial lags of capabilities and/or outcomes of neighbouring regions using standard spatial econometric techniques. See *LeSage – Pace* (2009) for details and *Gibbons – Overman* (2012) for a critical review.

[18] See *Perrons* (2012) for a purely capabilities based regional development indicator for UK regions.

The recent Europe 2020 Regional indices by *Athanasoglou – Dijkstra* (2014) and *Dijkstra – Athanasoglou (2015)* rank regions according to their progress in achieving the EU 2020 objectives.[19] These objectives directly cover all three outcome pillars and include goals for important drivers of competitiveness (R&D, education, labour market participation). In the Europe 2020 Regional Index, however, environmental ambitions and green goals are again omitted. The index gives higher weight to the social pillar than it does the income pillar. *Athanasoglou – Dijkstra* (2014) mainly focus on a region's distance to the respective individual national rather than to EU-wide objectives. Their main results are thus a relative measure of distance from national goals that were set more or less ambitiously, reflecting countries' starting positions. Given the large heterogeneity of regional performance within countries, most countries have regions that are very close to (or even above) the national targets, as well as regions that still have a long way to go. *Dijkstra – Athanasoglou (2015)* and part of the analysis in *Athanasoglou – Dijkstra* (2014) also present an index with respect to the EU-wide 2020 objectives. Little surprising most regions in Southern and Eastern European countries (with less ambitious targets) do worse under EU-wide targets, while regions in richer countries mostly do either slightly better or slightly worse than with respect to their countries' national targets.

4. Outcome Competitiveness under New Perspectives in European Regions

In the remainder of this paper we apply the concept of "outcome" competitiveness defined in section 2 to the regions of Europe. We introduce a composite index that covers the three pillars (income, social, ecological pillar) that determine a region's new perspectives outcome (NPO) competitiveness. We then provide some empirical evidence on the relation between total NPO, its pillars and the "input" factors that determine these outcomes. Subsequently we relate the results on our competitiveness measure to recent other concepts of regional outcome competitiveness.

With respect to the outcome dimensions, conceptual changes compared to the national approach of *ABSV* are not necessary, only the set of available data forces some changes. For input competitiveness we make changes both out of conceptual issues and data availability. We focus our indicators on factors available to policy makers at the regional

[19] The EU 2020 objectives for the EU as a whole are an employment rate of 75% (20-64 year-olds), 3% of EU's GDP to be invested in R&D, greenhouse gas emissions at 20% (or even 30%) below the 1990s levels, 20% of total energy production from renewable energy, a 20% increase in energy efficiency compared to 2005, an early school leaving rate below 10%, at least 40% of the population between 30 and 34 having competed third level education, and at least 20 million people beyond risk of poverty and social inclusion.

level. Additionally, we have to make several changes in the composition of indicators due to the limited availability of data at the regional compared to the national level.

4.1 Transferring Outcome Competitiveness and its Inputs to the Regional Level

For cost competitiveness we focus on wages and unit labor costs for the total economy and the manufacturing sector, for the economic structure on specific sector shares in employment. With respect to capability dimensions we separately build on education and innovation, social and institutional quality, as well as on environmental capabilities. According to the discussion in Section 3 we add regional infrastructure and amenities to the capabilities. The availability of comprehensive (and consistent) data over a longer period of time is still very limited at the regional level – especially with respect to social and ecological topics. The collection of comprehensive and EU-wide regional data on ecological and social inputs and outcomes is still in its infancy. Thus, important variables that have become available for very recent years (such as data on green-tech clusters or regional inequality) are not available even for the rather short and recent period analyzed. Thus, the overall number of variables is restricted to the availability of data at the beginning and the end of the period. Still, we build on a rich set of 54 variables that vary at the NUTS 2 level (Table 1).[20]

As many of the indicators used within the individual groups are potentially highly correlated with each others, we compile composite indicators based on principal components (PCA) factor analysis. To determine the weights for the individual variables in these indicators, we use the factor loadings for each indicator resulting from PCA factor analysis. This approach substantially reduces the complexity and dimensionality in investigating the relation between outcomes and inputs of competitiveness and allows us to identify variables that do not fit well into the groups we assigned them. In compiling these indicators we follow the procedure proposed by the OECD (2008) and recently adopted to composite indicators at the national level by Delgado et al. (2012) and ABSV. Details on the results on the PCA factor analysis are provided in the appendix (Table D). Methodologically, our overall NPO indicator is compiled in a two-step procedure. First, individual outcome indicators (see Table A in the appendix) are composed to the three pillars income, social and ecological outcome competitiveness. In a second step these three pillars are summed up to NPO. While the weights of the individual variables in each pillar are chosen by PCA/FA, we

[20] The data are compiled from several different data sources as summarized in Table A the appendix. This table contains all variables grouped by the different outcome and input categories presented in Table 1. Table A also indicates whether the same (or very similar) variables were used in ABSV at the national level.

choose equal weights of 1/3 for the three pillars to obtain NPO for two reasons. First, assigning the same weights to social inclusion and ecological sustainability as to income is in line with the Europe 2020 objectives and the EU 2020 Regional Index (*Athanasoglou – Dijkstra*, 2014) as well as with the Beyond GDP approach proposed in the WWWforEurope project. Furthermore, the second-stage factor analysis indicates that the common factors of the pillars do not explain enough to extract meaningful weights from the factor analysis.[21]

Table 1 – List of Indicators

Shortcut	Description of Composite Indicator	No. of indicators
NPO	New Perspectives Outcomes based on INCOME, SOCIAL, ECO	3
INCOME	*New Perspectives Outcomes – Income Pillar*	*3*
SOCIAL	*New Perspectives Outcomes – Social Pillar*	*6*
ECO	*New Perspectives Outcomes – Eco Pillar*	*3*
COST	Cost Competitiveness	4
STRUCTURE	Economic Structure	6
CAPABILITIES	Capabilities to provide competitive Outcomes	32
CAP_EDU_INNO	*Capabilities – Education and Innovation*	*12*
CAP_SOCIAL	*Capabilities – Social System*	*5*
CAP_INST	*Capabilities – Institutions*	*5*
CAP_INFRASTR	*Capabilities – (Intangible) Infrastructure and Amenities*	*5*
CAP_ECO	*Capabilities – Ecological*	*5*

For a full list of individual indicators, sources, and further notes see Table A in the appendix.

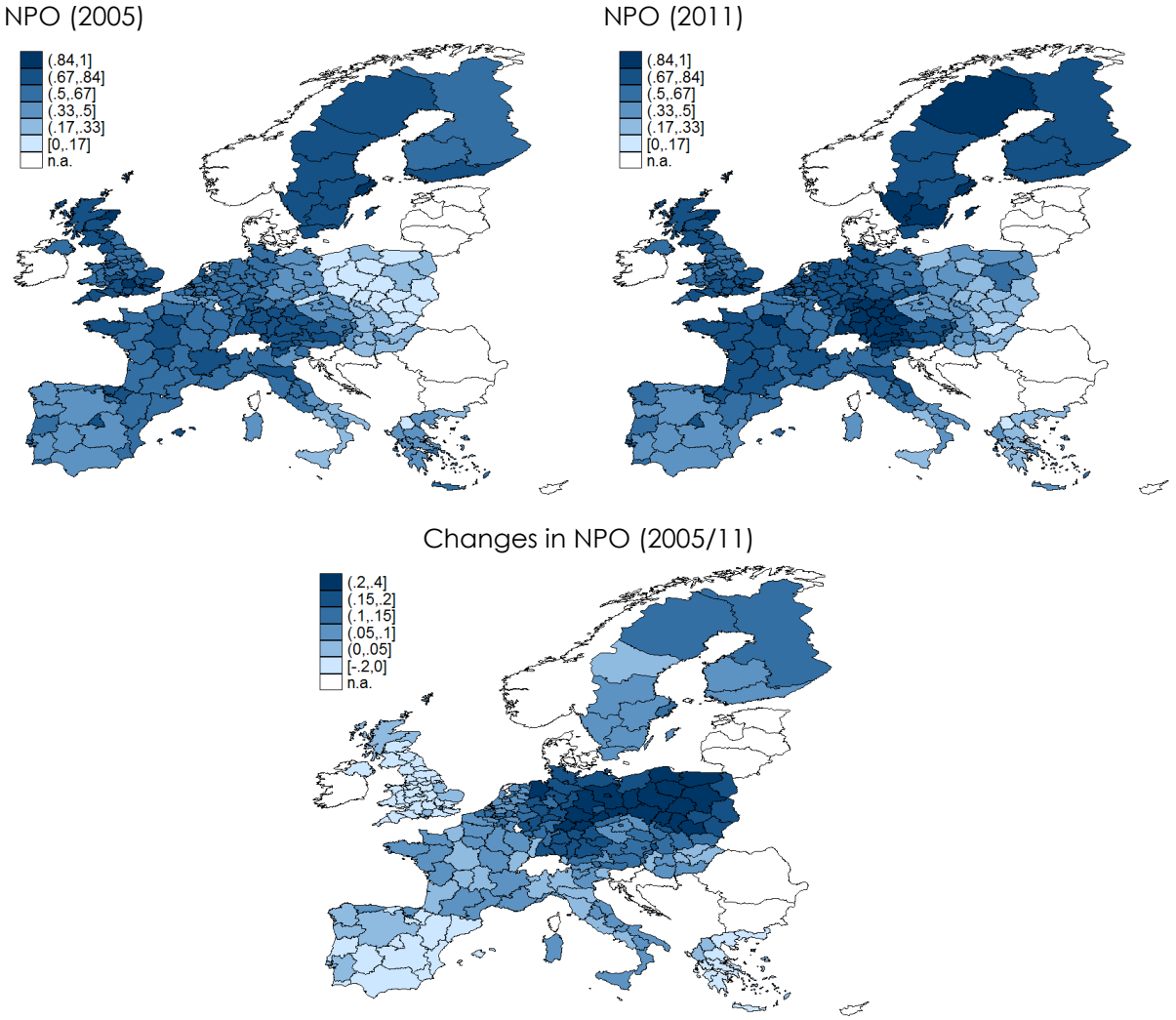
As we focus on the sub-national level we exclude EU countries that consist of one NUTS 2 region only (Cyprus, Estonia, Latvia, Luxembourg, and Malta). Additionally, Bulgaria, Croatia, Cyprus, Denmark, Ireland, Romania and Slovenia are dropped from the sample due to a lack of sufficient data in a number of variables.[22] This leaves us with a sample of 229 NUTS 2 regions in 16 EU countries that we analyze for their competitive performance during the

[21] Equal weights across pillars and countries, however, imply that all regions and countries attach the same (equal) weight to each pillar. This may be contradicting individual regions' or countries' political preferences. The RCI 2013, for instance, addresses this issue by varying pillar group weights across country groups according to their priorities (the innovation pillar group weight increases while the "basic" pillar group weight decrease with the level of development). Even though following an economically feasible logic, the choice of weights for different country groups still remains arbitrary. Also the fact that national or regional political preferences may contradict some of the Beyond GDP outcomes inherent in our definition of competitiveness provides an argument for equal pillar weights for all regions. Still, the NPO approach is flexible as the weights given to the three pillars could in general differ across countries according to their preferences or starting positions. Also, the individual pillars can be analyzed and related to potential drivers of competitiveness separately, as we can calculate scores and rankings for each of the pillars.

[22] In some countries a small number of individual regions are excluded because of insufficient data. These regions are the French overseas departments, the Portuguese autonomous regions Acores and Madeira, the Spanish exclaves Ceuta and Melilla as well as the Canary Islands, the French island of Corsica and Aland in Finland. Two Finish regions (North and East Finland) were merged because of changes in the NUTS classification during the observational period.

2005 to 2011 period.[23] A list of regions included and their NUTS codes as well as their NPO (pillar) ranks are provided in Table B in the appendix.

Figure 2: NPO Scores and Changes between 2005 and 2011



Index scores between 0 and 1 based on Min-Max normalization.

Figure 2 illustrates the NPO composite index for our sample of European NUTS 2 regions. The top left (right) panel of Figure 1 shows the geographical distribution of scores in the NPO composite indicator for the year 2005 (2011). Index scores are Min-Max normalized, with one (zero) being the highest (lowest) regional score recorded in the 2005 and 2011 period. The

[23] While this period may seem to be rather short at first glance, for many variables 2011 represents the latest year available. 2005 was chosen as a starting point as the earliest year with the completeness of the data being high enough to justify the analysis at hand.

darker (lighter) the color, the higher (lower) the scores. The bottom panel illustrates changes in the index scores between 2005 and 2011 (dark colour indicates high positive changes). The highest scores in NPO are found on average in Austria, Germany, Finland, France, the Netherlands, Sweden, and the UK but Figure 1 illustrates a substantial heterogeneity within some of these countries. The lowest scores are recorded for Greece and the CEE countries Hungary, Poland and Slovakia. German and Polish regions show the largest improvements in the index between 2005 and 2011. In Germany these improvements are not only concentrated on former East German regions. In all countries with the exception of Greece, Spain and the UK, regions improved their scores on average during the period observed. Table 2 illustrates the top and bottom 10 regions in levels and changes in the NPO indicator.

Table 2: Top and bottom 10 regions in New Perspectives Outcomes

	Top 10	Bottom 10
NPO (2011)	**SE11, UKI1, DE21, AT33, UKM5, DE60,** *ITH1*, **DE14, DE27, AT32**.	*ITF3*, PL32, *EL11*, PL11, HU32, PL52, PL33, SK04, HU31, *EL13*.
Δ NPO (2005/11)	PL12, PL51, PL22, PL52, PL63, PL62, PL41, **DE50, DEG0**, PL11.	*EL23, EL12, ES23, EL14, ES52, EL11, ES53, EL30, ES62, EL43*.
INCOMPE Pillar (2011)	**UKI1, DE21, FR10, DE60, DE11, DE71, DE25, DE12**, *ITH1*, **DE14.**	PL52, PL33, PL62, PL34, PL31, HU23, HU33, PL32, HU32, HU31.
SOCIAL Pillar (2011)	**AT32, DE21, AT33, DE13, DE14, AT22, NL31, AT31, DE22, BE25**.	*EL24, ITF6, ES43, ITF4, EL11, EL12, ES61, EL13, ITG1, ITF3.*
ECO Pillar (2011)	**SE11, SE33, SE12, SE21, UKM5, UKI1, SE31, SE23, SE33, SE22**.	CZ08, *ITH3*, CZ02, PL33, HU31, PL22, CZ04, PL52, PL11, *EL13*.

Bold … Western/Northern, *Italics … Southern,* Regular font … Eastern European regions. For a full list of regions, NUTS codes and NPO (pillar) scores see Table B in the appendix.

Figure 3 plots the regions' NPO scores against their scores in the three NPO pillars and distinguishes between regions in Northern/Western Europe, Southern Europe (Greece, Italy, Portugal, Spain), and in the four CEE countries (Czech Republic, Hungary, Poland, Slovakia) included. As expected, regions in Northern and Western Europe show the highest overall NPO scores as well as the highest scores in each of the three pillars. The lowest scores in NPO and the income pillar are scored by Eastern European regions on average.

Table 3 provides the coefficients of correlation between the 2011 levels and the 2005/11 changes in these indicators. As Table 3 and Figure 3 reveal the overall NPO composite index shows the highest correlation with the income pillar in all three country

groups (top left panel of Figure 3).[24] The correlation is also found to be quite high with the social pillar. The top right panel reveals that given their NPO scores regions in Eastern European (Southern European) countries tend to have relatively high (low) scores on the social pillar. A similar picture is also found for the relation between the income and the social pillar (middle right panel) with Eastern (Southern) European regions showing relatively high (low) scores in the social pillar at a given score in the income pillar. Thus, Figure 3 illustrates that higher outcome competitiveness at the income level seems to coincide with higher levels competitiveness levels in social outcomes.

Table 3 – Correlations between levels and changes in NPO and its pillars

	NPO	INCOME	SOCIAL	ECO	Δ NPO	Δ INCOME	Δ SOCIAL	Δ ECO
NPO	1.0000							
INCOME	0.8962*	1.0000						
SOCIAL	0.8033*	0.6355*	1.0000					
ECO	0.6683*	0.4249*	0.2550*	1.0000				
Δ NPO	0.1023	0.1334*	0.3715*	-0.3126*	1.0000			
Δ INCOME	0.1371*	0.1793*	0.3045*	-0.2031*	0.8892*	1.0000		
Δ SOCIAL	0.1531*	0.1839*	0.4099*	-0.2828*	0.9503*	0.7934*	1.0000	
Δ ECO	-0.2060*	-0.2259*	0.0027	-0.2697*	0.3089*	0.0443	0.1160	1.0000

2011 Levels; Δ … changes between 2005/2011. * … correlation significant at the 5% level.

The picture is less clear when it comes to competitiveness with respect to ecological outcomes. The high correlation between the ecological pillar and overall NPO scores (middle left panel) mainly results from the fact that the eco pillar accounts for one third of NPO. However, the correlation is much lower between this pillar and the other two pillars (bottom two panels), which indicates only weak positive links but not a trade-off.[25] With respect to the different country groups the analysis reveals that at given income levels, regions in Southern Europe score relatively high in the ecological pillar and low in the social pillar, while the opposite is true for Eastern European regions. Thus, it seems that the peripheral regions of the "old" Member States (in the South) have taken low road social strategies but enjoy the benefits of climatic conditions and – as far as its impact on emissions is concerned - relatively

[24] The high correlation of the income pillar and total NPO scores might be interpreted in a sense that raising GDP levels is a sufficient target to reach NPO goals. However, GDP only reflects one of three indicators within the NPO income pillar. Additionally, Section 5 below illustrates substantial deviations between GDP and NPO ranks throughout the sample.

[25] See also *Ketels* (2015), who notes that a general trade-off between GDP and Beyond GDP performance is not very likely, but admits that trade-offs between the three outcome pillars cannot be ruled out.

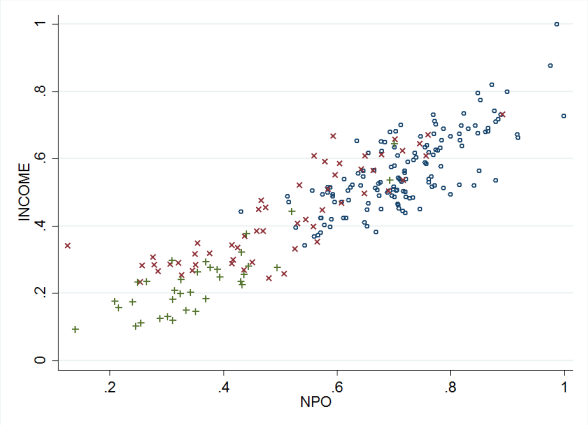
low manufacturing shares while the CEEC regions have chosen a high road social along with a low road ecological strategy (and a higher share of heavy industries).

While no region except for Stockholm scores top ranks in all three pillars, we find a number of regions that score very high in two but mediocre in a third pillar. Inner London (top ranks in the income and eco pillar), Upper Bavaria (Oberbayern) and Salzburg (top ranks in the income and social pillar), or Swedish Upper (Övre) Norrland (top ranks in the social and eco pillar) are examples. Among the most competitive NPO regions we also find regions that score high in one pillar and decent ranks in the remaining two – such as Hamburg (top in the income pillar), Tyrol (top in the social pillar), or Northeast Scotland (top in the eco pillar). Regions characterized by decent but not top ranks in all three pillars are Swabia (Schwaben), Upper Palatinate (Oberpfalz) and Upper Franconia (Oberfranken) each located in the German state of Bavaria. The mean standard deviation in a region's pillar ranks is lower in the bottom quartile than in the top quartile suggesting that regions with the lowest (best) ranks in *NPO* are more (less) likely to perform poor (well) in all three pillars.[26]

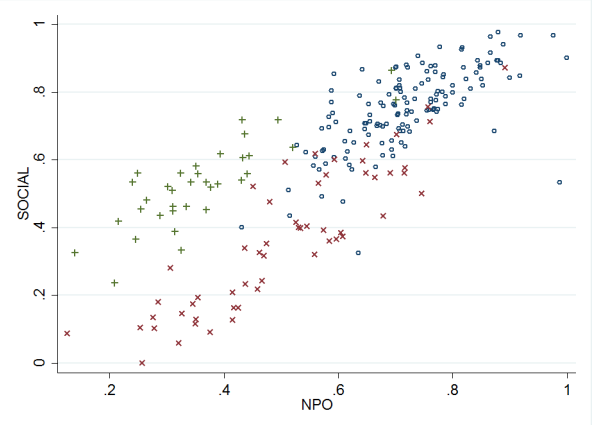
[26] For the question whether NPO rankings are different from GDP rankings, see Table B in the Appendix.

Figure 3: Regional scores on New Perspective Outcomes and its pillars (2011)

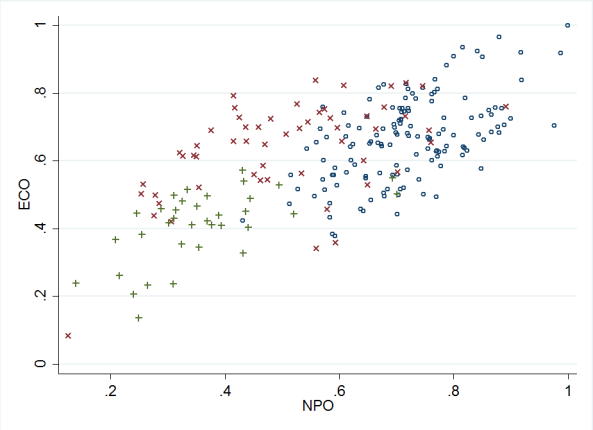
NPO vs. INCOME



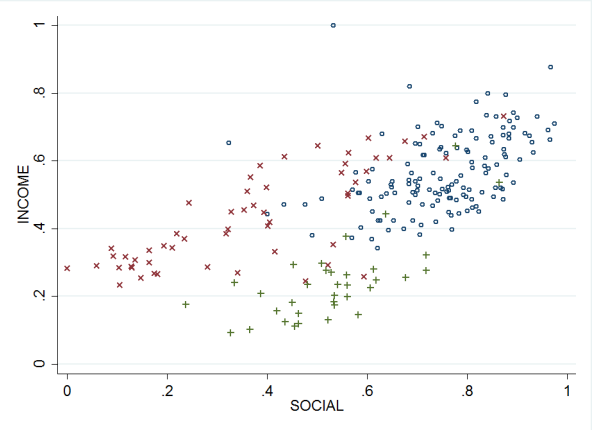
NPO vs. SOCIAL



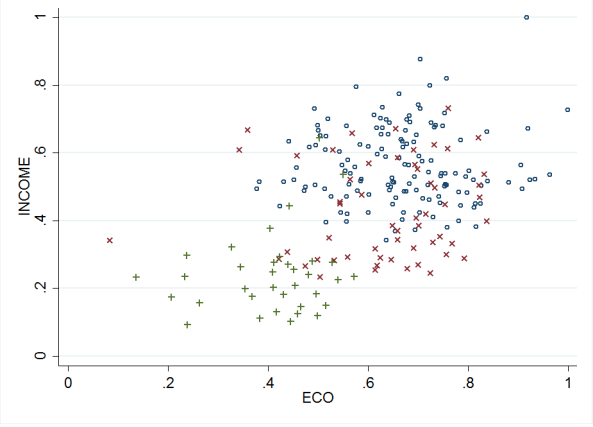
NPO vs. ECO



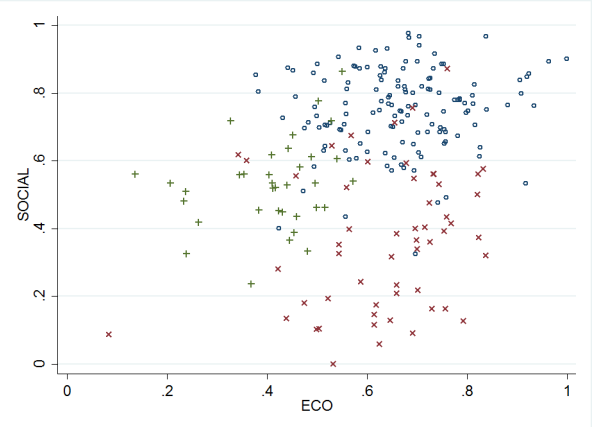
INCOME vs. SOCIAL



INCOME vs. ECO



SOCIAL vs. ECO



Country groups: o … North/West, x … South, + … East. Index scores between 0 and 1 based on Min-Max normalization.

4.2. Relating Outcome Competitiveness to its Determinants

It is also worth relating outcome competitiveness under new perspectives to its potential determinants. While the actual levels of regional competitiveness have evolved over a long-run process related to historical factors, the six-year period between 2005 and 2011 under investigation in the present paper may still provide some evidence on the determinants of recent changes in these competitive levels. Thus, the relation between outcome competitiveness and its inputs described in equation (1) above can be adopted to test which types of inputs contribute to predict changes in the competitiveness econometrically. The relation between changes in outcome competitiveness and its inputs can be described by equation (1).

$$\Delta\, NPO_{i_{2005/2011}} = \alpha + \beta_1 NPO_{i_{2005}} + \beta_2 COST_{i_{2005}} + \beta_3 STRUCTURE_{i_{2005}} + \beta_4 CAPABILITIES_{i_{2005}} + \mu_{i_{2005}}. \quad (1)$$

$\Delta\, NPO_{i_{2005/2011}}$ measures the changes in NPO between 2005 and 2011 in region *i*. *COST*, *STRUCTURE* and *CAPABILITIES* each represent a number of indicators (see Table A in the appendix) approximating a region's capabilities to increase outcome competitiveness. The variables considered in each of these composite indicators on inputs are listed in Table A in the appendix. The weights for the individual variables in each composite indicator were again extracted using Factor Analysis based on Principal Component Analysis. Additionally, the lagged level of new perspective outcomes $NPO_{i_{2005}}$ is added as an explanatory variable to account for potential β-convergence in new perspectives outcomes between regions (see Abreu et al. 2005 for a meta-analysis and Durlauf et al. 2005 for a comprehensive survey on growth and convergence). α is a constant term common to all regions, β_1 to β_4 are the coefficients to be estimated, and μ is a vector of error term that may be heteroskedastic and/or correlated with unobservable regional variables. Thus, in all specifications this residual term is clustered at the regional (NUTS 1) level.

For many important dimensions of our concept either the time period covered by the data is quite (too) short and/or the panel structure is extremely unbalanced. Therefore, we opt for the framework of a cross-sectional growth model in the tradition of Barro and Sala-i-Martin (1991,1992) and Mankiw et al. (1992) rather than for exploiting the time dimension in a full panel analysis. To reduce the issue of potential endogeneity in the right hand side composite indicators and/or their components we only use values of our "initial" period 2005 to explain changes in outcomes during the 2005/2011 period. The variables included as $CAPABILITIES$ can be grouped into several dimensions that contribute as inputs for outcome competitiveness (Table 1).

To account for potential spatial interdependencies in NPO developments the model in equation (1) has to be transformed into a spatial model that can be generalized as

$$\Delta NPO_{2005/2011} = \rho W\, \Delta NPO_{2005/2011} + X_{2005}\beta + W\, X_{2005}\gamma + \mu_{2005}, \quad (2)$$

$$\text{with } \mu_{2005} = \lambda W\, \mu_{2005} + \varepsilon_{2005}.$$

In Equation (2) *W* is a spatial weights matrix with the element w_{ij} being the inverse geographical distance between regions *i* and *j* if *j* is among the ten nearest neighbors of region *i* and with w_{ij} = 0 otherwise.[27] Thus, $W\,\Delta NPO_{2005/2011}$ reflects the spatially weighted changes in NPO of neighboring regions and ρ is the parameter of spatial autocorrelation in regional NPO developments. X_{2005} is matrix containing the explanatory variables NPO_{2005}, COSTS, STRUCTURE, and CAPABILITIES, as indicated in equation (1). Therefore, vector β contains the coefficients of the explanatory variables to be estimated and γ is the vector of coefficients of the spatial lags of these coefficients (i.e. spatial spillovers on NPO developments induced by the explanatory variables). Spatial models not only allow for spatial autocorrelation in the dependent and/or the explanatory variables, but can also account for spatial dependence in the error terms. Such spatial autocorrelation in the error term is captured by the spatial error process denoted in (2) with λ reflecting the coefficient of spatial correlation in the residuals.

Table C in the appendix shows the correlation between (changes in) outcomes and the right hand side variables. The econometric results for estimations on the non-spatial model in equation (1) during the 2005/2011 period with respect to their inputs in the base year 2005 are summarized in the left half of Table 4. We estimate the model in equation (1) including explanatory variables both on CAPABILITIES as a single composite indicator (specification (1) in Table 4) and on composite indicators for its different dimensions (specifications (2) to (4)). Further, we add dummy variables for regions in the *EAST* and *SOUTH* in specifications (3) and (4) to measure potential fixed country group effects applying the same country groups as above with Western and Northern European countries serving as a reference group. Specification (4) adds two dummy variables that may affect the development of regional outcome competitiveness: The variable *NAT_CAPITAL* is equal to one if a region hosts the

[27] Distance between regions is measured by the Euclidean distance between their geographical centroids. To facilitate the interpretation of the spatially lagged variables all elements in *W* are row-normalized. While the choice of the neighborhood criterion is arbitrary after all, a k-nearest neighborhood criterion is preferred over a critical distance criterion to account for the great heterogeneity in geographic size and density of European NUTS 2 regions in different parts of Europe. It is further preferred over a continguity matrix of bordering because of a number of island regions included that lack of immediate borders with neighboring regions but are still (likely to) interact with nearby regions. The main results proved to be robust to several modifications of W.

national capital city and is zero otherwise. This variable has been recently identified as predictor for high regional performance in Crespo Cuaresma et al. (2014) and Firgo – Huber (2014). *OBJECTIVE_1* is equal to one if a region was an Objective 1 region during (part) of the period observed. Being an objective 1 region may create a regional advantage if structural funds increase total investment. A number of studies have found positive (but limited) effects associated with Objective 1 cohesion policy (Cappelen et al., 2003; Esposti & Bussoletti, 2008; Becker et. al., 2010, 2012).

The second set of specifications in Table 4 reflects different specifications of the spatial model in equation (2). Specification (5) is the so-called "Spatial Autoregressive Model" (SAR) that includes the spatial lag of the dependent variable but restricts $\gamma = 0$ and $\lambda = 0$. Specification (6) corresponds to the "General Spatial Autocorrelation Model" (SAC) that includes a spatial lag in the dependent variable and in the error term. Finally, specification (7) is the "Spatial Durbin Model" (SDM) that relaxes the restriction $\gamma = 0$ and includes spatial lags of the explanatory variables in addition to spatially lagged dependent variable. Due to the simultaneous nature of $\Delta NPO_{2005/2011}$ and W $\Delta NPO_{2005/2011}$ estimating specifications (5) to (7) by OLS leads to biased and inconsistent estimates. One solution to this problem is the Maximum Likelihood estimator of the reduced form of equation (2).[28]

In all specifications we find that regions with higher NPO scores in 2005 were associated with lower growth rates in NPO scores throughout the period observed. This result is significant at the 1% level, implies a catching-up of low-road regions and points towards long-run convergence in outcome competitiveness under new perspectives. The indicator on the level of *COST* competitiveness, however, fails to significantly predict changes in NPO in all seven specifications. Thus, regions with higher wages and unit labor costs were not associated with lower average growth in outcomes.

Also the economic *STRUCTURE* does not significantly positively predict changes in outcomes. Its coefficient is insignificant in most specifications and becomes negative at a low (10%) significance level once we control for country-group specific effects. Not finding a significant positive relation is in line with our presumption that sophisticated structural characteristics do not necessarily result in a higher competitiveness because they may not match the region specific capabilities, result in competition with (too) many other regions and/or put pressure on social and ecological outcomes.

[28] See *Anselin* (1988) for a technically detailed and *LeSage – Pace* (2009) for a recent textbook on spatial econometrics estimation techniques.

Table 4 – Predictors for changes in New Perspectives Outcomes

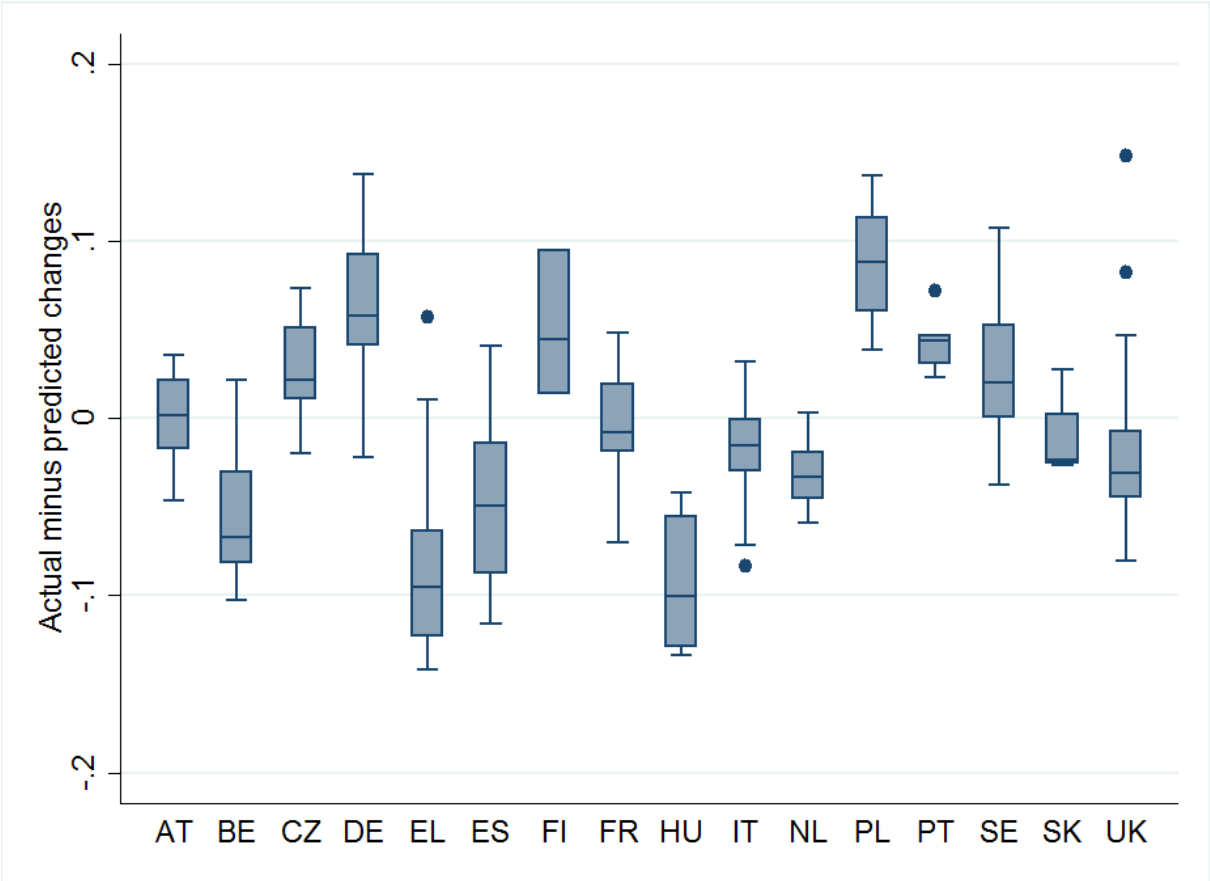
2005/11 Changes in	OLS				Reduced Form Maximum Likelihood		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
LEVEL2005	-0.274***	-0.384***	-0.267***	-0.261***	-0.115***	-0.122***	-0.106***
	(0.0512)	(0.0608)	(0.0579)	(0.0674)	(0.0245)	(0.0274)	(0.0329)
COST	0.0385	-0.107	-0.0626	-0.0599	0.0153	0.00802	-0.00250
	(0.0733)	(0.0683)	(0.0803)	(0.0865)	(0.0263)	(0.0296)	(0.0337)
STRUCTURE	0.0337	0.0115	-0.108*	-0.103*	-0.0202	-0.0214	-0.0236
	(0.0640)	(0.0534)	(0.0549)	(0.0586)	(0.0230)	(0.0241)	(0.0270)
CAPABILITIES	0.138***						
	(0.0510)						
CAP_EDU_INNO		0.224***	0.167***	0.169***	0.0840***	0.0905***	0.0821**
		(0.0551)	(0.0540)	(0.0544)	(0.0302)	(0.0319)	(0.0324)
CAP_SOCIAL		0.0371	0.0654*	0.0659*	-0.00527	-0.00293	0.00344
		(0.0383)	(0.0336)	(0.0336)	(0.0145)	(0.0155)	(0.0177)
CAP_ECO		0.0336	0.0678**	0.0679**	0.0289**	0.0275*	0.0246
		(0.0361)	(0.0296)	(0.0297)	(0.0144)	(0.0152)	(0.0172)
CAP_INST		0.188***	0.154***	0.157***	0.0271**	0.0351*	0.0667**
		(0.0294)	(0.0305)	(0.0343)	(0.0128)	(0.0183)	(0.0295)
CAP_INFRASTR		-0.0632*	-0.0158	-0.0145	-0.0234*	-0.0245*	-0.0207
		(0.0327)	(0.0288)	(0.0285)	(0.0137)	(0.0144)	(0.0163)
NAT_CAPITAL				-0.00476			
				(0.0157)			
OBJECTIVE_1				0.00569			
				(0.0213)			
EAST			0.0427	0.0451			
			(0.0416)	(0.0437)			
SOUTH			-0.0720***	-0.0702***			
			(0.0188)	(0.0193)			
ρ					0.844***	0.806***	0.859***
					(0.0347)	(0.0682)	(0.0395)
λ						0.166	
						(0.210)	
Constant	0.131***	0.102***	0.0834*	0.0720	0.0188**	0.0215**	0.0223
	(0.0259)	(0.0288)	(0.0444)	(0.0633)	(0.00916)	(0.0108)	(0.0150)
WX	No	No	No	No	No	No	Yes
N	229	229	229	229	229	229	229
R^2	0.213	0.481	0.590	0.591			
AIC	-532.7	-620.3	-670.4	-666.7	-1065.2	-1101.9	-1101.6

*** (**) [*] significant at the 1% (5%) [10%] level. Error terms clustered at the NUTS1 level. WX … Spatial lags of the explanatory variables. ρ… Parameter for spatial autocorrelation in the lagged dependent variable, λ … Parameter for spatial autocorrelation in the error term.

Nevertheless, higher *CAPABILITIES* are associated with higher growth rates in NPO if considered as a whole. When distinguishing between the different dimensions of capabilities we find that education and innovation (*CAP_EDU_INNO*) and institutional quality (*CAP_INST*) are (highly) significant predictors for higher NPO growth in all specifications. Additionally, ecological capabilities (*CAP_ECO*) become highly and social (*CAP_SOCIAL*) capabilities

become weakly significant once country group fixed effects are included. Thus, within their country groups, regions with higher ecological and social capabilities observed higher improvements in their outcome competitiveness. CAP_ECO are also significantly positive in the spatial specifications excluding WX. However, CAP_SOCIAL fails to robustly predict changes in NPO across the different specifications. So do infrastructure and regional amenities (*CAP_INFRASTR*). Southern European regions performed significantly worse than Northern and Western European regions. The dummies for national capital and Objective 1 regions fail to significantly predict differences in NPO developments across regions. The large and highly significant coefficient for spatial autocorrelation in NPO changes illustrates the high spatial dependence in the competitive performance at the regional level.

Figure 4: Actual versus Predicted Change in Competitiveness



Value above (below) zero indicates that region performed better (worse) in developing its New Perspective Outcomes (NPO) during the 2005/11 period than predicted by the results in specification (2) given their endowments in COST, STRUCTURE and the individual CAPABILITIES.

The econometric exercise in Table 4 allows us to relate the actual growth in NPO competitiveness of European regions to the level that is predicted by the theoretical model given the region specific inputs with respect to costs, economic structure and several types of capabilities. Figure 4 compares the actual with the predicted regional growth in NPO based on the results of specification (2) that includes the individual dimensions of capabilities but does not condition growth on the country groups North/West, East and South or on the performance of neighboring regions. The vertical axis in Figure 4 measures the regional residuals grouped by country. A positive residual indicates that a region performed better in NPO developments than expected given its endowments, a negative residual implies that a region could have performed better given its structure and capabilities.

Figure 4 reveals a great heterogeneity both between and within most countries. Some of the countries with high average NPO scores and capabilities were still performing worse than their capabilities predict, such as the Netherlands and the UK (with the latter showing extremely heterogeneous performance between regions). Regions in other countries with high NPO scores such as Germany, Finland and Sweden performed significantly better than predicted by their endowments, while the actual NPO scores of Austrian and French regions mostly correspond with their predicted values. Among the Southern European countries Portuguese regions outperformed their predicted scores, while Italian regions were slightly and Greek and Spanish regions remained far below their potential given their endowments. The results for the latter two countries, however, are most likely dominated by the deep economic crisis in the second half of the period observed. Among the four CEEC regions in Poland developed much better than predicted by their capabilities, also Czech regions did better than expected. On the other hand most regions of Slovakia slightly underperformed and Hungarian regions completely failed to use their potential in improving their New Perspective Outcomes.

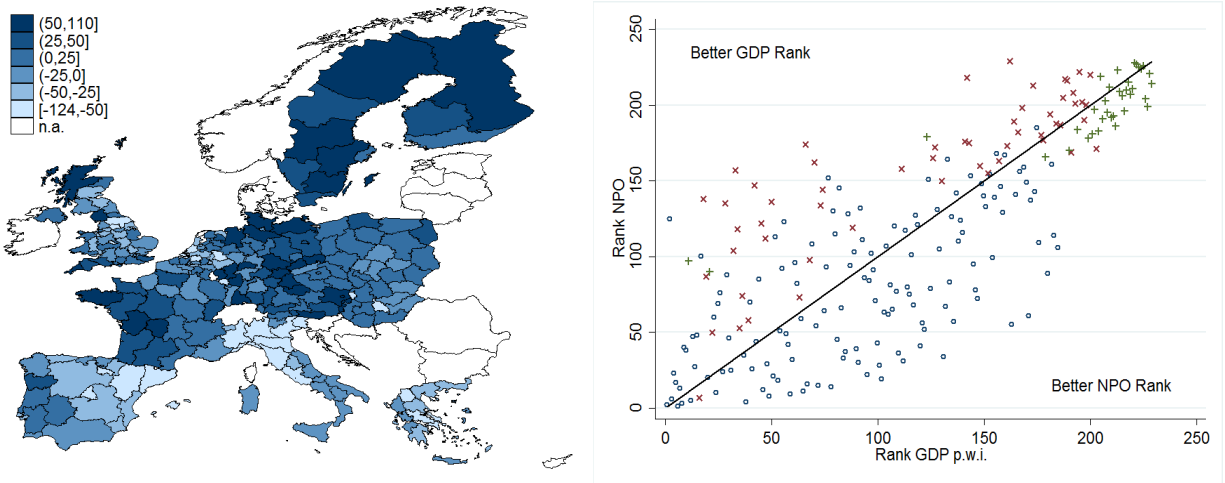
5. Relating the Results to Other Concepts of Outcome Competitiveness

As briefly discussed in section 3.3 Delgado et al. (2012) introduce the output per potential worker, i.e. GDP per working-age individual (henceforth GDP p.w.i.), as a concept of "foundational competitiveness" that incorporates the utilization of the labor market potential besides productivity to generate a two-goal welfare function (ABSV, 2013). While labor market utilization reflects one aspects of social inclusion and institutional quality it leaves out a number of other dimensions related to income and social inclusion (see Table A in the

appendix) relevant to achieve the Beyond GDP goals discussed in section 2. Also environmental outcomes are completely omitted by this definition. In fact in evaluating competitiveness Delgado et al. (2012) do not distinguish between outcome produced by energy and emission intense traditional industry and innovative and environmentally sound high-tech clusters. This caveat becomes even more relevant at the regional level at which the probability that individual branches of the industry or service sector dominate total aggregate outputs is much higher than at the national level.

Figure 5 illustrates differences in regions' ranks between the NPO index and a ranking based on GDP p.w.i. (in PPP). The map in Figure 4 shows that most countries host regions that perform better as well as regions that perform worse in one of the rankings than in the other (light coloured regions perform rank higher in GDP p.w.i. while dark coloured regions have higher ranks in NPO). Exceptions are Greece – where all regions have better ranks in the GDP p.w.i. ranking – and the the two Scandinavian countries in the sample, Finland and Sweden, in which all regions achieve better ranks in the NPO index. Accoring to the scatter plot in Figure 5, Southern European regions tend to rank substantially better in the GDP p.w.i. than in the NPO ranking while Eastern European regions tend to show slightly better ranks in the NPO than in the GDP p.w.i. ranking, although the vast majority of the latter regions finds itself at the bottom of both rankings.

Figure 5 – Differences in sample ranks between NPO and GDP p.w.i. (2011)



Map: Dark (light) indicates better rank in NPO (GDP p.w.i.). Scatter Plot country groups: o … North/West, x … South, + … East; Solid line indicates equal ranks in both rankings.

These results corrobate the missing dimensions with respect to social inclusion such as youth or long-term unemployment in the latter measure that are particularly relevant for the

crisis ridden regions of the Southern European periphery. Besides Sweden and Finland also in Austria, Germany and France the majority of regions ranks better in the NPO than in the GDP p.w.i. ranking. Austrian and German regions on average score very high in the income and the social NPO pillar (but moderate in the ecological pillar), while for the average French region differences between pillars are less pronounced. In the remaining countries of Western Europe regional differences between the two rankings vary substantially.

Table 5: Top 10 deviations in sample ranks compared to the NPO ranking

	GDP p.w.i.	EU 2020 Index	RCI*
NPO rank better	DE93 (110), AT11 (108), DEB2 (97), DEG0 (91), DE24 (83), DEB1 (81), FR52 (79), DED4 (79), UKM6 (79), FI1D (75)	ITH1 (130), ITC2 (122), UKI1 (115), ITI3 (101), DEB1 (97), AT32 (86), AT34 (83), BE10 (80), DE27 (79), DE94 (74)	ITH1 (162), ITC2 (121), AT33 (110), AT32 (102), ITI3 (97), SE33 (94), SE31 (91), ITH2 (90), SE32 (85), AT34 (83)
Reference rank better	ITH3 (124), BE10 (123), ITC4 (120), EL30 (108), ITI4 (107), ITC1 (105), ES24 (92) CZ01 (86), ES51 (86), ITH4 (84)	DED5 (114), CZ06 (94), DED2 (92), NL23 (91), CZ02 (82), CZ01 (80), DE30 (79), NL22 (75), UKF1 (75), PL11 (72)	UKF1 (94), NL42 (88), BE33 (86), UKF2 (86), UKE2 (86), BE22 (85), UKD3 (83), NL34 (83), DE30/40 (81), BE32 (78)

Rank differences in parentheses. For a full list of regions, NUTS codes and index scores see Table B in the appendix.
* Comparison with RCI ranks based on population-weighted average NPO score ranks in NUTS 2 regions combined to one functional region in the RCI (metropolitan areas of Amsterdam, Berlin, Brussels, London, Prague, and Vienna).

In each direction Table 5 illustrates the ten regions with the highest absolute differences between their ranks in NPO and GDP p.w.i. as well as NPO and two more reference indices that will be discussed below. Table 6 illustrates that the overall correlation of NPO with GDP p.w.i. (and the other two indices is quite high. GDP p.w.i. correlates more strongly with the income than with social pillar. The correlation with the ECO pillar is lower. Interestingly, the correlation with the ecological pillar is found to be higher in GDP p.w.i. than in the RCI and the EU 2020 Regional Index. Thus, the latter two widely miss ecological outcomes despite including them in their definitions.

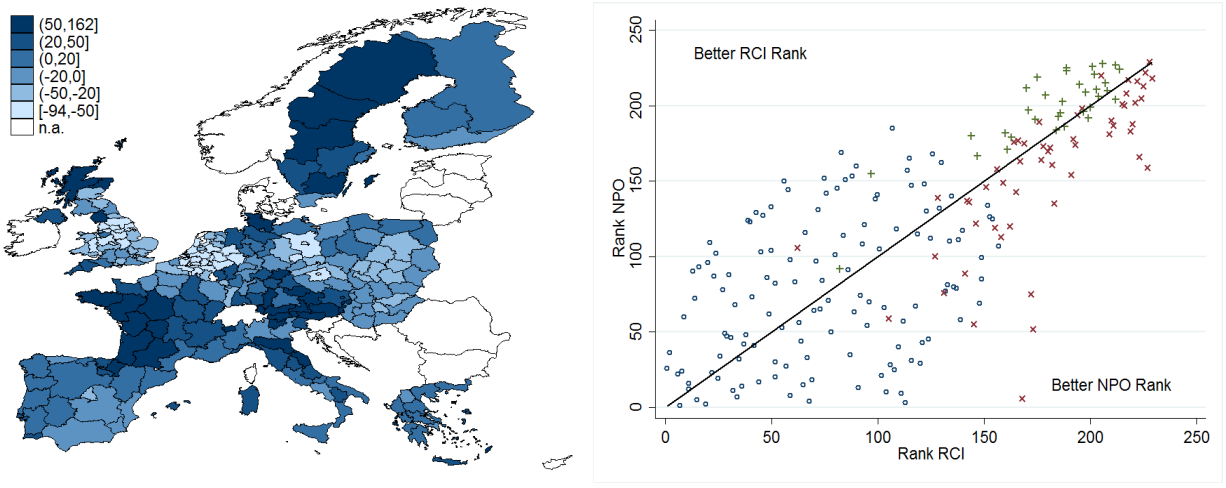
Table 6 – Sample rank correlation between NPO (Pillars) and other outcome indices

	NPO	INCOME	SOCIAL	ECO
GDP p.w.i.	0.783	0.868	0.548	0.430
RCI	0.744	0.727	0.749	0.247
EU 2020	0.810	0.703	0.838	0.313

As also outlined in Section 3 the Regional Competitiveness Index (RCI) 2013 completely lacks of ecological indicators whilst putting a high emphasis on labor market efficiency and

social inclusion. This major difference is likely to explain large parts of the dispersion in rank differences between RCI and NPO as illustrated in Figure 6. While regions of Western and Northern European countries are distributed equally at both sides of the 45° line that indicates equal ranks in both rankings, Eastern (Southern) European regions rank systematically better in the RCI (NPO) index. This corresponds well with the patterns found for the SOCIAL and the ECO pillar within the NPO index, with Eastern (Southern) European regions scoring relatively high (low) in the social pillar and low (high) in the eco pillar. As the latter pillar does not have relevance in the RCI, it favors Eastern European Regions while it penalizes Southern European regions. Analyzed by country, Austrian, French, Swedish, and (because of relatively high scores in the ECO pillar) Italian regions on average score substantially better in the NPO than in the RCI. In contrast regions in Belgium (low scores in the ECO pillar), the Czech Republic (low scores on INCOME and ECO), the Netherlands (many of which are among the top ranked in the RCI but only show medium scores in ECO), and the UK (high ECO scores but medium scores in the INCOME and SOCIAL pillar) score noticeably better in the RCI on average. Regions with the highest absolute differences between the two rankings are listed in Table 5 above.

Figure 6 – Differences in sample ranks between NPO and the RCI

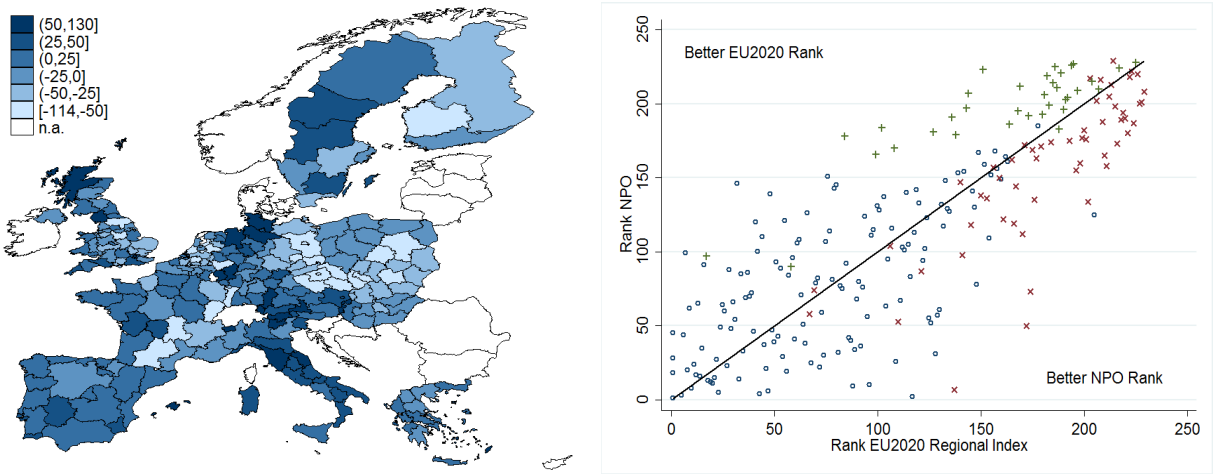


Map: Dark (light) indicates better rank in NPO (GDP p.w.i.). Scatter Plot country groups: o … North/West, x … South, + … East; Solid line indicates equal ranks in both rankings.

In contrast to the present NPO index the RCI contains regional as well as a number of national indicators. Thus, some differences in the rankings between the NPO and the RCI 2013 index are likely to be driven by the absence of national indicators driving regional performance in the RCI to a certain extent. Some differences also arise from the fact that the

RCI 2013 does not consistently rely on NUTS 2 regions but combines several NUTS 2 regions to more or less "functional economic regions" in the metropolitan regions of Amsterdam, Berlin, Brussels, London, Prague, and Vienna.[29] Additionally, in contrast to the NPO the scores in individual indicators linearly sum up to the pillar scores the arithmetic average of which in turn leads to the score in each pillar group. In composing the final RCI the weights for each pillar group are not the same for all regions but differ between five different types of regions according to their economic development.

Figure 7 – Differences in sample ranks between NPO and the Regional EU2020 Index



Map: Dark (light) indicates better rank in NPO (GDP p.w.i.). Scatter Plot country groups: o … North/West, x … South, + … East; Solid line indicates equal ranks in both rankings.

A comparison of NPO and the EU 2020 Regional Index ranks (Figure 7) with respect to EU-wide targets for the reference year 2011 reveals the following national patterns: While several Northern and Western European countries (Belgium, Germany, France, Sweden, UK) have both a number of regions performing better/worse in the NPO than in the EU 2020 ranking, in some countries (Austria, Greece, Italy, Portugal, Spain) all or most regions score better in the NPO ranking, while in some countries regions mostly score worse NPO ranks (Czech Republic, Finland, Hungary, Netherlands, Poland, Slovakia). This suggests an uneven distribution in the distances to the EU 2020 goals, which is not reflected in the Beyond GDP goals considered in NPO. These patterns are likely to be driven by differences in national ecological performance that are included in NPO but not in the EU 2020 Regional Index. The

[29] For this reason the same RCI ranks were assigned to all NUTS 2 regions within such functional regions in the illustrations of Figure 6 and in Table A in the appendix.

10 regions with the highest absolute differences in EU 2020 and NPO ranks in each direction are again listed in Table 5.

6. Summary and Conclusions

Competitiveness at the national level

The notion of competitiveness has been criticised due to (i) conceptual problems, (ii) its operationalisation and (iii) the implied policy conclusions. Nevertheless, the term is persistently used by policy makers, analysts and the media. This holds at the national level as well as within regions, and even for global players like Europe, the US or China. We discuss the diversity and development of the term and how these problems have been addressed in a new concept developed by WWWforEurope. This large European project has as its objective to delineate a new growth path for Europe, which should be more dynamic, socially inclusive and ecologically sustainable. It defines competitiveness as the ability of a country or region to deliver Beyond GDP goals. This ability is assumed to be driven by costs, economic structures and capabilities. Costs have to be properly compared to productivity, since it is the unit cost of input which determines "price competitiveness". The structural component is mainly measured by the share of sophisticated industries and the importance of product quality. *ABSV* (2013) define five crucial capabilities at the national level (innovation, education, social investment, ecological ambition and institutions). Due to the new consensus that GDP is not a good welfare indicator, "outcome competitiveness" is measured by the Beyond GDP goals. These are divided into three pillars: economic, social and ecological goals. We call this approach "New Perspectives Outcome" (NPO) competitiveness.

Regional competitiveness

Transferring the concept of competitiveness to the regional level invokes critical points that have also been raised at the national level (e.g. the lack of theoretical foundation or clear meaning of the term itself, and whether regions are in competition with each other). There is also a debate on the extent to which competitiveness is different from productivity, and whether costs or capabilities are more important. Maybe the most important difference to the national level is that absolute competitive advantages and capabilities are more important at the regional level, since differences cannot be adjusted (smoothed) via exchange rates or monetary policy. Furthermore, due to the extreme openness of this "meso"

level (in contrast to the micro and macro levels), interrelations between firms, entrepreneurship, local institutions, and spatial interconnectivity with other regions play an important role. Attractiveness with respect to working and living conditions is also important. Spatial and economic embeddedness of economic activities and clusters, as well as institutional quality and tangible and intangible infrastructure are regional assets. Using and improving existing strengths (smart specialization) becomes important compared to unconditional specialization in high-tech industries.

Operationalisation of the concept

The indicators used to quantify regional competitiveness differ from those used at the national level – aside from the conceptual issues named also for statistical reasons (limited data availability at the regional level). For outcome competitiveness, conceptual considerations between the national and the regional level play no role once we decide to use the Beyond GDP approach. Because the outcomes consist of impartial policy goals such as high income, low unemployment and environmental sustainability, the composition of a single index to measure regions' competitiveness in achieving these goals does not conflict with a place based policy approach. For input competitiveness we add "regional infrastructure and amenities" (including e.g. population density, and amenity indicators related to landscape and recreational appeal) as an additional dimension of capabilities. We include an entropy index measuring the sectoral concentration of the economy, data on clusters and the distance to (national and international) markets. In total, we use 12 indicators on outcome and 42 on input competitiveness. We use a principle component factor analysis and data for the NUTS 2 level to derive composite indicators. While the composite indicators for the different input dimensions (cost competitiveness, economic structure, capabilities) do not provide a measure for the fit between a region's actual economic structure and its capabilities, they do not force all input dimensions into a single composite index of inputs.

Top regions

Among the 16 countries analyzed, top NUTS 2 regions in New Perspectives Outcome competitiveness (NPO) are found in Austria, Germany, Finland, France, the Netherlands, Sweden and UK, with Western and Northern European regions leading and Southern and Eastern regions lagging behind. The correlation between overall NPO scores and the income pillar is relatively high (also with respect to social outcomes), but is rather low between NPO and the ecological pillar. Interestingly, Southern European regions tend to rank poorly in the

social pillar, while Eastern European countries rank poorly in the ecological pillar. The favourable results of Southern Europe in the ecological pillar may be aided by nature (less energy used for heating) but are also influenced by low and decreasing shares in manufacturing. Eastern European regions score highly in social inclusion but lag behind in ecological performance – results that may reflect an inheritance from former socialist systems. With respect to changes in NPO, German and Polish regions show the largest improvements. In all countries but Greece, Spain and UK, regions improved their scores on average between 2005 and 2011.

Comparing results to other approaches

Comparing NPO to other recent indices on regional competitiveness yields different results, partly because the concepts differ and partly because the latter do not include the ecological pillar. The European Regional Competitiveness Index (RCI) places high emphasis on labour market efficiency and social inclusion, but does not include ecological indicators. The Europe 2020 Regional Index includes all three pillars in its definition, but due to a lack of data also omits the ecological pillar in its operationalisation. Thus, in comparison to the NPO approach, these indices tend to favour Eastern European while penalizing Southern European regions.

Looking empirically for main drivers

An econometric analysis of the 2005/11 period shows a catching-up of regions with low NPO in 2005. Cost competitiveness, however, fails to significantly predict recent changes in NPO scores (regions with higher wages and unit labour costs are not associated with lower average growth in NPO). Capabilities are found to be a strong driver of change – specifically, education and innovation and high institutional quality. The results also illustrate the importance of spatial interdependencies in explaining changes in regional outcome competitiveness. Additionally, regions with higher ecological ambition and social investment showed higher improvements in their NPO scores, at least within their geographical country groups. A higher (lower) actual outcome competitiveness – that measures the achievement of impartial policy goals rather than inputs that may fit well in some but not in all regions – than econometrically predicted by the individual input dimensions may serve as an indicator on whether a region specialized or diversified in a "smart" way or not.

High-road strategies are feasible

An overarching policy conclusion is that outcome competitiveness as measured by Beyond GDP is difficult to achieve when adopting a "low road strategy" based on low costs and low social and ecological standards. On the other hand, ecological ambition and social investment seem to at least have no negative effect on competitive outcomes if combined with other growth and performance-enhancing capabilities such as education or innovation. Strong institutions tend to improve outcome competitiveness under new perspectives. This generally supports the quest for regional and national high road strategies. A careful design of regional policies to foster smart specialization and diversification as well as clusters based on regional strengths and in line with market growth seems to improve national and regional competitiveness.

Further research needed

It is the main intention of this contribution to serve as a starting point for a discussion of regional competitiveness under the perspectives of social inclusion and environmental sustainability besides traditional outcomes and to point out fields for further research. Clearly, the present approach contains several limitations. The regional NPO index presented is a first attempt to analyze regional competitiveness under new perspectives and to illustrate its determinants. However, at this point it cannot provide a wide set of robustness checks as does the European Regional Competitiveness Index (RCI), for instance. We leave this task for future research. While this NPO index intentionally ignores national factors because of a lack of information on how to break them down to the regional level, it may omit aspects of national competitiveness that also affect the regional level (c.f. Porter, 1990). Finally, due to the high degree of spatial linkages between densely populated nearby regions, future research should also focus on assessing competitiveness in functional rather than administrative regions. This, however, requires a comprehensive database yet to be established.

If well defined, an important concept

The term competitiveness is used persistently, as it is derived from notions of successful competition in markets with given costs and productivity levels (perfect competition model). At the meso and macro levels and as a basis for policy conclusions, it should, however, be defined in relation to the ultimate goals of a region or nation and not motivated by the goal to outperform neighbours or far-off global competitors. It should not be dominated by looking

at costs only (be it in the ordinary sense of "costs only", or in the enlightened version of unit costs). In order to be able to define policy instruments for change based on strengths and weaknesses, an assessment of structure and capabilities is all important. The policy focus should be shifted from costs to capabilities – at least for medium and high income countries – as well as to structural aspects. At the regional level such aspects are clusters, smart specialization and diversification strategies. By implementing a definition of outcome competitiveness based on Beyond GDP goals and driven by input competitiveness (modern capabilities), an old concept receives new meaning, and it becomes important to future analyses and policies, rather than producing "dangerous" or "misleading" statements.

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Appendix

Table A: List of Indicators

NEW PERSPECTIVES OUTCOMES INDICATORS – INCOME PILLAR			
1	GDP per Capita[1)]	2005 PPP	ES
2	**Net primary household income per capita**	**2005 PPP**	**ES**
3	Net disposable household income per capita	2005 PPP	ES
NEW PERSPECTIVES OUTCOMES INDICATORS – SOCIAL PILLAR			
4	Employment gender gap (difference male - female employment rate 25-64)[2)]	Percentage points	ES
5	Youth Unemployment Rate (aged 15-24)*	%	ES
6	Long-Term Unemployment as share of total unemployment*	%	ES; ESPON
7	People at risk of poverty or social exclusion*[2)]	%	ESPON
8	Employment rate in the population 25-64	%	ES
9	Unemployment rate*[1)]	%	ES
NEW PERSPECTIVES OUTCOMES INDICATORS – ECO PILLAR			
10	CO2 intensity: CO2 emissions from fuel combustion per € GDP (PPS)*[1)]	kg/GDP PPP	ES; ESPON
11	**Population exposed to Air Pollution (PM2.5)***	**%**	**OECD**
12	**Composite index of environmental and natural assets (green performance) and emission of air pollutants (Nox)**	**Index (0 to 100)**	**ESPON**
COST COMPETITIVENESS			
13	Compensation per person employed, total economy[2)]	2005 Euros	CE
14	Compensation per person employed, manufacturing[2)]	2005 Euros	CE
15	Unit labour costs (wage share), real, total economy	% of total GVA	CE
16	Unit labour costs (wage share), real, manufacturing	% of sectoral GVA	CE
ECONOMIC STRUCTURE			
17	**Share of employment in high technology sectors (high-tech manufacturing and high-tech-KIS-services)**	**% of total employment**	**ES**
18	**Share of employment in knowledge intensive services**	**% of total employment**	**ES**
19	**Financial & business services share in employment**	**% of total employment**	**CE**
20	**Entropy of sectoral employment (Shannon Index on sectoral variety based on 6 sectors)***	**Index (0 to 1.79)**	**CE**
21	***Manufacturing share in employment***	***% of total employment***	***CE***
22	*Share of employment in high and medium high technology manufacturing[2)]*	*% of total employment*	*ES*
CAPABILITIES - INNOVATION & EDUCATION			
23	**Share of active population in science & technology**	**% of age group**	**ES**
24	Share of population 25-64 with tertiary education (ISCED 5-6)	% of age group	ES
25	Participation rate in education and training (last 4 weeks; pop. age 25-64) [1)]	% of age group	ES
26	**Share of young people (15-24 olds) neither in employment nor in education or training*[1)]**	**% of age group**	**ES**
27	Share of women among students in ISCED 5-6	%	ES
28	**Share of creative workforce in active population**	**% of age group**	**ESPON**
29	R&D expenditures (private and public) share in GDP[1)]	%	ES
30	**Share of employment in Creative Industries Clusters[1)]**	**% of total employment**	**ECO**
31	**Share of employment in Knowledge Intensive Business Clusters[1)]**	**% of total employment**	**ECO**
32	Patent applications to the European Patent Office[2)]	No./GDP PPP	ES
33	***Share of early leavers from education and training among 18-24 olds*[1)]***	***% of age group***	***ES***
34	***Share of employment in Life Science Clusters[2)]***	***% of total employment***	***ECO***
CAPABILITIES - SOCIAL SYSTEM			
35	**Age dependency ratio (population >75 to population15-64)***	**%**	**ES**
36	**Infant mortality rate*[1)]**	**%**	**ES**
37	**Physician and doctors[1)]**	**No./100,000 inh.**	**ESPON**
38	*Female labor force participation rate (age group 25-64) [3)]*	*% of age group*	*ES*
39	***Life expectancy at birth***	***Years***	***ES***
CAPABILITIES - REGIONAL INSTITUTIONS			
40	**Share of voters in general elections**	**%**	**OECD**
41	**Regional Quality of Government Index**	**Index (–3 to +3)**	**Charron et al. (2013, 2014a,b)**

42	**Distance to markets (average distance to other regions in the sample)*[1)]**	**Euclidean distance (km)**	**ES; OC**
43	***Distance to capital city region****	***Euclidean distance (km)***	***ES; OC***
44	***Objective 1 region (2000-2006 and/or 2007-2013 period)***	***0/1 Dummy***	***European Commission***
CAPABILITIES - REGIONAL INFRASTRUCTURE & AMENITIES			
45	**Population density[1)]**	**1,000 inh./km²**	**ES**
46	**Ability of landscapes to provide shelter and safe transportation**	**Index (100 to 550)**	**Kienast et al. (2009)**
47	**Benefits related to non-recreational appeal of landscape**	**Index (100 to 550)**	**Kienast et al. (2009)**
48	**Landscape services from landscapes with touristic or recreational value**	**Index (100 to 550)**	**Kienast et al. (2009)**
49	***Capital city region***	***0/1 Dummy***	***OC***
CAPABILITIES - ECOLOGICAL			
50	**Share of Employment in industries with high energy purchases in total industrial employment*[1)]**	**%**	**ESPON**
51	**Number of Green Patents[2)]**	**Applications/inh.**	**ESPON**
52	**Influence of land cover and biologically mediated processes (e.g. GHS-production) on climate**	**Index (100 to 550)**	**Kienast et al. (2009)**
53	**Suitable living space and reproduction habitat for wild plants and animals to maintain biological and genetic diversity**	**Index (100 to 550)**	**Kienast et al. (2009)**
54	***Role of ecosystems in bio-geochemical cycles (e.g. CO2/O2 balance, N and P balance, etc.)***	***Index (100 to 550)***	***Kienast et al. (2009)***

Indicators in bold *indicate that (similar) indicators were not used at the national level in ABSV. Indicators in Italics* are dropped following principal components factor analysis. CE… Cambridge Econometrics (2015 release), ECO… European Cluster Observatory, ES… Eurostat, OC… Own calculations; All variables normalized to zero mean and unit variance. *… Sign of indicator reversed so less negative value indicates better performance. Variable transformed to [1)]… logs, [2)]… square roots, [3)]… squares before normalization to ensure skewness<1. For the two indicators provided by the OECD data are not available at the NUTS 2 level in all countries. In these countries we assigned the values of the underlying NUTS 1 regions to all of the respective NUTS 2 regions. For a few variables data are not available for 2005 but for a few years afterwards. In those instances we use the earliest year available. For CO2 emissions the values for 2005 (2011) reflect the year 2000 (2008) values. Data on people exposed to air pollution for 2005 (2011) are 2000-2002 (2010-2012) 3-years averages. The ESPON index of green performance is available for 2011 only, thus the 2011 data were also taken for 2005. For some variables a few (econometric) imputations were necessary.

Table B: Regions, NUTS Codes and Sample Ranks

Code	NUTS 2 Region	NPO	IN-COME	SO-CIAL	ECO	GDP p.w.i.	RCI 2013	EU 2020
AT11	Burgenland	55	66	30	121	163	112	125
AT12	Niederösterreich	56	33	17	178	121	78	95
AT13	Wien	40	14	85	133	9	78	87
AT21	Kärnten	43	57	19	124	100	124	52
AT22	Steiermark	37	50	6	141	85	110	45
AT31	Oberösterreich	29	29	8	129	48	106	54
AT32	Salzburg	10	15	1	86	24	111	96
AT33	Tirol	4	35	3	11	38	113	43
AT34	Vorarlberg	26	18	26	119	41	108	109
BE10	Région de Bruxelles-Capitale	125	39	205	76	2	16	205
BE21	Prov. Antwerpen	100	41	100	170	17	24	42
BE22	Prov. Limburg (BE)	124	79	59	194	139	39	94
BE23	Prov. Oost-Vlaanderen	86	46	22	201	94	30	37
BE24	Prov. Vlaams-Brabant	44	11	31	185	43	16	6
BE25	Prov. West-Vlaanderen	59	62	10	161	64	49	73
BE31	Prov. Brabant Wallon	96	25	128	154	61	16	59
BE32	Prov. Hainaut	185	151	191	206	175	107	178
BE33	Prov. Liège	168	128	172	191	156	83	157
BE34	Prov. Luxembourg (BE)	149	123	129	174	170	122	160
BE35	Prov. Namur	159	112	147	184	169	90	152
CZ01	Praha	97	88	29	157	11	97	17
CZ02	Střední Cechy	184	181	92	222	194	97	102
CZ03	Jihozápad	170	197	93	166	190	161	108
CZ04	Severozápad	219	209	176	226	205	175	182
CZ05	Severovýchod	181	204	116	197	201	160	127
CZ06	Jihovýchod	178	195	135	186	199	163	84
CZ07	Střední Morava	191	206	133	212	206	174	136
CZ08	Moravskoslezsko	197	202	158	220	202	171	143
DE11	Stuttgart	20	5	20	143	20	25	8
DE12	Karlsruhe	24	8	38	122	27	22	11
DE13	Freiburg	15	20	4	84	72	36	21
DE14	Tübingen	8	10	5	67	49	34	10
DE21	Oberbayern	3	2	2	68	8	19	5
DE22	Niederbayern	14	24	9	50	78	91	33
DE23	Oberpfalz	16	26	16	44	67	65	14
DE24	Oberfranken	19	27	23	52	102	69	56
DE25	Mittelfranken	12	7	14	71	46	32	19
DE26	Unterfranken	21	19	12	90	51	52	46
DE27	Schwaben	9	13	15	42	59	59	88
DE30	Berlin	120	81	99	156	108	46	41
DE40	Brandenburg	143	105	52	215	174	46	79
DE50	Bremen	38	16	79	126	10	42	65
DE60	Hamburg	6	4	37	59	3	15	47
DE71	Darmstadt	17	6	44	100	5	11	12
DE72	Gießen	39	49	53	88	90	37	50
DE73	Kassel	82	60	40	173	62	74	71
DE80	Mecklenburg-Vorpommern	114	139	90	105	183	119	77
DE91	Braunschweig	54	47	83	97	71	63	31
DE92	Hannover	51	44	80	99	54	55	64
DE93	Lüneburg	61	63	51	128	171	89	130

Code	NUTS 2 Region	NPO	IN-COME	SO-CIAL	ECO	GDP p.w.i.	RCI 2013	EU 2020
DE94	Weser-Ems	52	68	41	101	122	95	126
DEA1	Düsseldorf	76	17	102	169	26	27	93
DEA2	Köln	85	23	89	180	44	23	34
DEA3	Münster	101	52	76	183	116	45	113
DEA4	Detmold	42	28	66	123	58	64	86
DEA5	Arnsberg	102	40	106	175	97	50	123
DEB1	Koblenz	31	34	46	92	112	52	128
DEB2	Trier	34	37	34	125	131	67	89
DEB3	Rheinhessen-Pfalz	33	22	60	115	84	35	35
DEC0	Saarland	113	55	96	187	52	84	118
DED2	Dresden	99	120	58	113	154	80	7
DED4	Chemnitz	106	125	70	116	185	93	61
DED5	Leipzig	146	119	107	189	158	81	32
DEE0	Sachsen-Anhalt	137	135	97	167	172	99	103
DEF0	Schleswig-Holstein	36	48	55	81	110	87	92
DEG0	Thüringen	89	130	50	91	180	86	53
EL11	Anatoliki Makedonia, Thraki	222	211	224	176	195	226	223
EL12	Kentriki Makedonia	217	193	225	181	188	218	203
EL13	Dytiki Makedonia	229	178	227	229	162	228	214
EL14	Thessalia	216	201	215	190	189	222	208
EL21	Ipeiros	202	200	216	130	196	221	206
EL22	Ionia Nisia	165	180	188	32	126	223	210
EL23	Dytiki Ellada	205	205	219	131	187	224	212
EL24	Sterea Ellada	218	184	220	203	142	229	222
EL25	Peloponnisos	213	191	208	208	173	225	213
EL30	Attiki	174	133	209	139	66	169	184
EL41	Voreio Aigaio	188	185	218	38	184	220	209
EL42	Notio Aigaio	158	162	206	12	111	227	211
EL43	Kriti	182	199	201	73	166	219	200
ES11	Galicia	163	160	190	77	157	177	177
ES12	Principado de Asturias	175	146	203	162	143	164	193
ES13	Cantabria	150	147	193	43	130	159	159
ES21	País Vasco	58	42	174	18	39	105	67
ES22	Comunidad Foral de Navarra	74	51	153	53	36	131	69
ES23	La Rioja	144	108	199	58	74	165	167
ES24	Aragón	162	96	192	148	70	167	165
ES30	Comunidad de Madrid	104	56	186	35	32	62	106
ES41	Castilla y León	172	142	200	160	127	178	171
ES42	Castilla-La Mancha	198	175	214	168	168	196	215
ES43	Extremadura	190	190	222	26	197	210	220
ES51	Cataluña	136	80	197	74	50	142	153
ES52	Comunidad Valenciana	176	167	212	72	141	166	201
ES53	Illes Balears	134	138	196	16	73	183	202
ES61	Andalucía	194	182	226	83	181	194	219
ES62	Región de Murcia	189	176	213	103	164	176	218
FI18	Etelä-Suomi	35	70	36	56	37	26	15
FI19	Länsi-Suomi	62	131	63	29	105	70	9
FI1D	Pohjois- ja Itä-Suomi	72	150	61	28	147	92	39
FR10	Île de France	13	3	111	37	7	11	18
FR21	Champagne-Ardenne	127	104	151	110	118	153	135
FR22	Picardie	129	116	146	117	159	123	134
FR23	Haute-Normandie	131	85	141	147	128	129	100

Code	NUTS 2 Region	NPO	IN-COME	SO-CIAL	ECO	GDP p.w.i.	RCI 2013	EU 2020
FR24	Centre	79	83	113	62	125	133	70
FR25	Basse-Normandie	95	115	119	36	145	149	105
FR26	Bourgogne	105	92	123	79	129	157	115
FR30	Nord - Pas-de-Calais	167	136	185	153	160	126	149
FR41	Lorraine	140	127	140	142	150	135	114
FR42	Alsace	121	77	110	158	119	94	55
FR43	Franche-Comté	110	106	104	108	138	138	44
FR51	Pays de la Loire	75	91	112	46	115	132	83
FR52	Bretagne	41	98	57	22	120	121	60
FR53	Poitou-Charentes	83	111	109	39	134	149	116
FR61	Aquitaine	77	86	121	40	109	137	82
FR62	Midi-Pyrénées	65	87	105	45	107	118	13
FR63	Limousin	67	118	82	41	132	148	111
FR71	Rhône-Alpes	64	65	115	70	75	103	25
FR72	Auvergne	126	97	122	138	135	154	66
FR81	Languedoc-Roussillon	133	137	178	49	151	152	120
FR82	Provence-Alpes-Côte d'Azur	111	73	149	93	93	125	97
HU10	Közép-Magyarország	179	170	159	213	123	144	138
HU21	Közép-Dunántúl	203	215	163	211	207	187	191
HU22	Nyugat-Dunántúl	183	213	139	163	204	184	188
HU23	Dél-Dunántúl	215	225	184	193	218	207	204
HU31	Észak-Magyarország	228	229	204	224	221	206	225
HU32	Észak-Alföld	224	228	198	199	224	214	217
HU33	Dél-Alföld	210	226	180	179	217	208	207
ITC1	Piemonte	147	64	160	195	42	151	140
ITC2	Valle d'Aosta/Vallée d'Aoste	50	30	95	106	22	173	172
ITC3	Liguria	122	72	143	135	45	146	161
ITC4	Lombardia	138	32	142	218	18	128	150
ITF1	Abruzzo	160	158	189	64	148	182	198
ITF2	Molise	173	166	207	111	161	193	216
ITF3	Campania	220	194	229	164	200	205	226
ITF4	Puglia	201	183	223	132	193	215	228
ITF5	Basilicata	187	179	217	55	186	211	224
ITF6	Calabria	200	192	221	114	198	216	227
ITG1	Sicilia	208	189	228	127	192	217	229
ITG2	Sardegna	180	172	211	102	177	209	221
ITH1	Provincia Autonoma di Bolzano/Bozen	7	9	24	33	16	168	137
ITH2	Provincia Autonoma di Trento	53	59	77	82	35	145	110
ITH3	Veneto	157	61	134	221	33	156	156
ITH4	Friuli-Venezia Giulia	118	58	124	165	34	155	145
ITH5	Emilia-Romagna	87	36	117	146	19	141	121
ITI1	Toscana	112	74	161	80	47	158	170
ITI2	Umbria	119	121	156	51	88	162	166
ITI3	Marche	73	89	150	13	63	172	174
ITI4	Lazio	135	67	195	104	28	143	176
NL11	Groningen	47	93	67	25	13	38	49
NL12	Friesland (NL)	81	140	45	65	106	61	78
NL13	Drenthe	80	141	48	61	114	52	91
NL21	Overijssel	66	129	25	94	83	33	30
NL22	Gelderland	91	102	27	140	98	20	16
NL23	Flevoland	139	122	33	216	155	9	48
NL31	Utrecht	27	38	7	118	14	1	22

Code	NUTS 2 Region	NPO	IN-COME	SO-CIAL	ECO	GDP p.w.i.	RCI 2013	EU 2020
NL32	Noord-Holland	48	53	21	136	15	9	29
NL33	Zuid-Holland	88	69	47	150	29	13	28
NL34	Zeeland	123	100	28	198	56	40	124
NL41	Noord-Brabant	70	78	18	144	40	14	38
NL42	Limburg (NL)	108	110	42	149	69	21	62
PL11	Lódzkie	223	212	155	228	213	189	151
PL12	Mazowieckie	166	149	127	200	179	147	99
PL21	Malopolskie	207	216	157	219	219	179	144
PL22	Slaskie	212	186	173	225	209	170	169
PL31	Lubelskie	214	224	170	209	229	195	185
PL32	Podkarpackie	221	227	181	214	228	202	189
PL33	Swietokrzyskie	226	221	187	223	225	201	194
PL34	Podlaskie	199	223	148	192	227	200	183
PL41	Wielkopolskie	192	198	168	202	210	199	173
PL42	Zachodniopomorskie	209	214	194	196	214	198	197
PL43	Lubuskie	196	217	165	182	216	197	190
PL51	Dolnoslaskie	193	196	171	210	211	185	180
PL52	Opolskie	225	220	164	227	223	189	186
PL61	Kujawsko-Pomorskie	211	218	183	205	220	203	187
PL62	Warminsko-Mazurskie	204	222	179	172	226	212	192
PL63	Pomorskie	186	210	162	145	212	188	164
PT11	Norte	171	207	177	60	203	181	179
PT15	Algarve	155	174	167	48	152	191	196
PT16	Centro (PT)	169	203	144	89	191	180	175
PT17	Lisboa	98	113	154	17	68	127	141
PT18	Alentejo	177	188	169	151	178	192	199
SE11	Stockholm	1	12	11	1	6	7	1
SE12	Östra Mellansverige	28	95	74	3	101	57	1
SE21	Småland med öarna	22	99	32	4	95	102	72
SE22	Sydsverige	45	101	78	10	81	31	1
SE23	Västsverige	18	76	39	8	53	44	1
SE31	Norra Mellansverige	30	124	56	7	91	120	74
SE32	Mellersta Norrland	32	107	73	9	60	116	81
SE33	Övre Norrland	11	90	13	2	65	104	20
SK01	Bratislavský kraj	90	43	65	177	21	82	58
SK02	Západné Slovensko	195	187	182	207	208	186	168
SK03	Stredné Slovensko	206	208	202	188	215	204	181
SK04	Východné Slovensko	227	219	210	217	222	212	195
UKC1	Tees Valley and Durham	156	173	138	107	167	114	158
UKC2	Northumberland and Tyne and Wear	117	159	98	54	113	109	132
UKD1	Cumbria	78	143	54	47	146	136	148
UKD3	Greater Manchester	132	155	120	95	92	50	131
UKD4	Lancashire	142	164	68	155	137	76	119
UKD6	Cheshire	69	75	88	87	25	77	36
UKD7	Merseyside	148	161	145	98	149	116	133
UKE1	East Yorkshire and Northern Lincolnshire	164	165	125	171	133	115	162
UKE2	North Yorkshire	145	103	91	204	82	58	80
UKE3	South Yorkshire	154	171	152	78	153	88	142
UKE4	West Yorkshire	130	153	131	69	79	72	147
UKF1	Derbyshire and Nottinghamshire	151	156	130	137	124	56	76
UKF2	Leicestershire, Rutland and Northamptonshire	128	134	114	134	86	43	101
UKF3	Lincolnshire	141	157	86	152	165	100	146

Code	NUTS 2 Region	NPO	IN-COME	SO-CIAL	ECO	GDP p.w.i.	RCI 2013	EU 2020
UKG1	Herefordshire, Worcestershire and Warwickshire	84	114	87	63	96	48	57
UKG2	Shropshire and Staffordshire	153	154	108	159	144	75	139
UKG3	West Midlands	152	169	175	34	77	85	155
UKH1	East Anglia	93	126	71	75	76	59	51
UKH2	Bedfordshire and Hertfordshire	60	54	94	96	23	2	26
UKH3	Essex	107	94	103	112	104	2	75
UKI1	Inner London	2	1	166	6	1	2	117
UKI2	Outer London	94	71	137	66	87	2	122
UKJ1	Berkshire, Buckinghamshire and Oxfordshire	23	21	49	57	4	6	27
UKJ2	Surrey, East and West Sussex	25	45	62	27	31	8	68
UKJ3	Hampshire and Isle of Wight	49	84	64	31	57	28	24
UKJ4	Kent	71	117	126	14	99	41	63
UKK1	Gloucestershire, Wiltshire and Bristol/Bath area	46	82	81	23	30	29	40
UKK2	Dorset and Somerset	63	132	84	24	103	73	104
UKK3	Cornwall and Isles of Scilly	109	168	101	19	176	134	154
UKK4	Devon	68	152	69	21	117	96	90
UKL1	West Wales and The Valleys	161	177	132	120	182	130	163
UKL2	East Wales	115	148	72	109	80	66	98
UKM2	Eastern Scotland	92	109	75	85	55	71	85
UKM3	South Western Scotland	103	145	136	15	89	101	112
UKM5	North Eastern Scotland	5	31	35	5	12	68	23
UKM6	Highlands and Islands	57	144	43	20	136	139	129
UKN0	Northern Ireland	116	163	118	30	140	140	107

EU 2020 and RCI ranks correspond to the present sample of 229 regions and thus deviate from the original rankings. EU 2020 sample ranks with respect to EU-wide targets for the reference year 2011 based on data provided by Lewis Dijkstra in July 2015.

Table C – Correlations between outcomes and their determinants

	NPO 2011	NPO 2005	Δ NPO 2005/11	GDP p.w.i. 2011	GDP p.w.i. 2005	Δ GDP p.w.i. 2005/11	COST 2005	STRUC-TURE 2005	CAPA-BILITIES 2005	CAP_EDU _INNO 2005	CAP_ SOCIAL 2005	CAP_ ECO 2005	CAP_ INST 2005	CAP_IN FRASTR 2005
NPO 2011	1.0000													
NPO 2005	0.9050*	1.0000												
Δ NPO 2005/11	0.1023	-0.3305*	1.0000											
GDP p.w.i. 2011	0.7732*	0.6813*	0.1222	1.0000										
GDP p.w.i. 2005	0.7506*	0.7687*	-0.1322*	0.9511*	1.0000									
Δ GDP p.w.i. 2005/11	0.2931*	-0.0539	0.7765*	0.4369*	0.1375*	1.0000								
COST 2005	0.7131*	0.7373*	-0.1420*	0.5494*	0.6350*	-0.0876	1.0000							
STRUCTURE 2005	0.6071*	0.5863*	-0.0241	0.5819*	0.6305*	0.0296	0.6517*	1.0000						
CAPABILITIES 2005	0.6684*	0.6173*	0.0393	0.7375*	0.7261*	0.2503*	0.6016*	0.6591*	1.0000					
CAP_EDU_ INNO 2005	0.7877*	0.7633*	-0.0374	0.7254*	0.7495*	0.1435*	0.7482*	0.8513*	0.7364*	1.0000				
CAP_SOCIAL 2005	0.1586*	0.1165	0.0796	0.3219*	0.2376*	0.3399*	-0.0588	0.1472*	0.4645*	0.1759*	1.0000			
CAP_ECO 2005	0.4002*	0.4044*	-0.0577	0.3809*	0.3850*	0.1001	0.2601*	0.1767*	0.6920*	0.2550*	0.2585*	1.0000		
CAP_INST 2005	0.6744*	0.5232*	0.2729*	0.5593*	0.4801*	0.3952*	0.6259*	0.4019*	0.5962*	0.5215*	0.0269	0.3085*	1.0000	
CAP_INFRASTR 2005	0.2494*	0.2556*	-0.0444	0.4673*	0.5188*	-0.0124	0.3947*	0.5590*	0.7520*	0.4828*	0.2128*	0.3559*	0.2136*	1.0000

*… correlation significant at the 5% level

Table D.1 –Principal component analysis: INCOME[1)]

Variable	Component 1	
	Loadings	Weights of variables in component[2)]
GDP p.c.	0.56	0.32
Net prim. household inc. p.c.	0.59	0.35
Net disp. household inc. p.c.	0.58	0.33
Weights of components in summary indicator[3)]		1.00
Eigenvalues		2.79
Proportion of variance explained		0.93
Cronach's Alpha		0.96
Overall KMO		0.79

[1)] Based on rotated component matrix; [2)] Normalized squared factor loadings; [3)] Based on proportion of component in variance explained;

Table D.2 –Principal component analysis: SOCIAL[1)]

Variable	Component 1		Component 2	
	Loadings	Weights of variables in component[2)]	Loadings	Weights of variables in component[2)]
Unempl. rate	0.56	0.32	-0.23	0.05
Youth unempl. rate	0.51	0.26	-0.07	0.01
Empl. rate	0.43	0.18	0.25	0.06
Long-term unempl. rate	0.39	0.15	0.02	0.00
Empl. gender gap	-0.05	0.00	0.88	0.77
Poverty rate	0.29	0.08	0.33	0.11
Weights of components in summary indicator[3)]		0.72		0.28
Eigenvalues		3.52		1.04
Proportion of variance explained		0.76		
Cronach's Alpha		0.85		
Overall KMO		0.74		

[1)] Based on rotated component matrix; [2)] Normalized squared factor loadings; [3)] Based on proportion of component in variance explained;

Table D.3 –Principal component analysis: ECO[1)]

Variable	Component 1		Component 2	
	Loadings	Weights of variables in component[2)]	Loadings	Weights of variables in component[2)]
CO2 intensity	0.78	0.60	-0.12	0.02
Green performance index	0.63	0.40	0.18	0.03
Populat. exposed to air pollution	-0.02	0.00	0.98	0.95
Weights of components in summary indicator[3)]		0.59		0.41
Eigenvalues		1.82		0.72
Proportion of variance explained		0.85		
Cronach's Alpha		0.67		
Overall KMO		0.62		

[1)] Based on rotated component matrix; [2)] Normalized squared factor loadings; [3)] Based on proportion of component in variance explained;

Table D.4 –Principal component analysis: COST[1)]

Variable	Component 1		Component 2	
	Load-ings	Weights of variables in component[2)]	Load-ings	Weights of variables in component[2)]
Compensation p.e., total economy	0.70	0.48	-0.07	0.00
Compensation p.e., manufacturing	0.67	0.44	-0.02	0.00
Unit labour costs, total economy	-0.08	0.01	0.86	0.74
Unit labour costs, manufacturing	0.25	0.06	0.51	0.26
Weights of components in summary indicator[3)]		0.60		0.40
Eigenvalues		2.95		0.65
Proportion of variance explained		0.90		
Cronach's Alpha		0.88		
Overall KMO		0.72		

[1)] Based on rotated component matrix; [2)] Normalized squared factor loadings; [3)] Based on proportion of component in variance explained;

Table D.5 –Principal component analysis: STRUCTURE[1)]

Variable	Component 1		Component 2	
	Load-ings	Weights of variables in component[2)]	Load-ings	Weights of variables in component[2)]
Empl. in high tech sectors	0.80	0.64	-0.17	0.03
Empl. in financial & business services	0.49	0.24	0.23	0.05
Entropy of sectoral employment	-0.14	0.02	0.84	0.70
Empl. in knowledge intensive services	0.31	0.10	0.47	0.22
Weights of components in summary indicator[3)]		0.52		0.48
Eigenvalues		2.85		0.58
Proportion of variance explained		0.86		
Cronach's Alpha		0.86		
Overall KMO		0.77		

[1)] Based on rotated component matrix; [2)] Normalized squared factor loadings; [3)] Based on proportion of component in variance explained;

Table D.6 –Principal component analysis: CAPABILITIES[1)]

Variable	Component 1		Component 2		Component 3	
	Load-ings	Weights of variables in component[2)]	Load-ings	Weights of variables in component[2)]	Load-ings	Weights of variables in component[2)]
CAP_INFRASTR	0.71	0.50	-0.12	0.02	0.23	0.05
CAP_EDU_INNO	0.66	0.44	0.08	0.01	-0.19	0.04
CAP_ECO	-0.11	0.01	0.79	0.62	0.23	0.05
CAP_INST	0.18	0.03	0.57	0.32	-0.50	0.25
CAP_SOCIAL	0.10	0.01	0.19	0.04	0.78	0.60
Weights of components in summary indicator[3)]		0.44		0.28		0.28
Eigenvalues		1.96		0.94		0.72
Proportion of variance explained				0.90		
Cronach's Alpha				0.66		
Overall KMO				0.60		

[1)] Based on rotated component matrix; [2)] Normalized squared factor loadings; [3)] Based on proportion of component in variance explained;

Table D.7 –Principal component analysis: CAP_EDU_INNO[1)]

Variable	Component 1		Component 2		Component 3	
	Load-ings	Weights of variables in component[2)]	Load-ings	Weights of variables in component[2)]	Load-ings	Weights of variables in component[2)]
Patent applications	0.55	0.30	-0.19	0.03	-0.03	0.00
Empl. in science & technology	0.48	0.23	-0.04	0.00	-0.05	0.00
Creative workforce share	0.41	0.17	0.11	0.01	-0.06	0.00
R&D expenditures	0.40	0.16	0.10	0.01	-0.01	0.00
Creative industries clusters	-0.05	0.00	0.59	0.34	-0.09	0.01
Knowledge intensive industries clusters	-0.06	0.00	0.63	0.39	0.01	0.00
Tertiary education share	0.12	0.01	0.41	0.17	0.07	0.01
Female tertiary student share	-0.21	0.04	-0.11	0.01	0.68	0.46
Participation in education and training	0.16	0.02	0.16	0.02	0.53	0.28
Inactive Youth Share	0.23	0.05	0.02	0.00	0.49	0.24
Weights of components in summary indicator[3)]	0.47		0.34		0.19	
Eigenvalues	5.13		1.60		0.90	
Proportion of variance explained	0.76					
Cronach's Alpha	0.88					
Overall KMO	0.80					

[1)] Based on rotated component matrix; [2)] Normalized squared factor loadings; [3)] Based on proportion of component in variance explained;

Table D.8 –Principal component analysis: CAP_SOCIAL[1)]

Variable	Component 1		Component 2	
	Load-ings	Weights of variables in component[2)]	Load-ings	Weights of variables in component[2)]
Age dependency ratio	0.76	0.58	0.11	0.01
Infant mortality rate	-0.65	0.42	0.14	0.02
Physician and doctors	0.01	0.00	0.98	0.97
Weights of components in summary indicator	0.59		0.41	
Eigenvalues	2.85		0.58	
Proportion of variance explained	0.86			
Cronach's Alpha	0.66			
Overall KMO	0.62			

[1)] Based on rotated component matrix; [2)] Normalized squared factor loadings; [3)] Based on proportion of component in variance explained;

Table D.9 –Principal component analysis: CAP_ECO[1)]

Variable	Component 1		Component 2		Component 3	
	Load-ings	Weights of variables in component[2)]	Load-ings	Weights of variables in component[2)]	Load-ings	Weights of variables in component[2)]
Local influences on climate	0.62	0.39	0.11	0.01	-0.56	0.31
Green patent applications	-0.36	0.13	0.75	0.56	0.23	0.05
Suitability to maintain biolog. & genet. diversity	0.54	0.29	0.60	0.36	0.17	0.03
Empl. share in energy intense industries	0.44	0.19	-0.27	0.07	0.78	0.61
Weights of components in summary indicator[3)]		0.38		0.33		0.29
Eigenvalues		1.26		1.09		0.98
Proportion of variance explained				0.83		
Cronach's Alpha				0.26		
Overall KMO				0.43		

[1)] Based on rotated component matrix; [2)] Normalized squared factor loadings; [3)] Based on proportion of component in variance explained;

Table D.10 –Principal component analysis: CAP_INST[1)]

Variable	Component 1		Component 2	
	Load-ings	Weights of variables in component[2)]	Load-ings	Weights of variables in component[2)]
Distance to markets	0.82	0.68	-0.15	0.02
Quality of government	0.57	0.32	0.29	0.09
Share of voters in general elections	-0.05	0.00	0.95	0.89
Weights of components in summary indicator[3)]		0.54		0.46
Eigenvalues		1.55		0.81
Proportion of variance explained		0.79		
Cronach's Alpha		0.53		
Overall KMO		0.59		

[1)] Based on rotated component matrix; [2)] Normalized squared factor loadings; [3)] Based on proportion of component in variance explained;

Table D.11 –Principal component analysis: CAP_INFRASTR[1)]

Variable	Component 1	
	Loadings	Weights of variables in component[2)]
Landscape appeal	0.54	0.29
Safe transport & shelter	0.52	0.27
Recreational value	0.49	0.24
Population density	0.44	0.19
Weights of components in summary indicator[3)]		1.00
Eigenvalues		3.18
Proportion of variance explained		0.80
Cronach's Alpha		0.91
Overall KMO		0.66

[1)] Based on rotated component matrix; [2)] Normalized squared factor loadings; [3)] Based on proportion of component in variance explained;

Project Information

Welfare, Wealth and Work for Europe

A European research consortium is working on the analytical foundations for a socio-ecological transition

Abstract

Europe needs change. The financial crisis has exposed long-neglected deficiencies in the present growth path, most visibly in the areas of unemployment and public debt. At the same time, Europe has to cope with new challenges, ranging from globalisation and demographic shifts to new technologies and ecological challenges. Under the title of Welfare, Wealth and Work for Europe – WWWforEurope – a European research consortium is laying the analytical foundation for a new development strategy that will enable a socio-ecological transition to high levels of employment, social inclusion, gender equity and environmental sustainability. The four-year research project within the 7th Framework Programme funded by the European Commission was launched in April 2012. The consortium brings together researchers from 34 scientific institutions in 12 European countries and is coordinated by the Austrian Institute of Economic Research (WIFO). The project coordinator is Karl Aiginger, director of WIFO.

For details on WWWforEurope see: www.foreurope.eu

Contact for information

Kristin Smeral

WWWforEurope – Project Management Office

WIFO – Austrian Institute of Economic Research

Arsenal, Objekt 20

1030 Vienna

wwwforeurope-office@wifo.ac.at

T: +43 1 7982601 332

Domenico Rossetti di Valdalbero

DG Research and Innovation

European Commission

Domenico.Rossetti-di-Valdalbero@ec.europa.eu

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