Competitiveness under New Perspectives

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Abstract

This paper aims to redefine the term competitiveness to enhance its usefulness for the evaluation of country performance and for policy conclusions. We attempt to establish a definition that is adequate if economic policy strives for a new growth path that is more dynamic, socially inclusive and ecologically sustainable. We tentatively apply the proposed definition to evaluate the "competitiveness" of EU member states as well as to compare Europe's "competitiveness" with that of the US (and, where possible, with Switzerland, Japan and China).

In the first part of the paper, we examine the evolution of the concept from a focus on "inputs" at the firm level (price or cost competitiveness) to economic structure and capabilities at the country level and finally to "outcome" competitiveness, where outcomes are defined in a broad sense and in the context of the WWWforEurope project. We propose to define competitiveness as the "ability of a country (region, location) to deliver the beyond-GDP goals for its citizens".

In the second part of the paper, the performance of the EU-27 countries is assessed along the dimensions described above. We begin with price competitiveness and then proceed to economic structure and countries' capabilities regarding innovation, education, the social system, institutions and environmental ambition. We conclude with outcome competitiveness in terms of economic, social and ecological outcomes. Overall, we compile a database of 68 indicators that describe these different aspects of competitiveness.

In the third part of the paper, we investigate empirically the relationship between "outcome" and "input" competitiveness for the EU-27 using panel data analysis for the period from 2000 to 2010. We construct a composite indicator for outcome competitiveness consisting of income, social and ecological pillars, following the beyond-GDP literature. This measure is then econometrically related to composite indicators of the three groups of input indicators: price competitiveness, economic structure, and capabilities. The results of panel OLS regressions suggest that both economic structure and capabilities on aggregate are positively related to our measure of outcome competitiveness, while a negative relationship is found for the wage component of price competitiveness. Among the different dimensions of capabilities, ecological ambition and institutions are positively associated with outcome competitiveness.

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Contents

Tables

Figures

Annex tables

Annex figures

1. Aims and outline

The aim of this paper is twofold: first, to establish a concept of competitiveness that is adequate for the transition of economies to a socially inclusive and ecologically ambitious growth path – as envisaged by the WWWforEurope project – and relevant to Europe as an industrialised high-income region. Second, we apply this new concept to assess the competitiveness of the EU member states, to learn on which pillars it rests and which policy actions might improve it. The second goal is particularly important since growth in Europe has been disappointing over the past decades (and after the financial crisis) and unemployment is above 10 percent.

The paper is organised as follows. In the next section, we discuss the evolution of the term competitiveness from the firm perspective to the industry and macro level. Early analyses focused on low costs and soon included productivity (by itself or in relation to costs); this notion is known as price or cost competitiveness. Later, assessments of economic structure, technology and other capabilities (enablers) were added, and the result was called quality or technological competitiveness. Attention then shifted to evaluating outcomes instead of costs or capabilities. Competitiveness became associated with the ability of a region or country to create value added and employment or to improve living standards (see, for example, *European Commission*, 1998). Given that the aim of the WWWforEurope project is to analyse the preconditions necessary for a transition to a more socio-ecological European growth path, it makes sense to define competitiveness, specifically its "outcome" component, from the perspective of the ultimate aims of society. A similarly broad approach has recently been taken in the discussion on "beyond GDP", and the OECD has set up the "Better Life Index" to make this operational.[1]

In sections 3 to 5 of the paper, we assemble and analyse indicators on the different dimensions of competitiveness outlined above, combining traditional indicators used in the literature to date with new ones that emphasise the social and ecological aspects of input and outcome competitiveness. Section 3 analyses price competitiveness. Section 4 investigates the sophistication of production and exports as revealed by the structure of an economy (e.g. the share of technology-driven or high-skill industries). Section 5 looks at capabilities, that is, enablers of a "high-road", non-price concept of competitiveness. We collect indicators on (i) innovation, (ii) education, (iii) the social system as a "productive" force, (iv) incentives and preferences for ecologically sustainable behaviour, and (v) institutions.

Section 6 analyses outcomes. First, we report traditional outcomes like GDP and employment and then broader sets of outcome goals, among them social inclusiveness and ecological sustainability. We follow the literature on "beyond GDP" and the OECD Better Life Index in our evaluation of outcome competitiveness. Section 7 summarises our main findings on competitiveness under new perspectives for the European economies in comparison to the US.

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[1] *OECD* (2011); see also European Commission (2007), *German Sachverständigenrat* (1981).

Section 8 analyses econometrically the relationship between outcome competitiveness (success in achieving the beyond-GDP goals) and input competitiveness (costs/structure/ capabilities). Building on the database compiled for sections 3 to 6, we apply panel data estimation methods to the EU-27 countries over the period 2000 to 2010. This provides information on the importance of different drivers of competitiveness and therefore on the instruments that may be used to improve competitiveness under new perspectives. Section 9 concludes.

2. Developing a meaningful concept for the transition

2.1 From crisis towards a new growth path

Competitiveness of nations or regions is an evasive concept. It is usually not well-defined but persistently used by politicians, economists, business people and media.[2] It has regained attention in today's era of globalisation and - after the financial crisis - particularly in countries struggling to return to growth and limit unemployment. This holds for Southern Europe but also for other European economies and the US, which all attempt to stabilise and restructure their financial sectors and to refocus on their shrinking industrial base. The purpose of this paper is to define competitiveness from the perspective of an economy in transition to a new path of growth and development with high dynamics, more social inclusion and environmental sustainability. These are the goals of the EU 2020 strategy, and the WWWforEurope project has the mission to provide analytical support for the transition of Europe to a new growth path until 2020 and beyond. This transition should take place in an environment in which industrialised countries face multiple challenges including globalisation, tight public budgets, costly welfare systems, and ageing populations. Persistent disequilibria exist across countries within the euro area; high income differences (often increasing at least within countries) and climate change are additional challenges. We venture to link competitiveness to drivers of economic growth and to the ultimate aim of societies: to increase the welfare of their citizens, which we measure by means of the so-called "beyond GDP goals".

2.2 The many facets of "competitiveness"

2.2.1 Price competitiveness

Historically, the term competitiveness has been used primarily to draw attention to the cost position of firms or countries. It is still often used today when an economy (or a firm or industry) is challenged by new low-cost competitors. It is this narrow focus on costs that was criticised by *Krugman* (1994A, 1994B) as "elusive and meaningless" at the conceptual level and as "misleading or even dangerous" at the policy level, since this narrow interpretation implies that cost reduction is the only effective policy response. Complaints about losing competitiveness focus on wages as the main cost component, but they also extend to high energy prices and taxes. To some degree, this preoccupation with costs comes from the origin of the concept of competitiveness at the level of the firm. However, even at the firm level, the theory of the firm and management theory emphasise that success in oligopolistic markets depends on "competitive advantage" and capabilities generated by innovation (*Aiginger,* 2006).

Absolute cost levels decide neither about the survival of firms nor about the health of an economy; instead, they should be set in relation to productivity. The profitability of firms and the

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[2] See *Aiginger* (1997, 1998, 2000); *Fagerberg* (1994), *Hölzl – Reinstaller* (2011), *Grilo – Koopman* (2006), *Grupp* (1995), *Krugman* (1996), *Krugman – Hatsopoulos* (1987), *Orlowski* (1982), *Oughton* (1997), *Peneder* (1999, 2003).

ability of an industry to sell internationally are not limited by costs if productivity is also high (and/or high prices can be charged). Profit margins are positive if the productivity lead (plus price advantage) of a firm or region is larger than the cost disadvantage. These "relative costs" are summarised in the concept of unit labour costs. On the practical side, it is not easy to find data for the absolute level of productivity (per capita or per hour) *and* the wage level in a consistent way.[3] Monitoring *changes* in unit labour costs is much more common and easier, although it also involves a number of statistical issues.[4]

The role of productivity is sometimes emphasised to the extent that some authors consider productivity as the only meaningful concept of competitiveness (*Porter*, 1990; *Kohler*, 2006). This may de-emphasise costs too much and distract from quality components.

Concepts of cost competitiveness in the narrow sense (costs only) or in the more balanced approach (looking at costs and productivity simultaneously) are complicated when all cost components (labour, capital, energy, taxes) or all productivity components (labour productivity, capital productivity, resource productivity, government efficiency) should be addressed. These extensions are usually implemented in cost benchmark studies, which look at individual cost components sequentially, or in studies on total factor productivity (TFP), which use a production function approach.[5]

2.2.2 Quality competitiveness

Later, competitiveness came to be seen as more than an accounting result comparing costs and revenues at one point in time. A broader interpretation of the term evaluates the sources of competitiveness of firms and countries as well as their future prospects. This involves examining the processes that lead to a favourable cost or productivity position and the opportunities to sustain or improve it. Competitiveness in this sense is about processes and abilities.[6] In the literature, terms like "quality competitiveness" or "technological competitiveness" are used to describe this broader interpretation, although both expressions could be seen as narrowly focusing on two specific aspects (quality and technology).

We investigate two components of this broader notion of competitiveness. The first is the *structure* of an economy, and the second are its *capabilities*, for instance in terms of the innovation and education system. The structural composition of the manufacturing sector, for example, can be analysed by breaking down value added or exports (i) by the main input used

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[3] In unit labour cost calculations, productivity is usually measured in real terms, while wages are measured in nominal terms. If both were measured in nominal terms, the relationship between the level of value added per employee and the wage level per employee degenerates into an inverse "wage ratio" (Y/W), which is traditionally interpreted as a result of industrial relations, market structure and capital intensity rather than as an indicator of price competitiveness.

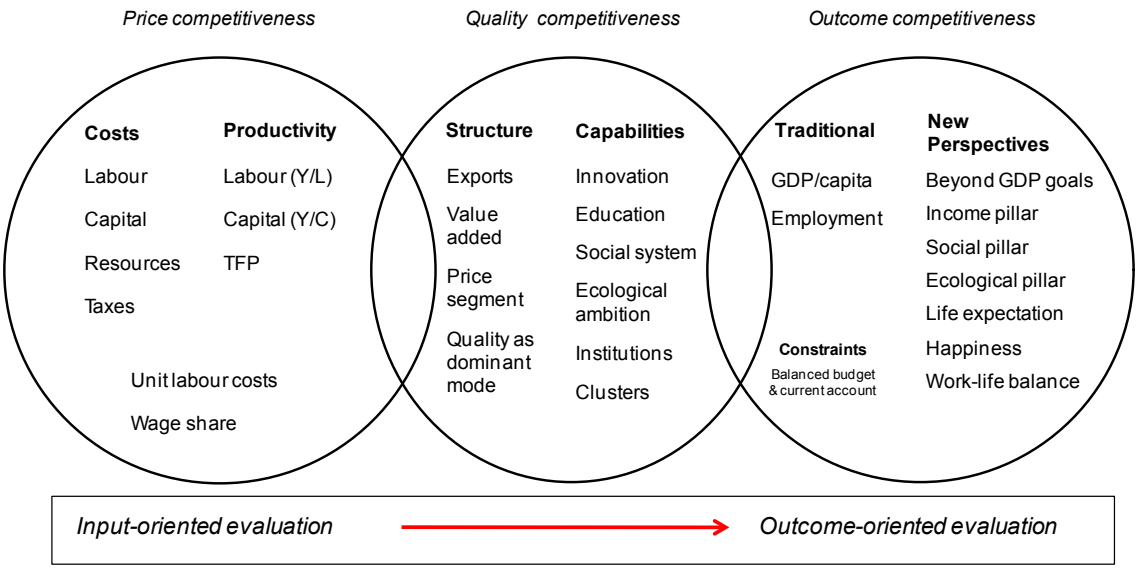
[4] These begin with the question whether to account for changes in currency values or not. Further, price indices used to deflate value added or production on the one hand and wages on the other hand can also differ.

[5] Information on TFP is more commonly provided *for* changes over time (e.g. in the EU KLEMS database) than for absolute comparisons, and practically never in a way that allows comparing TFP with a comprehensive cost evaluation ("total costs").

[6] This is reflected in the German expression for competitiveness, “Wettbewerbsfähigkeit" – literally, “the *ability* to compete”.

in an industry (differentiating for example between labour-intensive and technology-intensive industries), (ii) by the sophistication of inputs (e.g. low-skilled or high-skilled labour), (iii) by the extent and characteristics of services used/provided (transport services vs. knowledge input), (iv) according to whether competition takes place mainly along the price or the quality dimension, and (v) according to whether a country/region's exports are positioned in the highest or lowest price segment of its product market (this indicator is available for exports only). We also report the share of production and exports in (vi) innovation-intensive sectors and (vii) education-intensive sectors. Lastly, we assess the importance of ecological and renewables industries.[7]

Figure 1 **Towards a concept of competitiveness under new perspectives**



Source: Own conceptualisation for WWWforEurope.

Capabilities provide information about the sources of success and failure of firms or industries and pave the ground for assessing their future prospects. Innovation and education affect firm growth, market positions and GDP growth, especially in industrialised countries. Indicators on research inputs and outputs, as well as on investment and participation in human capital formation at various stages are instrumental for this purpose. The importance of institutions has received increased attention over the past years (*Acemoglu*, 2003; *Rodrik et al.*, 2004; *Bouis et al.*, 2011). This includes the role of governance and the extent to which the public sector and regulation support or hinder firms in the long run. The rule of law, absence of corruption and trust in institutions are widely accepted as determinants of efficiency and growth for firms and countries. The importance of clusters (cooperation between firms in "related industries") for

[7] To assess economic structure, we mainly rely on taxonomies provided in *Peneder* (2001), which refer to manufacturing. Two taxonomies – those on innovation and education intensity – include services. Examples of studies that use these taxonomies to examine the structural dimension of competitiveness at the European level are *Janger et al.* (2011) and *Janger* (2012).

competitiveness has been analysed by *Porter* (1990, 2004), *Ketels* (2006), and *Ketels – Protsiv* (2013).

In the context of transition to a new growth path, the capability of the social system to enhance the productive capacity of an economy becomes important. Productivity-enhancing measures include retraining people if qualifications become obsolete, reducing inherited differences in education or increasing female labour force participation. As to the ecological aspect, *Porter* (2004) emphasises the sophistication of consumers providing incentives for firms to improve technologies and products in order to gain a first-mover advantage.[8] Demand by economic actors for alternative energy sources, changing habits in light of climate change, and environmental taxation could all contribute to environmental innovation and lower energy intensity. Thus, social and ecological activities may turn into productive forces that do not limit incomes and production but increase welfare. In other words, social inclusion and ecological ambition can be drivers of growth and development.

2.2.3 Outcome competitiveness

Competitiveness should not be assessed by looking at inputs proper (costs and productivity) or inputs more broadly (structure and capabilities) alone. Rather, it ought to be complemented by assessing outcomes ("the proof of the pudding is the eating").

Outcome competitiveness was initially measured using trade or current account balances, with deficit countries judged to be uncompetitive. The importance of the external-balance benchmark subsequently declined: on the one hand, fast-growing countries tend to have trade deficits; on the other hand, the current accounts of member countries were seen as meaningless in a currency union, where no currency reserves are necessary to compensate deficits and there is no national currency that can be devalued. Further, some countries' large surpluses were sometimes seen as the result of politically-motivated prevention of currency appreciations ("currency manipulation") and a resurgence of mercantilist policies. In the wake of the financial crisis, this neglect of rising current-account deficits proved a mistake (see *Aiginger*, 2010); the difference in the depth of the crisis in individual countries was found to be correlated with their current-account position (and its change). The current-account deficits of Greece, Portugal and Spain (accrued in the pre-crisis period) added to the problems of these Southern peripheral countries, as financial markets added up public and private debt as well as current-account deficits in calculating the risk of governments bonds (see *Aiginger et al.*, 2012).

However, balancing the current accounts is not the ultimate aim of society (at least as long as there are no large deficits). The ultimate aim of an economy should be to enable high and rising incomes, to provide employment opportunities and to improve living conditions. Current accounts (as well as public deficits) are thus shifted into the position of constraints that could destabilise growth. A typical definition of outcome competitiveness along these lines 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".

[8] See also *Vernon* (1966).

Fundamental assessments of outcomes thus began with GDP per capita as the main indicator of outcome competitiveness. Employment and unemployment indicators were then added to the analysis.[9]

In the context of transition to a more socially inclusive and environmentally sustainable path, the goals of social inclusion and sustainability are particularly important. The "social pillar" includes poverty reduction through transfers, limiting differences in net incomes through progressive taxation, guaranteeing pensions above poverty level, achieving gender equality and providing broad access to the health system. Ecological sustainability can be evaluated in terms of low CO2 emissions and energy intensity or a large share of energy produced from renewable sources. If the growth path should be sustainable, i.e. in line with the biophysical limits of the world, these goals need to be added to GDP in an analysis of outcome competitiveness.

The critique of GDP as central measure of economic performance and meaningful indicator of welfare is closely related to the "beyond GDP" debate (*Stiglitz et al.*, 2009). This approach measures the achievements of a society using a broader set of goals. Since the ultimate purpose of an economy's competitiveness is to serve the aims of its citizens, the beyond-GDP approach is a good point of departure to re-evaluate the concept.[10]

An alternative to broad sets of indicators as in "beyond GDP" is to measure welfare using comprehensive indicators that summarise many components contributing to well-being. Life expectancy is an example of a quantitative indicator; survey responses to questions on life satisfaction or personal "happiness" are subjective indicators.[11]

2.3 Proposed definition

Given the evolution of the concept over time, we propose to define competitiveness in light of the envisaged new growth path as the "ability of a country (region, location) to deliver the beyond-GDP goals for its citizens today and tomorrow".

The competitiveness of a country or region requires a set of viable firms and industries that are able to compete internationally, building on balanced costs and productivity. They have to be embedded in the structure of an economy and driven by capabilities developed privately or by the government. Current accounts as well as public-sector revenues and expenditures need to be balanced in the long run, but balanced accounts are not the ultimate aim. Given the objective of transition to a more socially inclusive and environmentally sustainable growth path, investments in the social and ecological system that make an economy more productive (in creating incomes and welfare) are an important part of competitiveness from the perspective of

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[9] *Aiginger* (2006B) defines evaluations of GDP as operationalisation 1 of output competitiveness, and evaluations of employment as operationalisation 2.

[10] There is much ongoing research on the measurement of "beyond GDP" to improve the approach and to customise it to the preferences of different societies. For example, the indicators making up the OECD's Better Life Index contain the following categories: housing, health, work and life balance, education and skills, social connections, civic engagement and governance, environmental quality, personal security and subjective well-being.

[11] The UN's human development index is a further example. It consists of three indicators: GDP per head, education and life expectancy.

the new growth path. The social system and environmental ambitions of (public and private) institutions can become a "productive force". The outcomes to which firms and countries should contribute are the beyond-GDP goals. Our definition is therefore an extension – particularly important for the aim of a transition – to those defining competitiveness as value added plus employment or high and increasing living standards (see Table I in the Annex for an overview on definitions proposed in literature).

2.4 Discussion of the proposed definition

2.4.1 Relation to theory

Our definition starts from the notion of a welfare function as defined in welfare theory. Social welfare consists of a bundle of goals, both material and immaterial. Material goals comprise income and employment, while immaterial goals may contain fairness of distribution, health, justice, freedom or the ability to follow personal preferences. It is open to choice which goals to include in the welfare function, which weights to give to these goals, and whether to emphasise dynamic or static aspects. Our operationalisation of the welfare concept is close to the "beyond GDP" debate – currently one of the most active branches of welfare theory – and to the aim of the WWWforEurope project, which is to support transition to a more dynamic, inclusive and sustainable growth path. The importance we attach to capabilities is based on strategic management theory, which emphasises competitive advantage, innovation and firm-specific capabilities, and on modern growth theory, which emphasises human capital, innovation and institutional quality. This choice of variables is also supported by our empirical analysis. Our definition thus comprises many elements of a "high road" to competitiveness (*Aiginger*, 2012) based on quality and innovation.

2.4.2 Monitoring the transition to a new growth path

The definition proposed involves important choices. Defining competitiveness as an ability to create welfare in general and to deliver the beyond-GDP goals in particular moves away from the emphasis on costs as a main driver of competitiveness and external balances as a main indicator of success. A low cost position derived from currency devaluations, cost-cutting and beggar-thy-neighbour policies are, in this view, ineffective tools for raising the long-run competitiveness of an industrialised country. Problems may arise when costs are too high relative to productivity, but when they are broadly in line – and the current account is balanced – further cost-cutting is an unhelpful strategy for rich countries. Reducing social expenditures and environmental ambition, together with other elements of a "low road" to competitiveness, are counterproductive for the transition to a new growth path.

Productivity is an important part of competitiveness, but it loses its singular relevance if the growth path should become more inclusive and sustainable. Higher resource productivity may be more important for welfare if sustainability is among the goals.

Economic structure is crucial for assessing competitiveness since it offers an outlook on future prospects. A country's capabilities (innovation and education system etc.) determine its welfare

position today but even more so in future. Emphasising structure and capabilities changes the nature of competitiveness from ex-post evaluation to an ex-ante concept.[12]

2.4.3 Dividing indicators into enablers and outcomes

Allocating indicators on the social system and sustainability to costs, capabilities or outcomes is difficult. In early competitiveness rankings, social expenditures and environmental standards were regarded as costs that diminished the price competitiveness of countries and locations. In the meantime, the literature has developed concepts of the social system as a "productive force" and of environmental sophistication as a creator of first-mover advantages, green jobs and export potential.

We should therefore distinguish between "enablers" and "corrective strategies". Some social measures like education and training, lifelong learning and childcare institutions may increase capabilities and thus productivity. On the other hand, social expenditures like unemployment benefits and pensions change the ex-post distribution, aiming at reducing poverty and income differences. Their purpose is not to increase an economy's productive capacity.

Similarly, some indicators on ecological sustainability may be seen to represent a productive force. Examples include subsidies for renewable energy fostering innovation and technical progress, or consumers' preferences for recycling and organically produced food. Other environmental expenditures could be counted on the cost side, such as expenditures on the noise insulation of motorways, clean-up of pollution and reconstruction after environmental disasters. These are corrective measures that restore environmental quality, thus improving welfare albeit at rather high costs.

2.4.4 Relation to welfare assessments

Defining competitiveness as the ability to deliver on the beyond-GDP goals is certainly unusual from the point of view of the firm or industry level, and it also differs from popular use in policy discussions. With the definition we propose here, the term competitiveness has arrived at the country level. A legitimate question that may arise is why we do not simply talk of "welfare analysis"[13] and abandon the term competitiveness when comparing economies.

The answer has different dimensions:

- Firstly, the notion of competitiveness (instead of welfare or living standards) engenders a focus on market processes, which is particularly relevant for open economies exposed to international competition. Welfare, on the other hand, tends to be regarded as a policy goal of the public sector, associated with public support and redistribution.

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[12] When trying to separate the components of competitiveness into costs, structure, capabilities and outcomes, we acknowledge that they are to an extent related. Productivity is partly determined by structure and capabilities, and labour productivity can be seen as a component nested in traditional outcomes as well as outcomes under new perspectives.

[13] *D'Aspremont - Gevers* (2002).

- Secondly, competitiveness emphasises the bottom-up character of welfare creation. Ultimately, welfare comes from firms and industries that compete successfully and generate jobs and income.
- Thirdly, using the term competitiveness to assess the contribution of firms and industries to the ultimate aims of society could help to reduce the misuse of the term to describe only cost factors. A case in point are claims that Europe loses competitiveness if taxes on energy or emissions are implemented, without taking into account that this may enhance long-term welfare by fostering innovation and mitigating climate change.

2.4.5 Relation to competitiveness rankings

A large and rapidly expanding number of competitiveness rankings are available today.[14] They use a multitude of indicators – partly hard data, partly survey results – to assess the competitiveness of countries. This has the advantage of measuring a wide range of economic aspects, which potentially reduces measurement error and helps cope with the complexity of the problem, such as differences in countries' starting position and socio-economic systems. A disadvantage of "large indicator approaches" is that they sometimes lack a clear concept.[15] Rankings usually combine indicators of outcome competitiveness with those of input or process competitiveness, and indicators on price competitiveness with data on external balances. In addition, they mix indicators on performance levels with indicators on changes in performance dynamics. Sometimes they implicitly favour the size of an economy.

2.4.6 Relation to *Delgado et al.* (2012)

The approach taken here resembles that of *Delgado – Ketels – Porter – Stern* (2012; henceforth also DKPS). They define outcome competitiveness using a modified concept of labour productivity: GDP per capita, where the denominator is the working-age population as a proxy for the potential instead of the actual labour force. Outcome is thus – in contrast to our approach – not a set of indicators containing social and ecological goals. The only outcome goal indirectly included in DKPS is, apart from productivity, maximum labour force utilisation. Hence in principle we could interpret DKPS' dependent variable as a two-goal welfare function, containing total labour productivity plus some employment measure (utilisation of labour market potential).

Further, DKPS derive a competitiveness index first by regressing this modified measure of labour productivity on its determinants, and then using the estimated coefficients to compute a competitiveness score for each country. This inspires the approach we take in section 8, regressing a set of beyond-GDP indicators on the determinants outlined above.

As determinants of "modified labour productivity", DKPS use composite indicators of macroeconomic performance (MACRO), microeconomic performance (MICRO) and of social and political institutions (SIPI). The composite indicators for MICRO and SIPI are constructed

[14] Examples include those of the International Institute for Management Development (IMD, a business school) and the World Economic Forum.

[15] This was the case especially in the beginning; lately, some rankings also provide theoretical underpinnings.

using principal component factor analysis. MACRO essentially consists of fiscal and monetary policy as well as output volatility. This category does not exist on its own in our approach, but some elements may be incorporated in institutional quality, and the absence of volatility and disequilibria is a constraint of our outcomes. MICRO is a broad set of indicators from corporate strategy to the business environment, and both MICRO and SIPI are captured by our capability indicators.

Thus a common ground exists between DKPS and our approach, with DKPS focusing more on productivity as the outcome goal, while our approach is motivated by a focus on the transition of the current economic system to a more inclusive and sustainable one (measured by beyond-GDP indicators). DKPS consider macroeconomic performance, microeconomic performance and institutions as drivers of competitiveness. We investigate costs (relative to productivity), economic structure and capabilities as driving forces.

2.5 Empirical setup

In sections 3 to 7, we use our proposed concept of competitiveness to provide a descriptive analysis of the EU member states' current performance. In addition, we compare the EU-27 to the US, and - where data are available - to Japan, Switzerland and, in rare instances, to China.

We start with price competitiveness (section 3) and proceed to economic structure (section 4), capabilities (section 5) and outcomes (section 6), where we begin with GDP per capita and employment and then include broader social and ecological outcomes.

For some indicators, data are available over a longer time period than for others. Our approach is to examine the most recent year available (2011 or 2012, but sometimes only 2008). For comparisons over time, we relate this to the year 2000. We mainly use data on the EU-27 countries, which serve as a benchmark and which we sometimes generally refer to as "Europe". If possible, we also show data for the EU-15, which comprise all EU member states until 2004, and for the euro area, which currently has 17 members. The "new member states" complement the EU-15. They consist of ten Central and Eastern European countries (CEECs) as well as Cyprus and Malta. Section 7 relates "Europe" to the US.

In section 8, we analyse econometrically the relationship between outcomes and the input groups costs, structure and capabilities. To this end, we compile a panel dataset on the indicators described in sections 3 to 6, covering the period 2000 to 2010 for the EU-27. The main statistical information is extracted from each group of input and outcome competitiveness indicators by means of principal components factor analysis. We then use panel data analysis to investigate the relationship between the different input factors and outcome competitiveness under new perspectives.

3. Price competitiveness

3.1 Concept and operationalisation

The debate on competitiveness has long been dominated by concepts of price (cost) competitiveness. Recent examples include Germany's post-unification efforts at regaining competitiveness through wage restraint and losses of competitiveness in Southern Europe following strong wage increases. Despite a large and increasing literature that overemphasising costs might lead to wrong policy conclusions at least for rich countries, many politicians and media still equate competitiveness with low costs. However, according to firm theory the entry and exit of firms depends not on wages but on average costs (costs divided by output), and short-run output is determined by marginal costs (cost changes incurred by the "last" unit of output). This implies that costs (all types, not only labour costs) as well as productivity are relevant for the viability of firms and industries. In homogenous industries, unit costs are crucial, and any firm with higher unit costs makes losses. In heterogeneous markets with vertical product differentiation, firms can co-exist with different costs if quality or consumer valuation of products differs to the same extent.

To evaluate the price competitiveness of the EU-27 member states, we begin with absolute labour costs per employee and then proceed to labour productivity and unit labour costs.[16] We focus on the levels of these indicators as measures of current price competitiveness. Rates of change since 2000 are analysed separately in a box, which also examines total factor productivity (TFP) growth.[17]

3.2 Descriptive analysis

In Figure 2, we present data on the levels of compensation per employee, labour productivity and unit labour costs (the ratio of the first two), both for the total economy and manufacturing.

Labour costs (compensation per employee) are lowest for the total economy in the new member countries in Central and Eastern Europe, despite some catch-up to the "old" member states of the EU-15 since 2000. The highest labour costs are registered by small economies like Luxemburg, the Netherlands, Denmark and Belgium (also Switzerland). The large European economies are located in the middle, with Germany at the bottom of this group, just above the EU-27 average. Manufacturing labour compensation exceeds compensation on aggregate in the high-income countries, while it is lower in most new member countries. Germany has comparatively high costs in manufacturing, albeit still below France and the smaller old member countries, while Ireland has a lower position in this sector compared to the total economy.

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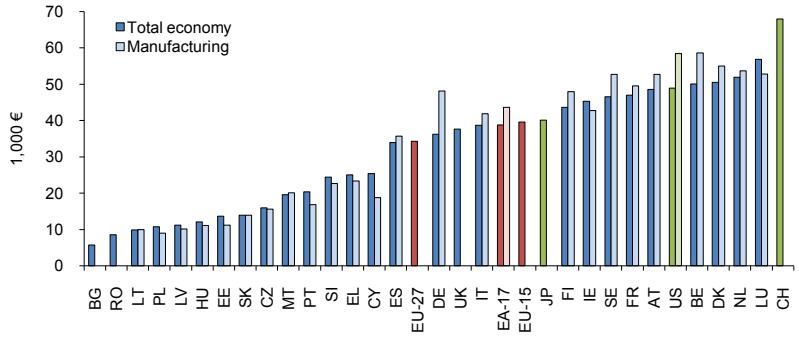
[16] For a comprehensive analysis of price competitiveness, see *ECORYS* (2011); for productivity see *Schröder* (2012).

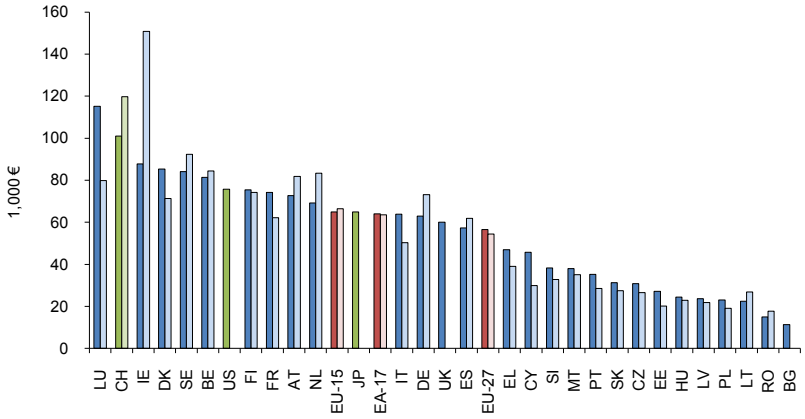
[17] The data used in this section were extracted from AMECO and Eurostat unless stated otherwise. For international comparison, all data are given in a common currency, the euro. Since the focus in this section is on the price of inputs from the producers' side, the data are not adjusted for cross-country differences in purchasing power. For reasons of data availability, all indicators except TFP growth were computed on a per-person basis rather than per hour worked.

Figure 2 **Price competitiveness level, 2011**

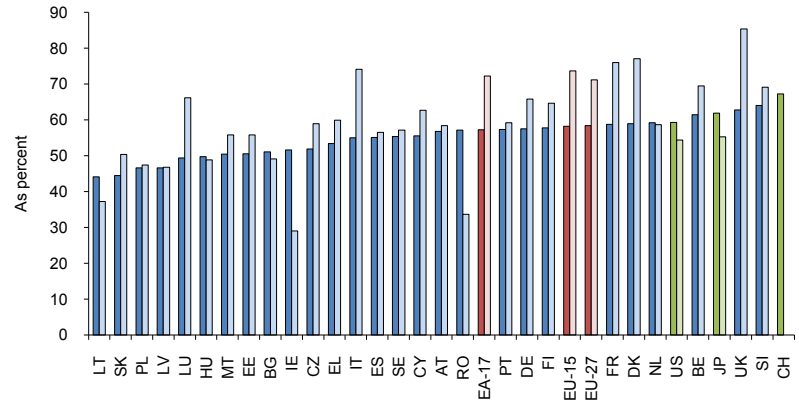
Compensation per employee



Output per person employed



Unit labour costs



Notes: Data in current (2011) euro prices and exchange rates. Countries ranked by total economy values.
Source: Eurostat (AMECO), WIFO calculations.

Regarding labour productivity (output per person employed), the ranking resembles that of labour costs, with small Western countries ahead. Luxemburg and Ireland are particularly productive, so much so in comparison to labour compensation that in terms of unit labour costs, they can be found among the most price-competitive group of countries according to this

measure, the new member countries.[18] This group has a labour cost advantage between 20 to 30 percent over the EU average, with the exception of Slovenia. In Sweden and Finland, unit labour costs are also comparatively low as these countries rank more highly on productivity than on wages. In the UK, the Netherlands and in France, the reverse is true.[19] The Southern European countries still lag behind in terms of productivity, but their wage restraint since the crisis has led to a more favourable position in terms of unit labour costs in 2011 (except for Italian manufacturing).

Box: Changes in price competitiveness, 2000-2011

Economic policy is often more interested in changes in price competitiveness than in current levels. Therefore, although we are primarily interested in levels, we report here also the rates of change between 2000 and 2011 in labour compensation, labour productivity, unit labour costs and - where comparable cross-country data are available - in total factor productivity.

Both labour costs and productivity increased fastest over the period in the new member countries (3 percent in real terms p.a.). Overall, unit labour costs also increased, indicating that productivity rose more slowly than wages. Ireland, Finland, the UK and Sweden also had comparatively large wage increases, but considerable productivity gains held unit labour costs in check (they even declined in the UK, both on aggregate and in manufacturing, and in Swedish and Finnish manufacturing). In Denmark and to a lesser extent in the Netherlands and in France, productivity could not compensate the wage dynamics, so that unit labour costs increased by more than 2 percent per year.

In the Southern European crisis countries, wages rose faster than productivity until 2008. Since then, wages were cut and productivity improved slightly. However, between 2000 and 2011, unit labour costs in Italy, Greece, Spain and Portugal still increased by about 2 percent per year. In Italy in particular, wages kept rising despite negative annual average productivity growth rates. In German and Austrian manufacturing on the other hand, annual wage increases remained below productivity gains, leading to declining unit labour costs.

Total factor productivity (TFP) growth is an indicator of improvements in the productivity of all production factors combined. Calculated using the growth accounting approach, based on a standard neoclassical production function, TFP growth is that part of labour productivity growth that cannot be explained by the growth of capital and labour. Hence, it may be considered an underlying driver of labour productivity growth and an indicator of technological progress. It is therefore frequently analysed in studies on the sources of growth and competitiveness.20

The figures for TFP are similar to those for labour productivity: high growth rates in the new member states, Finland, Sweden and the US; intermediate growth rates in the Netherlands and Germany; and lower or even negative growth in Belgium, Denmark and Italy. More surprising is Ireland's negative performance, which supports a cautious approach towards Irish productivity figures. Spanish TFP also declined until 2007, indicating that the country's wage increases up to the crisis may have been unsustainable. TFP growth in the manufacturing sector considerably exceeded that in the economy as a whole in most countries, and even Belgium and Denmark, with negative average annual TFP growth on aggregate, registered positive growth in manufacturing.

[18] However, the figures for Luxembourg and Ireland should be interpreted with caution. Luxembourg, with its large financial sector, is a special case. In Ireland, the low rate of corporation tax - currently at 12.5% - provides an incentive for multinational companies to register their profits in the country. This implies that Irish value added (and hence productivity) figures may be artificially inflated upwards.

[19] In manufacturing, the overall picture is similar. In several new member countries, unit labour costs are lower than for the total economy, again with the exception of Slovenia. Manufacturing wages are also particularly high relative to productivity in the UK, Italy, France and Denmark.

[20] We use data from the EU KLEMS Growth and Productivity Accounts. The 2009 release of this database covers 16 countries (15 EU members and the US) over the period from 2000 to 2007. As a result, these data are unaffected by the post-2008 crisis.

4. Quality competitiveness: Economic structure

4.1 Concept and operationalisation

The structure of an economy allows an assessment of the quality of competitiveness today as well as likely future opportunities. A firm is better positioned in the long term if its selling position is derived from a lead in technology or its employees' skills rather than from cheap labour, physical capital or energy. Since innovations usually generate rents, profits are higher in technology-driven, skill-intensive industries; since process and product innovations generate demand, growth rates are likely to be higher for technology-driven and skill-intensive industries.

In the theory of firms it is well established that profitability is higher in industries with fewer firms, in industries with entry barriers , heterogeneous products, and with competition in quality instead of prices. In the long run all competitive advantages can erode, if there are no competitive advantages specific to that firm. However innovation and skills are capabilities that can sustain or create dynamic advantages. Countries with higher incomes can compete in the long run only in industries where there is some vertical heterogeneity. This could be a bridge between the assessment of profit differences in the short and medium run and the growth rate of industries in advanced industrial countries: in industries without comparative or competitive advantages production will be lost to new low cost competitors, while in industries where innovation, high skills, quality competition and new product characteristics are important (e.g. eco content) the sectors in high-wage countries will grow fast.

We apply nine classifications to evaluate quality competitiveness in production and trade. For production structure, we use data on value added, for trade we primarily use export data.

- The *first* taxonomy classifies industries according to the *main factor input used* (technology-driven, labour-intensive etc.; available for value added and exports, manufacturing only).[21]
- The *second* divides manufacturing industries into *four types of skills used* (from high to low; available for value added and exports, manufacturing).
- The *third* taxonomy clusters industries according the *type of service inputs used* (from transport services to knowledge-based services inputs (available for value added and exports, manufacturing).
- A *fourth* classifies industries according to *competitive mode*, i.e. whether success depends mainly on price or quality competition (available for value added and exports, manufacturing).
- The *fifth* analyses whether a country supplies goods primarily in the top, medium or lower *price segment* of its industries (available only for exports, manufacturing).
- The *sixth* taxonomy allows classifying industries according to the *intensity of innovation* (available for value added and exports, manufacturing plus services).

[21] Available for value added and exports, manufacturing only.

- The *seventh* taxonomy classifies industries according to *education intensity* (available for value added and exports, manufacturing plus services).[22]
- Taxonomies *eight* and *nine* report the *share of ecological and renewable industries* (available for exports, manufacturing).

These classifications provide a differentiated picture of economic structure. To make the task manageable, we highlight the position of countries in the "best" segment e.g. in technology-driven industries, high-skill industries, the highest price segment etc.

For production, data are available only for the EU members from 2000 to 2008. For exports the data extend to Switzerland, the US, Japan and China and up to 2011.

4.2 Structure of production and exports

The structure of an economy allows a first assessment of the quality competitiveness. Production, services and even more so exports in sophisticated industries indicate that an economy is to some extent sheltered from low cost competition, and that the industries of a country can accrue rents, invest in future opportunities and is involved with fast growing industries.

4.2.1 Production structure

The top group for most indicators consists of the following five countries: Sweden, Germany, Ireland, the UK and France. Sweden and Germany have top positions in almost all structural performance indicators. The exception is that the share of education-intensive industries in both countries is relatively small, which indicates deficits in high value-added service sectors. Ireland excels in manufacturing. Its main weakness is underrepresentation in industries in which quality competition dominates. The position of the Netherlands and Slovenia improves in taxonomies which extend to the service industries. France and the UK have deficits in innovation-intensive sectors and to some extent also in industries with high skill intensity. Finland has a deficit in high skill industries and in those with high educational intensity. Bulgaria, Romania and Lithuania are all further back in taxonomies including service industries.

Greece is the country with the largest structural problems. The share of innovation-intensive sectors is particularly low, while the country's position in education and knowledge-based services is somewhat better. Poland has a rather weak structure too, which suggests that it's recent success during and after the financial crisis should be taken with caution. Its good macroeconomic performance could in part due to the return migration of Polish workers from the UK and Ireland and the consequent construction boom. For Lithuania, Romania, Bulgaria, but also for Portugal and Spain, most rankings indicate structural problems.

Correlation is rather high between shares in technology-driven, skill-intensive and quality driven industries. Rankings for knowledge-based services and innovation- and education-intensive industries are not closely correlated.

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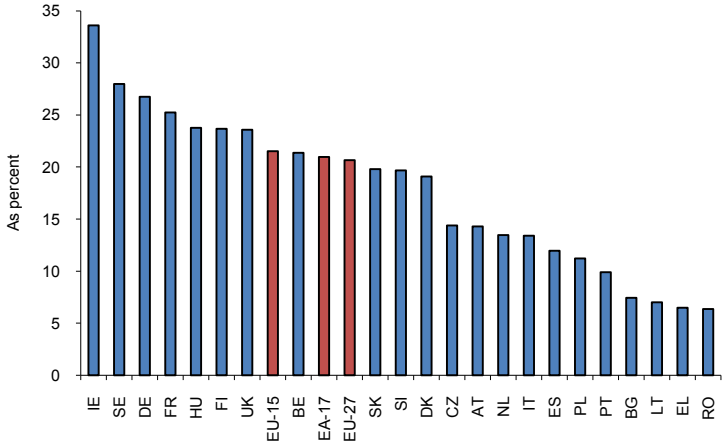
[22] See *Peneder* (2007, 2010).

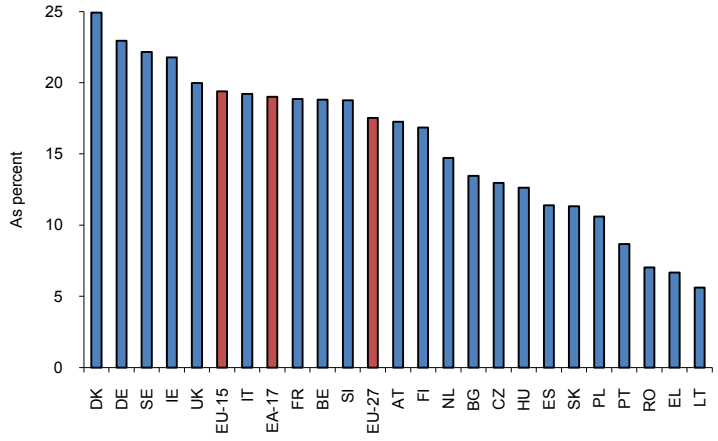
Large countries and those in the Northern periphery seem to be in the top league more often than small countries. Belgium, the Netherlands, Denmark and Austria have a successful manufacturing sector despite average or below-average ranks in terms of industrial structure. The bottom group consists of new member countries and those from the Southern periphery. Ireland's position and partly also Hungary's are determined by FDI. Hungary does well in technology-driven industries, but shows weakness in industries where education, knowledge and skills are important.

Figure 3 **Structure of production in manufacturing, 2008**

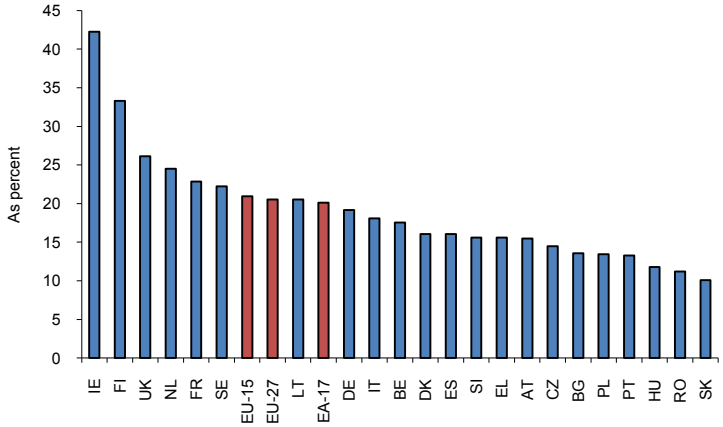
Technology-driven industries



High-skill industries



Industries based on knowledge-based services



Notes: Shares in value added of manufacturing. Competitive mode: high, medium and low quality competition.
Source: Eurostat (SBS), WIFO calculations.

4.2.2 Export structure

Sophistication of exports is similar to that of production, but Ireland gets the top position according to many export indicators, a position based on high exports in ICT and in pharmaceuticals.[23] Finland, Latvia and Estonia's export structure is much less favourable than its production structure. Finland, in particular, looses more than 10 ranks in exports structure relative to production structure in technology driven industries, knowledge based industries and high quality competition. This indicates that Finland had become a knowledge- and ICT-based society, but cannot use this to the same extent possible for exports a decade earlier. The position of Finland as well as of Sweden is more favourable if quality is measured within sectors.

A more sophisticated export structure relative to a production structure is seen by Hungary, Slovakia and the Czech Republic. This is due to multinational firms which are located here as a basis for exporting: these countries have a better export structure relative to production structure.

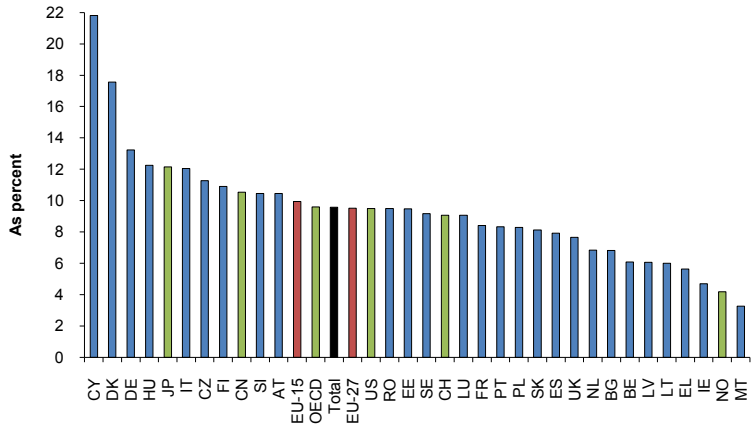
In exports for eco- and renewable industries, the Scandinavian countries are in the lead. Germany and Italy have good positions, while France and the United Kingdom clearly lag behind, indicating a lower priority attached to environmental sustainability.

Among the new member countries in Central and Eastern Europe, Hungary or the Czech Republic tend to reach the highest positions, while the majority of these countries is still in the lower third of the distribution.

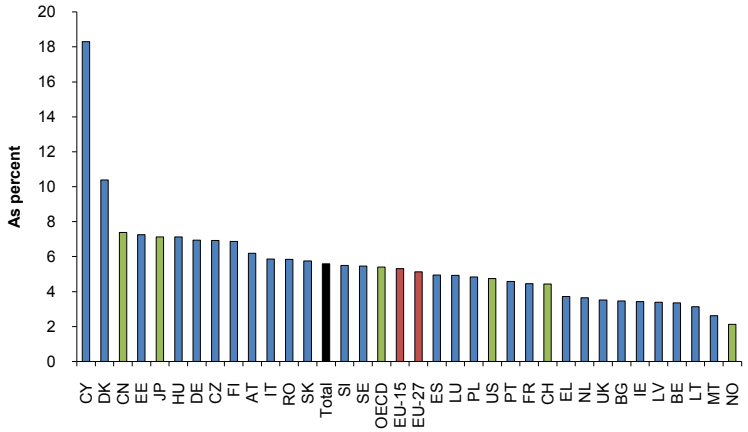
[23] Cyprus and Malta also tend to be ranked near the top in exports. In Cyprus, the reason is a high share of pharmaceuticals exports; to a large extent, however, this is intra-industry trade, as imports are high in the same sectors.

Figure 4 **Exports of eco industries and renewables, Ø 2009-2011**

Export shares of eco industries



Export shares of renewables



Notes: Total: all OECD countries, EU-27, China, India and Brazil.

Source: UNO (Comtrade), *Köppl et al.* (2013), WIFO calculations.

5. Quality competitiveness: Capabilities

5.1 Concept and operationalisation

The second element of quality competitiveness consists of factors which allow firms to perpetually upgrade, and adapt dynamically to new demand and opportunities. We analyse five such enablers of change and future growth, namely innovation, education, a productivity enhancing social system, ecological ambition and supportive institutions. All these five capabilities are discussed in modern growth theory, but also in strategic firm theory. They allow the dynamic change of economic structures and shift the analyses further away from the traditional cost focus of earlier studies on competitiveness (Figure 1).

In the long term, the ability of an economy to adapt to – or indeed to stay at the forefront of – technological change, depends substantially on the education level of its population and on the conduciveness of its economic environment to innovation. The literature on endogenous growth (e.g. *Lucas*, 1988; *Romer*, 1990; *Aghion – Howitt*, 1992; *Griffith et al.*, 2004; *Vandenbussche et al.*, 2006) provides theoretical and empirical evidence regarding the importance of these two factors. Specifically important for the transition to a new growth path are incentives in the social and ecological system which change production structure and promote competitiveness.

A literature in social policy emphasises the "enabling" or "productive" nature of some social spending, in contrast to its redistributive component (*Giddens*, 1998; *Bock-Schappelwein et al.*, 2009). For instance, *Hemerijck* (2012) distinguishes between "service-oriented *capacitating*" and "benefit-transfer *compensating*" social programmes.[24] The former category includes active labour market policy measures, child-care provision and rehabilitation expenditures for the disabled, all of which serve to increase the ability of different social groups to participate in production and society at large.

Since *Porter – van der Linde* (1995), "sophisticated" consumers are seen as drivers for firms to generate new and better products, thus providing first-mover advantages. Indicators on citizens' ecological preferences and the incentives faced by firms and consumers (e.g. taxes) in this regard are enablers of energy and resource efficiency and of the supply of ecological products.

The empirical growth literature emphasises the importance of institutions and trust for economic growth and the functioning of society in general. Therefore we investigate indicators on institutions that are considered beneficial for competitiveness.

The choice of indicators is specifically important, first since some "social indicators" may also retard structural change, while others enhance the productive potential. Some institutions may reduce flexibility while others promote change. Secondly some indicators signal processes and capabilities, while other indicators in existing sets of "social indicators" or "ecological scoreboards" report outcomes. Clusters increase the productive potential of economies, too, but are analysed in *Ketels - Protsiv (2013)*.

[24] Emphases are from the original article.

5.2 Innovation and education

As innovation indicators signalling capabilities we chose R&D expenditures, patent applications, indicators on tertiary education and the share of degrees in mathematics, science and technology. As indicators for the education system we chose public expenditure for preschool education and the starting age of education, as well as expenditure for tertiary education and participation in vocational training and lifelong learning.

The Scandinavian countries (Finland, Sweden, and Denmark) as well as Germany and Austria[25] are leaders in innovation as shown by R&D expenditure and patent applications; this is not always the case regarding tertiary education. Germany is at most average when it comes to tertiary attainment, and Austria lags considerably behind the EU average. As far as the share of maths, science and technology is concerned, France, Ireland and the United Kingdom take better positions than for R&D in general, the same holds for some new member countries (Lithuania, Slovakia, Czech Republic, Poland and Romania). The leading position of Finland is outstanding; it scores first in all indicators on innovation capabilities (and is third in patents).

Abilities generated by education in general are similar but the position of Germany, the United Kingdom (and Ireland) is less favourable than for innovation. France has deficits in vocational training, lifelong learning and the share of woman in tertiary education. Germany, which is close to the top in research, is in the middle in education expenditure (from preschool to tertiary education) and participation in vocational training; it is narrowly among the top ten in early education, in the middle group in lifelong learning and at the end as far as the female share in tertiary education is concerned. The United Kingdom and Ireland lack vocational training and expenditure on tertiary education is low (in Ireland also in preschool education). A better ranking for education is achieved in Latvia (due to preschool expenditure and a high female share in tertiary education); in Slovenia it stems from a top ten rank in vocational training, lifelong learning and women participation in tertiary education.

5.3 The social system as enabling force

As an indicator for a productivity enhancing social system we take expenditure on active labour market policy, public expenditure on sickness and healthcare, disability, family and children and the female labour force participation rate.

All in all, the country that stands out as a star performer in this section is Denmark: it is at or near the top regarding all indicators presented. Belgium, Sweden, France and the Netherlands also do well, while the new member states, especially from Central and Eastern Europe, lag behind considerably.

5.4 Ecological ambition

As indicators for the sophisticated system of incentives and preferences promoting the change to sustainability we chose (a low) share of oil and gas imports, municipal waste generation, high

[25] And outside of EU Switzerland, US and Japan. The low position of the US on MST graduates also stands out.

recycling rates, tax rates on energy and environmental taxes, share of organic farming and the share of eco innovations and emissions. The results are more different across countries than for the other categories and differ also from the rankings of the other abilities. The leader is Denmark, which has the highest recycling rate, low oil and gas imports and high taxes on energy and environment, and a good position in eco patents. The Netherlands follows in third place with high imports of oil and gas, low organic farming and low eco patents. Slovenia is a surprise in second place with medium positions in organic farming, recycling and patents, and also a good position in all other indicators. Austria is next despite low energy and environmental taxes. Along with Hungary, Romania and Bulgaria new member countries are lagging in environmental ambition, but also Finland with low recycling, few patents and low environmental investment. Ecological ambition is the only type of indicator among capabilities where Finland is not top.

5.5 Institutions

As institutions promoting competitiveness we analyse trust, the liberalisation of the labour market and business, the accountability of government, regulatory quality and the control of corruption.[26]

Results are rather similar across indicators and show a lead for the three Scandinavian countries (Denmark, Sweden, Finland), closely followed by Austria and the Netherlands. The positions of Greece, Italy, Romania and Bulgaria suggest that competitiveness could be improved if trust in government and governance were higher. Institutions do converge since the five countries with the fastest improvements in institutions between 2000 and 2010 are all new members (Czech Republic, Slovakia, Latvia, Bulgaria and Estonia). Out of the leaders, Sweden and Denmark improved their excellent positions. The Southern countries have lost ranks, so also did the United Kingdom, Germany and France.

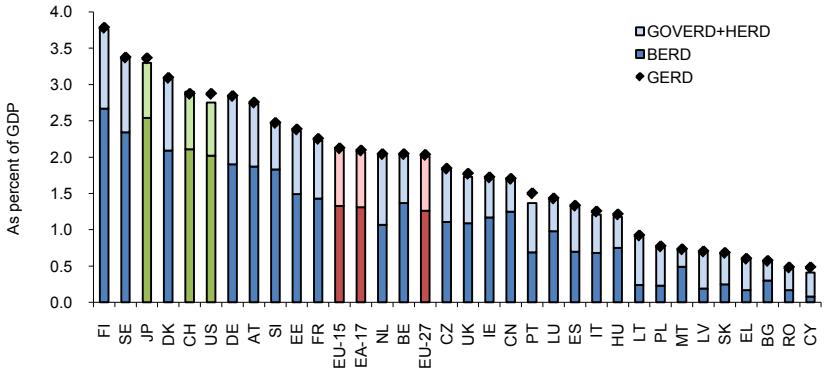
5.6 Summary

Summarising all five capability indicators results in a lead for the three Scandinavian countries (Denmark, Sweden, Finland), closely followed by Austria and the Netherlands. Germany and France take a top 5 position in innovation and social abilities, but a less favourable one for education, ecological abilities and institutions. The positions of Greece, Italy, Romania and Bulgaria suggest that competitiveness could be improved specifically if the trust in the government and governance were higher.

[26] See *Kaufmann et al.* (2010).

Figure 5 **Innovation indicators**

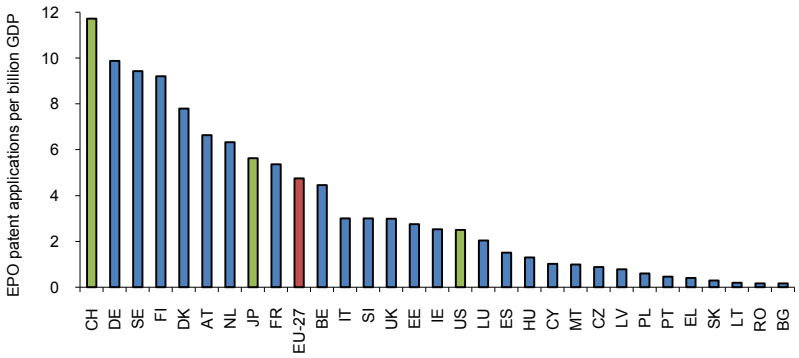
R&D expenditure: total vs. private and public sectors, 2011



Notes: Countries ranked by values for GERD in percent of GDP. Data for Greece cover 2007; data for Japan, the US and China cover 2009; for Switzerland, GERD and BERD data refer to 2008, GOVERD+HERD to 2010.

Source: Eurostat and European Commission (2013), Innovation Union Scoreboard Database, WIFO calculations.

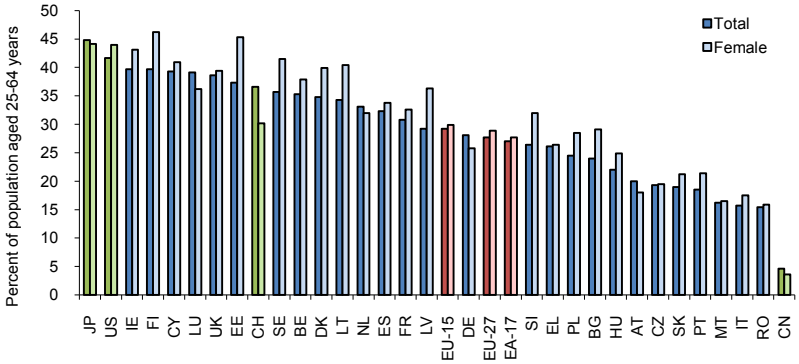
EPO patent applications per billion GDP (PPS), 2010



Notes: EPO denotes the European Patent Office; data for Malta and Latvia cover 2009. Data for the US and Japan should be interpreted with caution.

Source: Eurostat, WIFO calculations.

Tertiary educational attainment, 2012

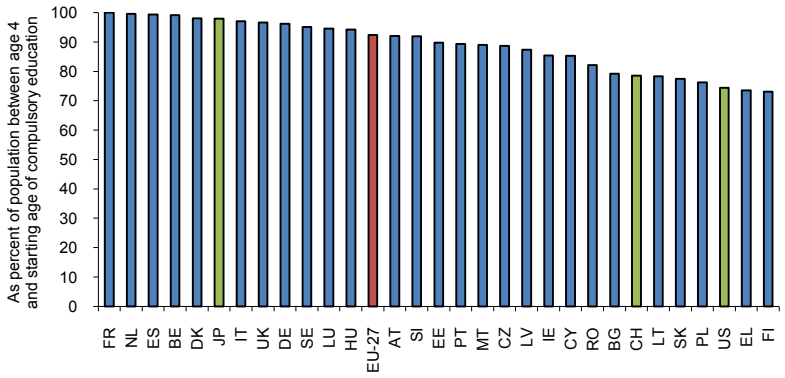


Notes: Data refer to the percentage of the (total or female) population aged 25-64 years that has completed tertiary education (ISCED 5-6). Countries ranked by tertiary educational attainment in the total population aged 25-64 years. Data for the US, Japan and China cover 2010.

Source: Eurostat, OECD, WIFO calculations.

Figure 6 **Education indicators**

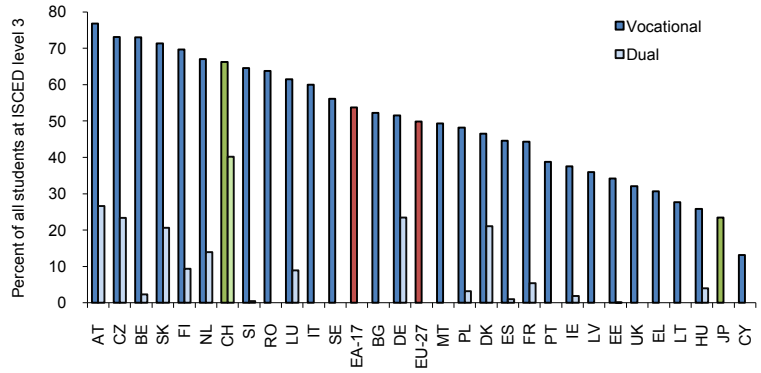
Participants in early education, 2010



Notes: Countries ranked b y the percentage of early education participants between the age of 4 and the starting age of compulsory education in the total population of the corresponding age group.

Source: Eurostat.

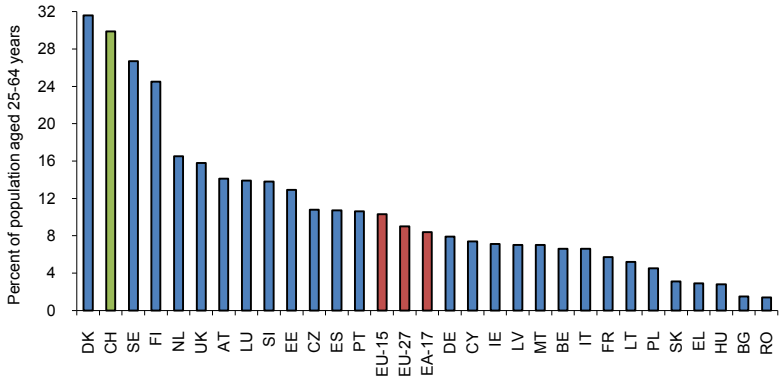
Upper secondary education pupils in vocational and dual programmes, 2010



Notes: "Dual" refers to combined school- and work-based education programmes. Countries ranked by the percentage of students in upper secondary education (ISCED level 3) attending programmes with vocational orientation. Data for Slovenia cover 2009.

Source: Eurostat, OECD, WIFO calculations.

Adults participating in education and training, 2012



Notes: The adult population covers the age group between 25 and 64 years.

Source: Eurostat.

6. Outcome competitiveness under new perspectives

Traditionally, assessments of outcome competitiveness examine GDP per capita as well as employment and unemployment rates (see *Aiginger,* 2006). Broader investigations also include the budget deficit, public debt and current-account deficits. However, improving fiscal or external balances is not an aim in itself; rather it is a constraint that becomes binding if deficits exist. A set of indicators on the traditional approach is provided in section 6.1.

Defining competitiveness as the "ability of a country, region or location to deliver the beyond-GDP goals" requires indicators on the beyond-GDP goals, and – considering the aims of the WWWforEurope project – especially indicators that are useful for evaluating progress on socio-ecological transformation (section 6.2). We aggregate the indicators into three pillars of "competitiveness under new perspectives": an income pillar, a social pillar and an environmental pillar. Finally we report comprehensive indicators which summarise different aspects of socioeconomic performance using a single indicator (either from surveys or from statistics; section 6.3).

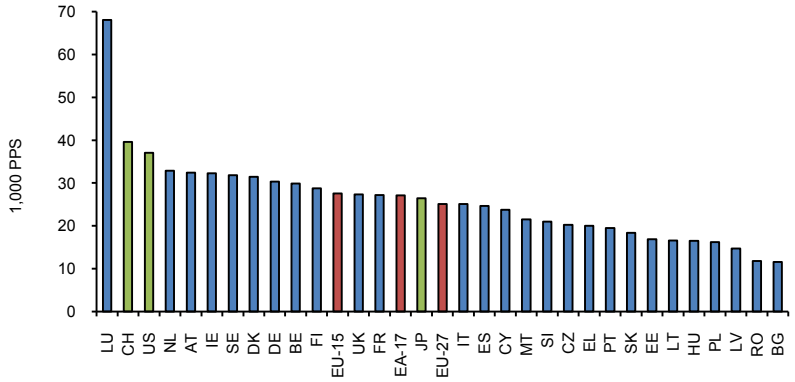
6.1 Outcome competitiveness: Traditional indicators

As indicators for the traditional approach we take GDP per capita, employment and unemployment rates (which represent goals of the welfare function) as well as public deficits, debt and current account position (which are not goals but become important policy issues and threaten welfare if not balanced in the long run).

According to this set Luxembourg, Sweden, the Netherlands, Denmark and Austria lead in outcome competitiveness. The Netherlands leads in employment and is second in GDP and unemployment. It is in a median position for budget deficit and debt; its current account is in surplus. At the low end Hungary has a low employment rate and GDP; then follows Italy also with low employment rate accompanied by huge public debt and a large current account deficit . Interestingly the Southern European countries (Greece, Spain, Malta, and Portugal) fare much worse than the new member countries from Central and Eastern Europe. Germany and Finland are close to the top group, while France takes a middle position for most indicators and an even less favourable one for its high public debt and negative current account.

Figure 7 **Traditional outcome indicators**

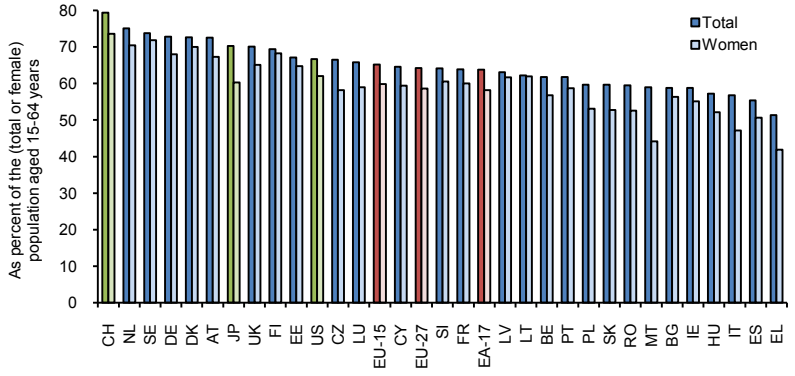
GDP per capita, 2011



Notes: Data for Luxembourg and Ireland should be interpreted with caution.

Source: Eurostat.

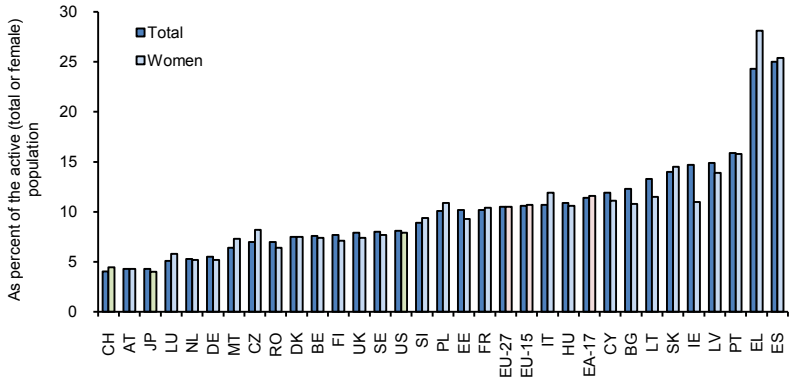
Employment rate, 2012



Notes: Countries ranked by the percentage of employed persons in the total population aged 15-64 years. Data for the US and Japan refer to 2011.

Source: Eurostat, OECD.

Unemployment rate, 2012



Notes: Countries ranked by the percentage of unemployed persons in the total active population. Data ranked by total unemployment rate; data for Switzerland refer to 2011.

Source: Eurostat, OECD.

6.2 Outcome competitiveness under new perspectives

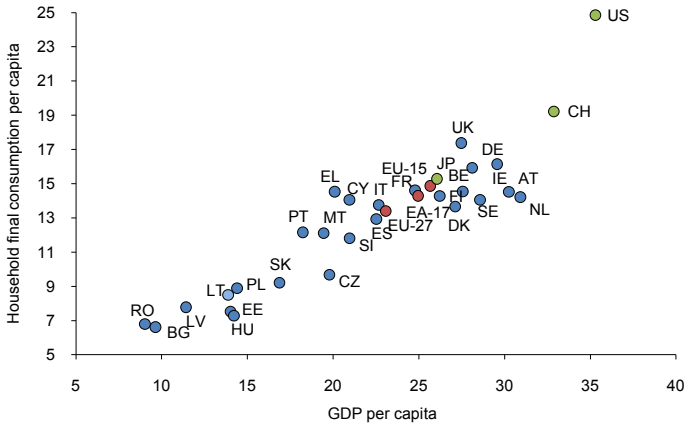
While the beyond-GDP goals are numerous, we focus on three pillars. The income pillar subtracts or adds some expenditure from or to GDP. The social pillar summarises several social indicators that we consider outcomes of the social welfare system rather than enablers. The ecological pillar reports resource productivity, emissions, energy intensity and the share of renewable energy.

6.2.1 Income pillar

For the income pillar we start with GDP per head. First, we deduct depreciation (which does not contribute to welfare but is a cost). The United Kingdom climbs some ranks for net national income as depreciation is lower in its large services sector. Ireland loses ranks due to its large manufacturing and construction sectors. Second, we correct for transfers from and to other countries which results in "Net Disposable Domestic Income": For NDDI the Netherlands loses its excellent position, while France makes some positional gains.

The final indicator often assessed as the most relevant for welfare evaluation is household final consumption. Luxembourg is still on top in this regard, followed by Germany, Austria and France. The Netherlands which has had an excellent position in GDP per capita drops to rank 10. The Scandinavian countries Denmark, Finland, and Sweden are ranked only between 9 and 14. Greece takes rank 7. Some doubt arises as to whether the consumption indicator is really closer to welfare (as stated in parts of the Beyond GDP literature) than GDP since household consumption is high if it is debt financed or if government do not balance their budgets. In general, indictors in this group are highly correlated.

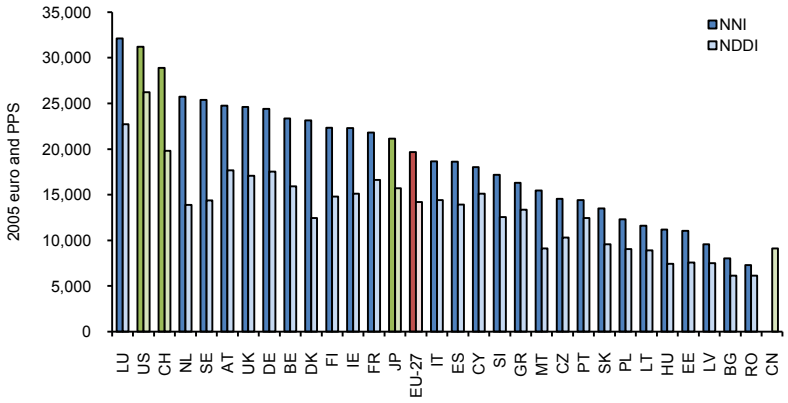
Figure 8 **Household consumption expenditure vs. GDP, 2010**



Notes: GDP per capita and household final consumption in 1,000 € (2005 euro and PPS). Excluding Luxembourg.

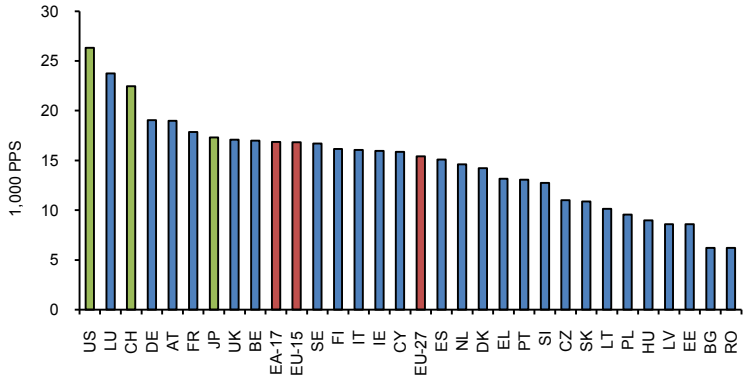
Figure 9 **Income pillar indicators**

Net national income and net disposable domestic income per capita, 2011



Notes: Data in thousands of 2005 euros, adjusted for differences in purchasing power using the PPS exchange rate for 2005. Both series measured per head of population. Countries ranked by net national income (NNI) per capita. NDDI is net domestic disposable income.

Net disposable household income per capita, 2011



Notes: Data refer to net disposable income of households and non-profit institutions serving households (NPISH) per head of population. Data in thousands of 2005 euros, adjusted for differences in purchasing power using the PPS exchange rate for 2005. Data for Switzerland and Bulgaria cover 2010; Romania data cover 2009.

Source: Eurostat (AMECO), WIFO calculations.

6.2.2 Social pillar

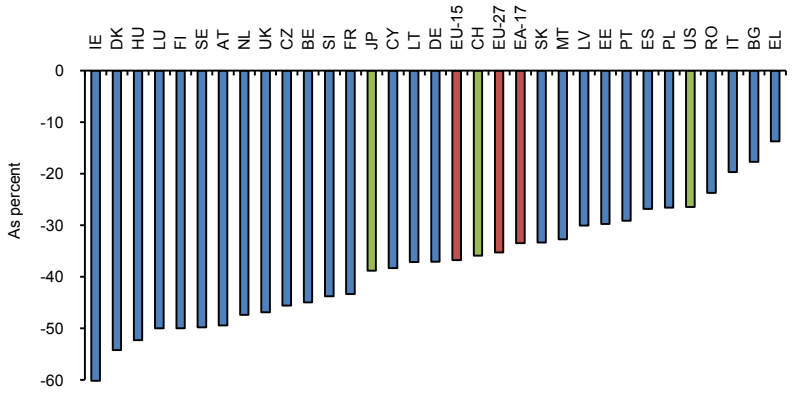
The social pillar summarises that part of social indicators, which characterise outcomes of the socioeconomic systems. Unemployment is the result of micro economic behaviour and macroeconomic performance. Poverty reduction and limiting income differences are important indicators of social inclusion, and depend on macroeconomic dynamics, labour market policy and the tax systems. As indicators we chose unemployment rates (specifically long-term unemployment and the unemployment of young people), as indicators on distribution we take poverty rates, the impact of transfers to reduce poverty, the Gini coefficient and the relationship between high and low incomes. We add the employment gap between genders, life expectancy and health insurance as additional outcome indicators.

Scandinavian countries including the Netherlands take the first four positions, closely followed by Austria. Some new member countries have a rather good position e.g. the Czech Republic which lead in the three poverty indicators (poverty risk, poverty of the elderly, and poverty

reduction by transfers). Slovenia and Hungary are among the top 10, scoring with the poverty indicators and distributional indicators. Germany and France have middle positions. At the lower end there are the two Eastern European countries Bulgaria and Romania, closely followed by Spain, Greece and Portugal. Italy's position is somewhat better due to a high life expectancy and comprehensive health insurance. Youth unemployment as well as long-term unemployment are high in the Baltic countries, insurance coverage is low. On the positive side the gender employment gap is very small here too. This group of indicators is less correlated than the income group since in poverty, inequality, unemployment, the gender gap in employment and health insurance different issues are necessarily also included.

Figure 10 **Indicators on income distribution and poverty**

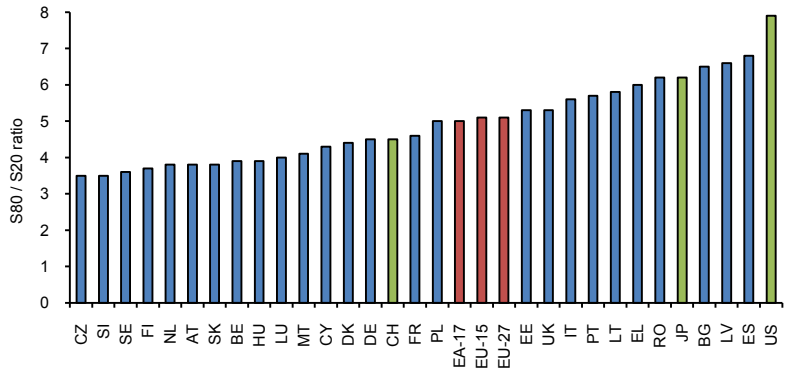
Poverty reduction by social transfers, 2011



Notes: Comparison between at-risk-of-poverty rates before and after social transfers; data for Japan 2009, for the US 2010.

Source: Eurostat, OECD.

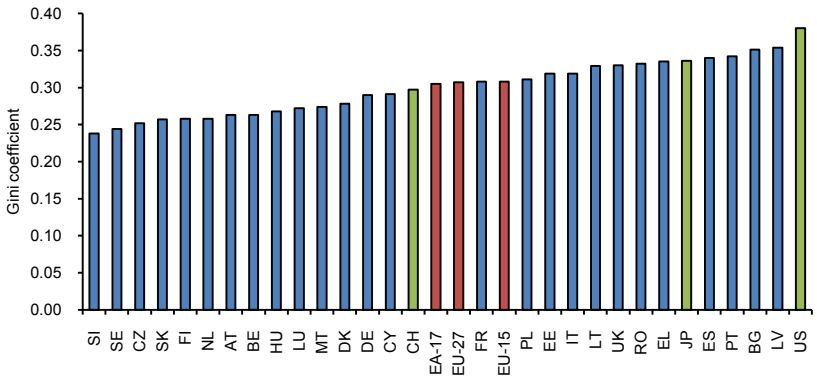
Ratio of top vs. bottom income quintiles (S80/S20), 2011



Notes: The S80/S20 income quintile share ratio is the share of all income received by the top quintile divided by the share of the first quintile; data for Japan 2009, for the US 2010.

Source: Eurostat, OECD.

Gini coefficient of disposable income, 2011



Notes: The Gini coefficient relates cumulative proportions against the cumulative proportions of income. It ranges between 0 in the case of perfect equality and 1 in the case of perfect inequality; data for Japan 2009, for the US 2010.

Source: Eurostat, OECD.

6.2.3 Ecological pillar

Resource productivity[27] is high in very small countries (Luxemburg and Malta) but also in large countries with a small manufacturing base (United Kingdom, France, and Italy). It is lowest in new member counties (Bulgaria, Romania, Baltic States, Poland and Slovakia). CO2 emissions are low additionally if the countries use nuclear energy (France, Sweden) or hydropower (Austria), as well as in Spain and Portugal due to its climate and advances in solar energy. The share of renewable energy is highest in Austria, Sweden, and Portugal in the former driven by a high share of hydropower, and in Portugal by attempts to foster alternative energies (wind, solar). It is low in new member countries (the Czech Republic, Hungary and Poland) but also in the United Kingdom and Belgium and it only has a middle position in Germany, France, Greece and the Netherlands.

We had to choose among a large variance of indictors each grasping some aspects of the ecological system, no standards are available for choices up to now. Italy, Portugal, Spain and France achieve good overall positions, for very diverse reasons (from climate, the use of nuclear energy, low industrial sector). Sweden is among the top countries because of an ambitious policy (since its climate engenders energy use and the manufacturing sector is large). Summarising, the indicators in this pillar are not highly correlated (and the results are also not correlated to those in the other pillars).

6.2.4 New perspectives: Conclusions

Ecological outcome is measured in indicators on resource and energy efficiency, relative NOx emissions and share of electricity from renewable energy.

Ranking countries according to competitiveness under new perspectives underlines the lead of small countries in GDP, after the corrections are done. The per capita incomes of Scandinavian countries and big countries are rather similar. The southern countries still have a significant and even larger lead over new member countries in the revised indictors on income and consumption as compared to GDP per head. The social indicators give a tremendous lead to the Scandinavian countries (Sweden, Finland, Denmark) with the Netherlands and Austria also among the top five. New member countries outperform southern European countries due to less poverty, a more equal income distribution, lower gender gaps and higher life expectancy. As far as ecological indicators are concerned, southern countries perform rather favourably, due to a high life expectancy, a low industrial sector share and low energy intensity (high oil imports and a low share of renewable energy which were reported by the capability indicators show that a more ambitious policy would deliver a better performance). Sweden and Austria are countries in which policy efforts support ecological performance. All in all the evaluation shows that it is worth broadening the outcome evaluation from the dominant perspective of GDP per head, first by correcting GDP for elements not connected with welfare, and then by including the social and ecological perspective.

[27] GDP per kg of resources used.

6.3 Comprehensive indicators

As an alternative to the three pillars we present five indicators which give comprehensive subjective or objective assessments of the performance of a socioeconomic system: life expectancy is a rather objective indicator, life satisfaction, happiness, expected healthy years and work-life balance are subjective indicators.

The leading countries according *life expectancy* (at birth) are all from southern Europe: Spain, Italy and Cyprus. Next come Sweden, then Malta and France as well as Ireland, the Netherlands and Austria. The countries with the lowest life expectancy are the Baltic countries, Bulgaria, Romania and Hungary, all new member states with formerly socialist systems. Denmark, Finland and Germany are in the lower middle group. Switching to *healthy years* expected at birth**,** Sweden takes first place; Denmark improves 4 ranks, and Greece jumps from eleventh to fourth place. Spain, France and Germany lose, as do Austria, the Netherlands and Portugal indicating weakness in the preventative aim of a health system.

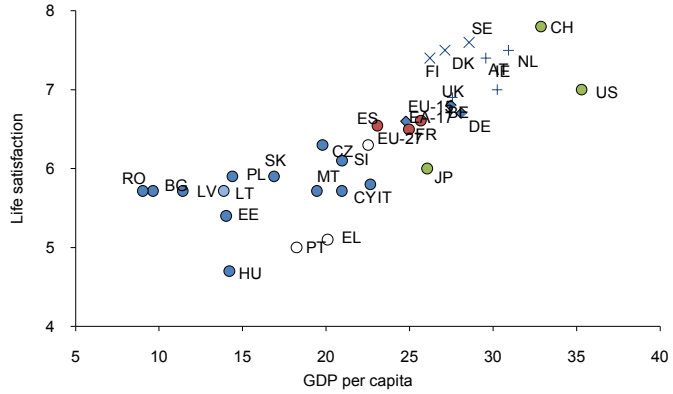
Asking respondents for *life satisfaction* in a survey yields the best results in Sweden, Denmark and Finland, the three countries with welfare states of the – successful – Scandinavian type. The Netherlands and Austria are also among the top 5. The large countries Germany and France come in tenth and eleventh place. Greece and Portugal are at the bottom of the table, with the new member states from Central and Eastern Europe.

Work-life balance is considered best by respondents in the Netherlands, Sweden and Denmark, with Luxembourg, Hungary and Italy also among the best-rated countries. Work-life balance is considered to be low in Portugal, Austria, France and the United Kingdom. In the latter country, the score is worse than in the US, but still better than in Japan, where the long-hours culture in particular drives the result.

The comprehensive indicators are not closely related; especially work life balance and healthy expected lifetime indicate different ranks than overall life time and satisfaction. Happiness is not correlated with any of the other four. This shows that the use of comprehensive indicators is limited for analyses and thus probably even more so as regards policy making. Sweden, the Netherlands and Denmark are among the top countries most often followed by Ireland and Luxemburg, Germany, France, and the United Kingdom sit at the middle ranks.

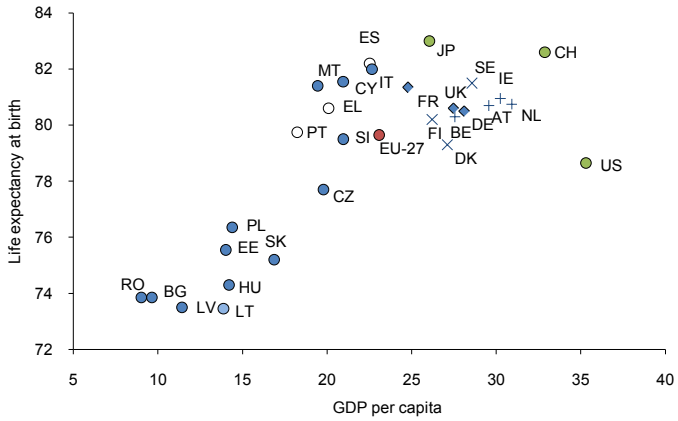
Figure 11 **Comprehensive indicators**

Life satisfaction vs. GDP per capita



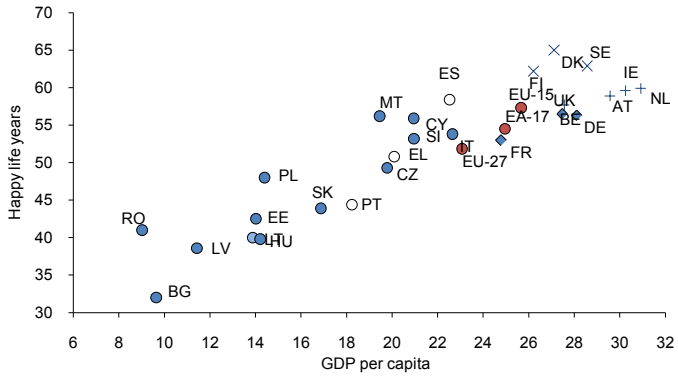
Notes: People are asked to rate their general satisfaction with life on a scale from 0 to 10.
Source: OECD Better Life Index, 2013 Edition.

Life expectancy at birth vs. GDP per capita



Notes: Excluding Luxembourg. GDP in 1,000 € (2005 euro and PPS).
Source: Eurostat, OECD, WIFO calculations.

Happy life years vs. GDP per capita



Notes: Excluding Luxembourg. GDP in 1,000 € (2005 euro and PPS).
Source: Eurostat, OECD, World Happiness database (http://worlddatabaseofhappiness.eur.nl), WIFO calculations.

7. Competitiveness of the EU relative to the US

We now use the framework to compare the competitiveness of the European Union with that of the US, and add information on Japan and Switzerland.

7.1 Price competitiveness

Wages and per capita productivity are about one third lower in the EU than in the US, and even more in comparison to Switzerland. The comparison between the EU-27 and Japan also reveals a gap, but compensation per capita is about equal in Japan and the euro area. The wage spread is however large within the European Union. Wages are higher in four small countries (Luxemburg, Denmark, Belgium and Netherlands) than in the US. In new member countries they are less than 30 percent of the US level. The wage gap Europe's vs. the US is even larger for manufacturing, since compensation in manufacturing in the US is about 20 percent higher and in Europe it is only 4% higher than in the total economy.[28]

Since the productivity gap is of the same magnitude, the unit labour cost (level) is about equal. The productivity gap is somewhat smaller for Europe than the wage gap for the total economy and larger for manufacturing. Indicating, a potential for Europe to increase productivity specifically in manufacturing. Looking at the dynamics between 2000 and 2011, wages as well as productivity increased faster in the US for the total economy but marginally faster in Europe for manufacturing.

7.2 Export structure

Europe had trailed the US in the sophistication of its export structure for a long time, but by2011 it had caught up or even taken the lead.

The share of technology-driven industries and that of skill-intensive industries is now about equal; Switzerland has in both respects much higher shares in exports and Japan is near the European figures. As far as industries with knowledge-based service input are concerned, the US and Japan have slightly higher export shares than Europe. Europe and the US have equal shares of quality dominated industries. Switzerland excels in quality dominated industries as well as in skill-intensive industries.

As far as eco industries and renewables are concerned Europe has a higher share than the US, Switzerland has lower shares, and China and Japan are definitely one step ahead in both types of industries. In Europe only Denmark and Cyprus have higher shares (and Hungary and Germany are close to these leaders).

The relative position of the US in structure is even more negative if trade instead of exports is analysed. Since the US imports are rather sophisticated too, the US has a trade deficit in all four sophisticated sectors. The US deficit in technology-driven industries amounts to 178m euro,

[28] The wage premium in the US vs. EU-27 increases for manufacturing therefore to 65 percent (34 percent for euro area), in manufacturing only Belgium has wages rather similar to the US.

while Europe in this sector enjoys a trade surplus of 101 m euro. The same results – deficits for the US and surpluses for Europe – holds for skill-intensive industries, knowledge-based industries and quality-dominated industries.

Summing up Europe is concentrating on sophisticated industries; Switzerland is the champion in this regard and has improved its structure, while the EU and the US have now lower shares in sophisticated industries than in 2000. This in part reflects the inroads of China which increased its share in sophisticated industries. The US lost export shares to an extent that trade balances became negative.[29]

7.3 Capabilities

However, Europe is still trailing the US, Japan and Switzerland in *innovation and education.* Expenditure for R&D as well as attainment in tertiary education is much lower. In R&D it is firms' expenditure which are much lower in Europe; government spending is about equal. For total R&D only Sweden and Finland are ahead of Japan and the US. Denmark, Germany and Austria are near to the US. The share of graduates in mathematics, science and technology is large in Europe.

Education expenditure is about the same in relation to GDP, but somewhat less in Japan. Preschool education gets more money and more children are involved in Europe than in the US. The share of women in higher education is somewhat larger in the US (above 50 percent as in EU), slightly less in Switzerland and Japan. Enrolment in vocational and dual programs is about 50 percent in Europe, very low in Japan and rather unknown in the US. Country differences are very large in the EU ranging from 75 percent in vocational programs in Austria to less than 30 percent in new member countries.

For productivity enhancing elements of the *social system* – like active labour market policy[30] and social expenditures on children (and family and disability) – Europe spends more. Social benefits on sickness and health care are about the same in Europe and the US; they are lower in Japan and much lower in Switzerland. Disability benefits are much higher as are social benefits for children and family, so that total social expenditure is higher in Europe. Benefits on sickness and health care vary between less than 5 percent in many new member countries and more than 10 percent in Ireland and the Netherlands. The EU is not able to exploit the potential of its well educated female workforce; the female employment rate is 64 percent, still four percentage points lower than in the US and 12 percent lower than in Switzerland. Sweden and Denmark have female employments rates higher than 75 percent, it is about 50 percent only in Italy and Greece.

Europe leads in most indicators on *environmental ambition*. Tax revenues from environmental taxes are three times higher in EU-27 than in the US and one third higher than in Japan. The

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[29] China has the highest share in eco industries and in renewable exports, with Europe second and Switzerland and the US behind. Only Denmark has consistently higher export shares than China in "green" industries.

[30] For active labour market policy double the money is spent relative to Japan and four times relative to the US, it varies more than 10 to 1 between Denmark and UK (as well as new member countries).

share of organic farming is 5 percent in the EU; it is near zero in the US and Japan[31] The share of eco patents is highest in Japan (7 percent), followed by Europe (5 percent) and about 4 percent in Switzerland, the US and China. Recycling rates are 63 percent in the EU-27, about 34 percent in Switzerland, 26 percent in the US and 19 percent in Japan. Municipal waste generation is about equal in all regions reported. The share of oil and gas imports in GDP is lowest in Switzerland, and somewhat higher in EU than in the US. It does not reflect attempts to supply renewable but also or even more domestic resources

As far as *institutions* are concerned, the EU has stronger regulated labour markets with a large margin behind the US, Japan, and Switzerland and stricter business regulation (with a smaller margin). As far as labour market regulation is concerned even the most liberal countries in the EU-27 (UK, Ireland and some new member) have stricter regulation than in the US. In some European countries (Scandinavian, Anglo-Saxons, the Netherlands and Austria) business is less regulated than in the US, China and Japan (which are very close), Switzerland's business is least regulated. Governance indicators show better "voice and accountability" and better corruption control for EU-27, but lower regulatory quality and less rule of law. In all indicators Switzerland excels, Japan is behind Europe and the US with the exception of corruption control.

7.4 Traditional outcome indicators

The traditional output indicators report a lead by the US: GDP per capita (less in GDP per hour)[32] and employment rates are higher[33], unemployment[34] is lower. Limits to Europe's lead in the set of traditional indicators exist, since public deficits and debt is higher and the current account is negative in the US[35]. The better performance of Japan is shown by traditional indicators with the exception that public debt is extremely high; Switzerland leads in all five indicators.

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[31] Shares are very different across countries in Europe ranging between 0.5 percent in Bulgaria and 18 percent in Austria.

[32] GDP per capita at PPS is 50 percent higher in the US than in EU-27 (40 percent vs. euro area), EU-27 is also trailing Japan (10 percent) and Switzerland (42 percent). GDP per capita at PPS in China is one fourth of Europe. The countries with highest GDP in Europe (Switzerland outside EU-27 and Netherlands and Austria inside) have about 15 percent lower per capita income than the US.

[33] Employment rate is highest in Switzerland and Japan, Europe trails the US by two percentage points (with Scandinavian countries, Germany, the Netherlands and Austria above the US rate).

[34] The unemployment rate is in the long-run about the same in the EU and the US. Who was “leading” changed several times during the financial recession. It increased more strongly and became higher in the US, in the most recent data it is considerably higher in EU-27. Unemployment is definitely lower in Switzerland as well as in Japan in the short and long run, best performers in EU-27 (Austria, the Netherlands) can cope with the low rates of Japan, despite an increasing population and much less prohibition of dismissals.

[35] Budget deficits and debt are much higher in the US and in Japan as compared to EU-27; Switzerland has the least deficit but cannot reach the very low rates of several new member countries or the balanced budget of Sweden or China. The current account is deeply in the red in the US, all other regions have surpluses, the largest relative to GDP in Switzerland, followed by Japan; EU-27 current account is balanced, with deficits in the south and large surpluses in Sweden, the Netherlands, Germany and Denmark.

Table 1 **Labour costs and productivity relative to the US, 2011**

	Compensation per employee Current prices		Output per person employed Current prices		Unit labour costs	
	Total economy	Manufacturing	Total economy	Manufacturing	Total economy	Manufacturing
	US = 100				Levels (wage share)	
EU-15	80.8	77.1	85.8	73.0	0.582	0.696
EA-17	79.2	74.7	84.6	69.8	0.573	0.667
EU-27	70.0	60.8	74.7	59.9	0.584	0.680
Switzerland	138.8	.	133.3	131.8	0.672	.
Japan	82.0	74.7	85.7	86.8	0.619	0.553
United States	100.0	100.0	100.0	100.0	0.593	0.544
	EU-27 = 100					
EU-15	115.4	126.9	114.8	122.0		
EA-17	113.2	122.9	113.2	116.7		
EU-27	100.0	100.0	100.0	100.0		
Switzerland	198.1	.	178.5	220.2		
Japan	117.1	122.8	114.8	145.0		
United States	142.8	164.5	133.9	167.1		

Source: Eurostat (AMECO), WIFO calculations.

Table 2 **Export structure and trade balance, 2011**

	Exports				Trade balance				
	Technology-driven industries	High-skill industries	Knowlegde-based services	High RQE	Technology-driven industries	High-skill industries	Knowlegde-based services	High RQE	Manu-facturing
	Percentage shares				mn euro				
EU-15	33.2	27.9	18.8	51.4	93,427	181,308	23,486	298,116	252,637
EA-17	33.0	26.3	17.8	50.9	108,276	169,473	22,296	304,991	323,804
EU-27	34.2	28.5	19.6	52.1	101,173	165,938	12,008	304,250	261,594
Switzerland	41.0	41.1	16.7	69.0	22,037	33,318	5,731	41,882	30,865
Japan	35.4	22.0	22.7	51.4	82,740	52,952	50,437	134,326	167,893
United States	32.0	23.2	22.3	45.0	-177,993	-79,886	-33,874	-192,297	-367,757
China	30.4	19.9	19.9	35.4	128,877	92,350	13,079	158,774	519,460

Source: Eurostat (Comext), UNO (Comtrade), WIFO calculations.

Table 3 **Outcomes under new perspectives: income pillar EU vs. US, 2011**

	GDP at PPS	Net national income NNI	Net disposable domestic income NDDI	Household final consumption expenditure HFC
		Per capita data		
		US = 100		
EU-15	72.7	70.2	58.9	58.6
EA-17	70.7	67.5	58.3	56.4
EU-27	65.5	63.1	53.5	52.9
Switzerland	92.9	88.8	74.9	76.1
Japan	72.2	66.3	59.4	60.3
United States	100.0	100.0	100.0	100.0
		EU-27 = 100		
EU-15	110.9	111.3	110.3	110.7
EA-17	108.0	107.0	109.0	106.6
EU-27	100.0	100.0	100.0	100.0
Switzerland	141.8	140.7	140.0	143.9
Japan	110.2	105.1	111.2	114.0
United States	152.6	158.6	187.0	189.0

Source: Eurostat (AMECO), WIFO calculations.

7.5 Outcome indicators under new perspectives

For Beyond GDP goals the picture is different. The US still leads in the income pillar, trails in equity and poverty prevention, but has lower youth and long-term unemployment giving a mixed result in the social pillar. And the US definitely trails in the ecological pillar.

7.5.1 Income pillar

The indicators on the income pillar are highly correlated; therefore the picture does not change if we use net national income (instead of GDP) to rank the regions. The US's lead is increasing if we use disposable domestic income or consumption data.

7.5.2 Social pillar

Poverty is much higher in the US as compared to Europe, the spread is a little bit less for old age poverty (since the employment rate is higher in this age category). The reduction of poverty through social transfers is one third less in the US. Switzerland has a somewhat lower at risk of poverty rate and a marginally higher redistributive effect of social transfers, but old age poverty is higher than in EU-27. In Japan the overall poverty rate is a little bit smaller than in the US due to high redistributive transfers, but old age poverty is high.

Indicators on income distribution show more equality in EU-27 relative to the US, with even more equality in Switzerland and higher inequality in China. Differences in Europe exist, but no single member country has a gap between the top 20 percent and the lowest 20 percent income bracket or a Gini coefficient as high as in the US. Inequality of incomes in Japan is in between Europe and the US.

The long-term unemployment rate, the youth unemployment rate as well as the gender gap are definitely larger in the EU-27 than in the US. Within the important unemployment figures Europe is trailing recently by a far margin and is behind all regions (Europe has the highest youth unemployment). This is a severe sign that labour markets do not work perfectly in Europe despite high expenditure on active labour market measures. In nine EU countries however youth unemployment is as low as in the US, in six countries the long-term unemployment rate is lower. The employment gender gap is about one third larger in Europe (EU-27 as well as Switzerland) than in the US, in Japan it is even higher than in Europe.

Life expectancy is higher in Europe than in the US. It is even higher in Switzerland and Japan. Health coverage is near 100 percent in Europe, China, Japan, and Switzerland, and 84 percent in the US.

7.5.3 Ecological pillar

Emissions of carbon dioxide as well as energy intensity (both relative to GDP) are about 50 percent higher in the US as compared to Europe, Japan is near to Europe; and Switzerland has lower rates for each of these indicators. For both indicators the new member countries have about the same high rates as the US.[36]

7.6 Comprehensive indicators

Life expectancy at birth is higher in Europe than in the US, and even higher in Switzerland and Japan. Survey respondents in the US report life satisfaction as well as a good work-life balance more frequently. As far as happiness is concerned Europe reports the lowest happy life years (51.8), Japan reports 53.5 years and the US 57.9. Switzerland registers much higher happy life years (65.2), China 45.8 years only.

7.7 Conclusions on outcomes under new perspectives

Summing up, for traditional indicators on macro performance, Europe trails the US in GDP, and to some degree in employment/unemployment figures. But fiscal sustainability as well as the ability to cover imports by exports yields better results for Europe.

Adding the indicators on social inclusion and on ecological performance indicate that Europe is achieving a better position in evaluation of the Beyond GDP Goals than if we only use the traditional indicators. As far as comprehensive indicators are concerned Europe leads in life expectancy, but trails in subjective indicators.

[36] Taking the Yale evaluation on ecological performance (as an alternative evaluation including many more indicators) shows the US on rank 49, the average rank for EU-27 is rank 28, with top 5 ranks within Europe of Latvia, Luxembourg, France and Austria (Yale University, Environmental Performance Index).

8. Econometric analysis: Relating outcome competitiveness to its determinants

To investigate the relationship between "outcome" and "input" competitiveness econometrically, we build on the database of 68 indicators compiled for the descriptive analysis in sections 3 to 6 (see Table II in the annex for a complete list). Since the indicators contained in each of these groups are potentially highly correlated with each other, we first carry out a factor analysis based on principal components (PCA). This allows us to investigate the correlation structure within each indicator group, to identify variables that do not fit well into the groups we assigned them to, and to reduce the dimensionality of the data by extracting fewer (transformed) dimensions that explain a large proportion of the overall variance.[37]

Factor analysis based on PCA yields so-called factor loadings for each indicator which measure the correlation between indicator and factor. We use these to construct weights for combining the individual indicators in each group into a composite indicator. To do this, we follow the guidelines in *OECD* (2008) and *Annoni – Kozovska* (2010), as well as *Delgado et al.* (2012). We then use the composite indicators as dependent and independent variables in the econometric analysis.

To estimate the relationship between our measures of input and outcome competitiveness based on our dataset of 27 EU countries observed from 2000 to 2010, we use the following panel data model for country *i* and year *t*:

$$NPO_{it} = \beta_1 Price_{i,t-1} + \beta_2 Structure_{i,t-1} + \beta_3 Capabilities_{i,t-1} + \eta_t + u_{it},$$

where NPO stands for new perspectives outcomes, $Price$ for price competitiveness, $Structure$ for economic structure and $Capabilities$ refers to the indicators discussed in section 5. The error term u_{it} is assumed to have a mean of zero. η_t represents a period-specific fixed effect, such as macroeconomic shocks affecting all countries, and is accounted for by year dummies. For estimation, we use OLS and within-groups (WG) methods. In the latter case, the error term takes the form $u_{it} = \mu_i + v_{it}$, where v_{it} is a mean-zero error term and μ_i is a region-specific fixed effect that may be correlated with the other explanatory variables included in the model.

We lag the explanatory variables by one year to reduce concerns of endogeneity, that is, of correlation between the regressors and the error term. For this strategy to be valid, the error term needs to be serially uncorrelated. Therefore, we use standard errors that are robust to serial correlation in addition to heteroskedasticity. Since our variables are essentially generated

[37] Principal components analysis (PCA) decomposes each group of indicators into fewer, so-called "principal", components based on the eigensystem of their covariance matrix. The principal components are linear combinations of the indicators, which are orthogonal – that is, uncorrelated with each other – and account for most of the variance within the group. Factor analysis, in turn, assumes that each indicator can be explained by a linear combination of uncorrelated factors that are common to all indicators in the group (as well as some factors that are unique to each indicator). One approach, which we follow here, is to use PCA to extract the first principal components and to treat them as common factors (*OECD*, 2008).

regressors, which may result in biased and inconsistent estimates of the standard errors, we alternatively bootstrap the standard errors.

For comparison, we also estimate the equation using as the dependent variable a composite indicator based on the group of traditional outcome indicators discussed in section 6.1. We call this "traditional outcomes", or TO_{it}.

8.1 Data

First, missing values were interpolated for some series to obtain a complete dataset covering the period from 2000 to 2010. For this purpose, we mostly used linear interpolation.

Second, to prepare the data for factor analysis and composite indicator construction, we examined the distribution of each indicator by means of descriptive statistics and histograms – both in the overall cross-section and in each year – for skewness and outliers, which could distort the results. Skewness (in absolute values) is equal to or greater than 1 for several indicators, so we applied scale transformations to address it. The choice of scale transformation was based on inspection of histograms and skewness tests for the indicators transformed according to *Tukey*'s (1977) ladder of powers. For details of individual scale transformations, see Table III in the annex.

Third, all indicators were normalised by subtracting the mean and dividing by the standard deviation across countries, where both statistics refer to the initial year 2000 to allow for time variation in the indicators. As a result, all indicators have means of zero and standard deviations equal to 1 (z-scores), making them directly comparable in terms of units of measurement (the standard deviation).[38]

Finally, we checked that the orientation of all transformed and normalised indicators is in line with our concept of competitiveness. If necessary, indicators were reversed to ensure that more positive scores signal higher competitiveness. For example, the indicator *impact of social transfers*, originally consisting of negative values (percent reduction of poverty risk), was negated. Other indicators that were negated after normalisation include *compensation per employee*, *unit labour costs*, *energy dependence*, the *unemployment rate*, and *debt as a share of GDP*; furthermore, all indicators belonging to the social pillar of outcomes under new perspectives (*poverty, inequality* and the remaining *unemployment* indicators), as well as *energy intensity* were reversed (see again Table III in the annex).

8.2 Factor analysis and composite indicator construction

For each of the indicator groups listed in Table II, a factor analysis was carried out, using the principal components method to extract the common factors. First, the fit of the variables within each group was evaluated using statistics on communality (squared multiple correlations),

[38] We also investigated the robustness of the factor analysis results to using an alternative normalisation procedure that is commonly used (min-max), where the minimum is subtracted from each indicator value and the result is divided by the difference between maximum and minimum. The results were very similar.

sampling adequacy (Kaiser-Meyer-Olkin measure) and internal consistency (Cronbach's alpha); these allow a judgement on how well the indicators are able to explain each other, whether a lower-dimensional representation of the data is possible, and whether the indicator groups are internally consistent. All these statistics are based on the correlations between the variables in the group and are available with factor analysis in Stata.

As a result of this initial analysis, a few non-fitting indicators were excluded from some groups (shown in italic font in Table II). Those remaining all performed satisfactorily regarding the statistics discussed above. They may therefore be considered mutually consistent measures of the components of competitiveness that we assigned them to. This provides some ex-post, data-driven support for our choice of variables.

Next, factor analysis was applied to each group, where we always retain the first common factor explaining at least 50 percent (and frequently more than 60 percent) of the variance. Table IV in the annex provides an overview of the results. It shows that the ecological component of capabilities does least well, while the income pillar of new perspectives outcomes does best. We also carried out a separate factor analysis on the labour compensation subgroup of the price competitiveness indicators; this is our preferred measure of price competitiveness, given that otherwise both dependent and independent variables comprise measures of labour productivity.

Finally, we use the factor loadings derived from factor analysis to compute weights that we apply to the (scale-transformed and normalised) indicators in each group, resulting in one single remaining – composite – variable per group.[39] Within many groups, the obtained weights are fairly similar across indicators, highlighting that they tend to measure similarly relevant and complementary aspects of the variation among them. For example, in the group "new perspectives outcomes – income pillar", for which the factor analysis is the most successful in terms of the statistics reported in Table IV, the four indicators each receive a weight very close to 0.25. Other groups for which indicators have roughly equal weights are the labour compensation component of price competitiveness (weights of 0.5 on each indicator), the social and ecological subgroups of capabilities, the traditional outcome indicators and the ecological pillar of the new perspectives outcome indicators.[40] Summary statistics and a correlation matrix for the composite indicators thus constructed are provided in Table V in the Appendix.

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[39] To compute the weights, the factor loadings are rotated (using the varimax rotation) to maximise the loadings of the variables on one factor. The rotated loadings are then squared and standardised to sum to 1, in line with OECD (2008).

[40] In the overall price competitiveness group, the factor loadings and computed weights are roughly equal for the labour compensation and productivity indicators, and they are smaller and also approximately equal for the unit labour cost indicators. Among the indicators on economic structure, the value-added shares of skill- and innovation-intensive manufacturing industries and those with a high RQE obtain the smallest weights (between 0.001 and 0.04), while the export shares of technology-driven industries and those using knowledge-based services inputs get the largest weights (about 0.20). In the capabilities group on innovation and education, early education participation, upper secondary students in programmes with a vocational orientation and higher education graduates from maths, science and technology subjects are downweighted considerably (weights around 0.01), while the remainder receive weights of similar size to each other. Among institutions, the business deregulation index receives a lower weight (0.10) than the four indicators on quality of governance (between 0.22 and 0.23). Within the social pillar of

For capabilities, a two-stage factor analysis is implemented. First, we extract the first common factor from each of the subgroups (innovation and education, the social system, institutions and ecological ambition). On these, a further factor analysis is then carried out, so that we have both one overall measure of capabilities as well as its individual subgroups available as regressors. The weights derived from factor analysis that are used to aggregate the four subgroups are 0.29 for innovation and education, 0.29 for the social system, 0.26 for institutions and 0.17 for the ecological component.

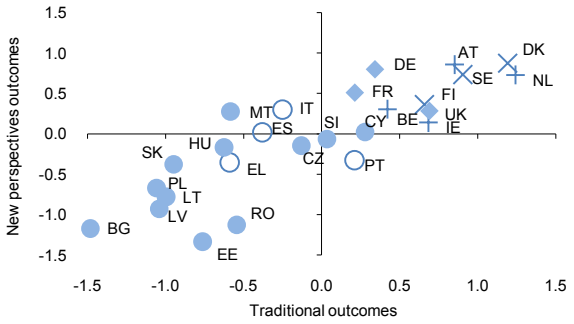
To construct the dependent variable NPO, we extract the first common factor from each of the income, social and ecological pillars of outcomes under new perspectives. Since the results of a second-stage factor analysis (as for capabilities above) indicate that the three pillars do not have enough in common to warrant the use of a factor model, we aggregate the first common factors of the three pillars using equal weights of 0.33 to obtain NPO. Compared to traditional assessments of outcome competitiveness therefore, the status of social and ecological outcomes is enhanced: they receive the same weight as the income pillar. While this is driven by methodological considerations, it is also in line with the aims of the WWWforEurope project with its emphasis on social inclusions and ecological sustainability. An alternative approach that consists of running three separate regressions with the individual pillars as dependent variables is currently the subject of further research.

Graphical inspection of the correlations between the composite indicators for new perspectives outcomes and traditional outcomes (Figure 12, top panel) reveals that the two are fairly highly correlated on average over our sample period. Similarly, as shown by the second panel of the figure, our measure of capabilities is positively associated with NPO. The Scandinavian countries are ahead on both the outcome measures and capabilities, while Bulgaria and other new member states lag behind on both. Economic structure is positively correlated with capabilities as well as new perspectives outcomes (middle panel). The last two panels of the figure suggest that the income and ecological pillars of NPO are positively correlated, while there is little association between income and social pillars. It therefore does not seem to be the case that richer countries, which achieve larger values on the income pillar, are on average characterised by less inequality and poverty risk, i.e. score better along the social pillar.

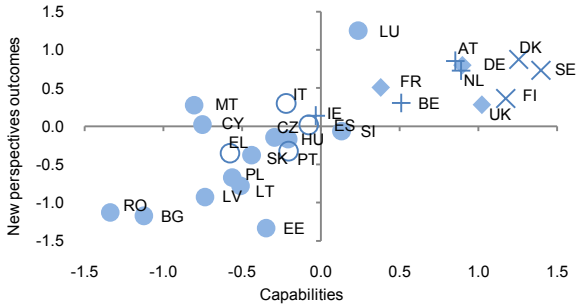
the new perspectives outcome indicators, the youth unemployment rate has a substantially smaller weight (0.02) than the rest.

Figure 12 **Correlation between composite indicators, time averages 2000-2010**

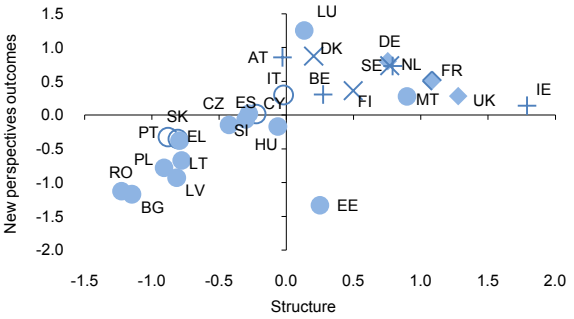
Outcomes under new perspectives vs. traditional outcomes



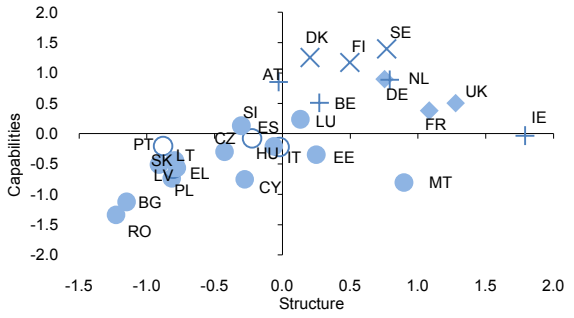
New perspectives outcomes vs. capabilities



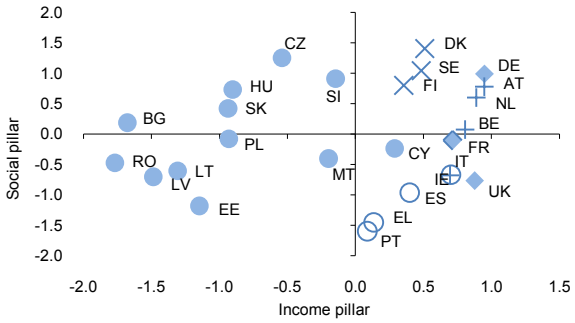
New perspectives outcomes vs. structure



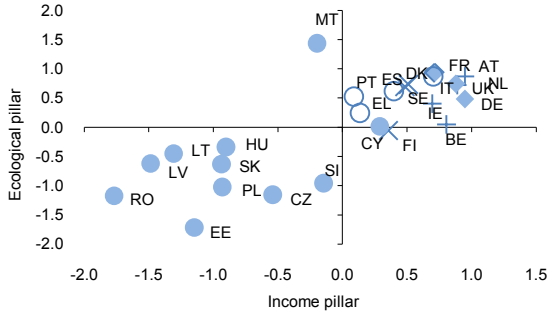
Capabilities vs. structure



Social pillar vs. income pillar



Ecological pillar vs. income pillar



Notes: Excluding Luxembourg. Country groupings: Scandinavian countries: Denmark, Finland, Sweden; large European countries: Germany, France, United Kingdom; new member countries: Bulgaria, Czech Republic, Estonia, Cyprus, Latvia, Lithuania, Hungary, Malta, Poland, Romania, Slovenia, Slovakia; Southern Europe: Spain, Greece, Italy, Portugal.

Source: Eurostat, OECD, IEA, Energy Balances, WIFO calculations.

8.3 Panel data estimates

Table 4 and Table 5 present OLS estimates for our panel of 27 countries and 11 years. The dependent variable in Table 4 is the composite indicator of new perspectives outcomes (*NPO*), and in Table 5, it is the composite indicator of traditional outcomes (*TO*). All regressions account for period-specific fixed effects. The results of within-groups (WG) regressions, which also control for country-specific fixed effects, are shown in Table 6.

Table 4 **OLS regressions: New perspectives outcomes vs. structure and capabilities**

Dependent variable: NPO_{it} (Standard errors)	(i) **OLS** (robust)	(ii) **OLS** (robust)	(iii) **OLS** (bootstrapped)	(iv) **OLS** (robust)	(v) **OLS ex LU** (robust)	(vi) **OLS** (robust)	(vii) **OLS ex LU** (robust)
$Price_{i,t-1}$							
$Wages_{i,t-1}$				-0.308**	-0.235*	-0.248**	-0.216*
				(0.133)	(0.131)	(0.107)	(0.115)
$Structure_{i,t-1}$	0.320***	0.362***	0.362***	0.198	0.222*	0.255**	0.272***
	(0.093)	(0.110)	(0.114)	(0.121)	(0.119)	(0.100)	(0.095)
$Capabilities_{i,t-1}$	0.556***			0.243*	0.305**		
	(0.101)			(0.146)	(0.143)		
$InnoEdu_{i,t-1}$		-0.318	-0.318			-0.293	-0.205
		(0.229)	(0.229)			(0.183)	(0.208)
$Social_{i,t-1}$		0.340	0.340			0.227	0.217
		(0.242)	(0.224)			(0.173)	(0.179)
$Institutions_{i,t-1}$		0.329**	0.329*			0.228	0.176
		(0.153)	(0.172)			(0.146)	(0.145)
$Ecological_{i,t-1}$		0.231***	0.231**			0.163*	0.152*
		(0.073)	(0.092)			(0.089)	(0.089)
R^2	0.748	0.801		0.802	0.805	0.834	0.824
Time dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country dummies	No	No	No	No	No	No	No
Country number	27	27	27	27	26	27	26
Observations	270	270	270	270	260	270	260

Notes: Standard errors in all columns are robust to heteroskedasticity and serial correlation (Huber-White sandwich estimator of variance, with standard errors clustered on countries). In column (iii), standard errors are bootstrapped with 1500 replications, where resampling is based on individual years for each country and the random-number seed is set to 1. ***, ** and * indicate significance at the 1 percent, the 5 percent and the 10 percent levels respectively. Constant terms and time dummies not reported.

Source: WIFO calculations.

Column (i) begins with the first time lags of our composite indicators of economic structure and capabilities as explanatory variables, while in column (ii) we use the individual components of capabilities instead of the aggregate composite. Our preferred measure of price competitiveness, the composite indicator based on labour compensation (*Wages*), is introduced only in columns (iv) to (vii) because of potentially remaining endogeneity concerns. In columns (v) and (vii), Luxembourg is dropped from the sample since it turned out to be an outlier on many of the indicators described in sections 3 to 6.

Column (i) in both Tables 4 and 5 suggests that there is a positive and significant association between (the lags of) economic structure and the aggregate measure of capabilities on the one hand, and new perspectives and traditional outcomes measures on the other, controlling only for period-specific effects. When the individual subgroups of capabilities replace the aggregate measure in column (ii), the coefficient on economic structure remains significant and even increases in size in Table 4 but becomes insignificant in Table 5. At the same time, both the ecological and institutions subgroups of capabilities are significantly and positively associated with new perspectives as well as traditional outcomes. The coefficient on ecological ambition is larger and more significant in Table 4, while this is the case for the coefficient on institutions in Table 5. Using bootstrapped estimates of the standard errors in column (iii) does not lead to any substantive changes in the estimates, and this also holds for all other columns in Tables 4 and 5.[41]

Table 5 **OLS regressions: Traditional outcomes vs. structure and capabilities**

Dependent variable: TO_{it} (Standard errors)	(i) **OLS** (robust)	(ii) **OLS** (robust)	(iii) **OLS** (bootstrapped)	(iv) **OLS** (robust)	(v) **OLS ex LU** (robust)	(vi) **OLS** (robust)	(vii) **OLS ex LU** (robust)
$Price_{i,t-1}$							
$Wages_{i,t-1}$				-0.260*	-0.156	-0.235**	-0.167
				(0.132)	(0.100)	(0.115)	(0.107)
$Structure_{i,t-1}$	0.226***	0.106	0.106	0.124	0.156**	0.005	0.034
	(0.065)	(0.071)	(0.095)	(0.075)	(0.071)	(0.092)	(0.091)
$Capabilities_{i,t-1}$	0.721***			0.457***	0.545***		
	(0.093)			(0.148)	(0.130)		
$InnoEdu_{i,t-1}$		0.005	0.005			0.029	0.226
		(0.238)	(0.260)			(0.191)	(0.162)
$Social_{i,t-1}$		0.041	0.041			-0.065	-0.097
		(0.202)	(0.212)			(0.168)	(0.172)
$Institutions_{i,t-1}$		0.566***	0.566***			0.471***	0.364***
		(0.171)	(0.197)			(0.144)	(0.131)
$Ecological_{i,t-1}$		0.199**	0.199*			0.134	0.110
		(0.091)	(0.102)			(0.099)	(0.097)
R^2	0.748	0.786		0.780	0.800	0.811	0.816
Time dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country dummies	No	No	No	No	No	No	No
Country number	27	27	27	27	26	27	26
Observations	270	270	270	270	260	270	260

Notes: Standard errors in all columns are robust to heteroskedasticity and serial correlation (Huber-White sandwich estimator of variance, with standard errors clustered on countries). In column (iii), standard errors are bootstrapped with 1500 replications, where resampling is based on individual years for each country and the random-number seed is set to 1. ***, ** and * indicate significance at the 1 percent, the 5 percent and the 10 percent levels respectively. Constant terms and time dummies not reported.

Source: WIFO calculations.

There is no evidence across both tables that the composite indicators of innovation and education and of social capabilities are significantly related to either new perspectives or

[41] Results with bootstrapped standard errors for the remaining columns are available upon request.

traditional outcomes indicators, holding constant the other explanatory variables. Some degree of multicollinearity may lead to this outcome, given the high correlation between the innovation/education and social capabilities indicators (0.88, see Table V in the Appendix). When we introduce the individual components of capabilities separately into column (ii) – as in columns (i) to (iv) in Appendix Tables VI and VII – each is highly significant and positive.

It is not surprising that our results are generally similar when using new perspectives and traditional outcome measures as dependent variables, considering that the two are also highly correlated (0.85, see Figure 12 and Table V). The main differences between Tables 4 and 5 are that economic structure tends to be significantly associated with NPO but less so with TO, and that ecological ambition seems to matter more for NPO while the institutions variable is more important for TO.

Column (iv) adds the labour compensation component of price competitiveness, $Wages$, to the specification in column (i). The coefficient estimates in Tables 4 and 5 indicate that higher wages are significantly negatively related to outcome competitiveness, as our conceptual framework would suggest. While this holds generally both for outcomes under new as well as traditional perspectives, size and significance of the estimate are more robust across columns (v) to (vii) in Table 4 than in Table 5.

Our preferred specification in Table 4 is column (v), where Luxembourg is omitted, and all variables have the expected signs and are significant. Compared to column (i), the size of the coefficients on structure and capabilities declines, but not by more than two standard errors. The magnitude of the estimates suggests that a rise in wages by one standard deviation is associated with a 0.249-point decrease in the composite indicator on new perspectives outcomes. On the other hand, an improvement in economic structure or capabilities by one standard deviation is associated with a 0.172-point increase (0.214 points in the case of capabilities) in new perspectives outcomes.[42] These changes are not inconsiderable given that the sample mean of NPO is 0.107.

When introducing the individual subgroups of capabilities in column (vii) of Table 4, the coefficients on wages and structure retain their signs and remain significant, but of the capability components, only ecological ambition appears to matter for outcomes under new perspectives.

Our results are comparable to *Delgado – Ketels – Porter – Stern* (2012) insofar as there is some overlap between the indicators contained in our innovation/education and institutions variables as well as their explanatory variables MICRO and SIPI, for both of which they find significant positive effects. Also, their dependent variable, GDP per working-age population, is closer to our traditional outcomes than to NPO, which includes many more aspects of outcome competitiveness. The significant and sizeable relationship that we find between institutions and TO is therefore a result we share with DKPS.

[42] The standard deviations of wages, economic structure and capabilities are 1.06, 0.775 and 0.701 respectively. See Table V in the Appendix.

In Table 6, we report the results of estimating our main equation with *NPO* as the dependent variable using the within-groups estimator. This controls for omitted country-specific fixed effects that may be correlated with the included explanatory variables and may thus lead to biased OLS estimates. Similar to Table 4, the coefficient estimate on the ecological component of capabilities is significant and positive, while the coefficient on wages is significant and negative. Across all columns of Table 6, neither coefficient differs from its counterparts in Table 4 by more than two standard errors, suggesting that the OLS estimates may not be too unreliable. The coefficients on economic structure and the remaining capability variables are not significantly different from zero. This could be due to the rather low within-country time-series variation present in these indicators over our relatively short time span. Therefore, we draw our main conclusions from the OLS estimates in Tables 4 and 5.

Table 6 **WG regressions: New perspectives outcomes vs. structure and capabilities**

Dependent variable: NPO_{it} (Standard errors)	(i) **WG** (robust)	(ii) **WG** (robust)	(iii) **WG** (bootstrapped)	(iv) **WG** (robust)	(v) **WG ex LU** (robust)	(vi) **WG** (robust)	(vii) **WG ex LU** (robust)
$Price_{i,t-1}$							
$Wages_{i,t-1}$				-0.291***	-0.294***	-0.369***	-0.390***
				(0.091)	(0.102)	(0.108)	(0.138)
$Structure_{i,t-1}$	-0.049	-0.037	-0.037	-0.0001	0.012	0.036	0.048
	(0.058)	(0.058)	(0.076)	(0.057)	(0.066)	(0.058)	(0.082)
$Capabilities_{i,t-1}$	0.202			0.200	0.225		
	(0.174)			(0.135)	(0.136)		
$InnoEdu_{i,t-1}$		0.035	0.035			0.095	0.106
		(0.122)	(0.124)			(0.110)	(0.114)
$Social_{i,t-1}$		-0.009	-0.009			-0.103	-0.096
		(0.126)	(0.133)			(0.084)	(0.099)
$Institutions_{i,t-1}$		0.005	0.005			0.006	0.003
		(0.088)	(0.090)			(0.074)	(0.079)
$Ecological_{i,t-1}$		0.137**	0.137**			0.163***	0.172***
		(0.060)	(0.062)			(0.056)	(0.062)
R^2	0.979	0.980		0.980	0.979	0.982	0.980
Time dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country dummies	Yes	Yes	Yes	Yes	Yes	Yes	No
Country number	27	27	27	27	26	27	26
Observations	270	270	270	270	260	270	260

Notes: Standard errors in all columns are robust to heteroskedasticity and serial correlation (Huber-White sandwich estimator of variance, with standard errors clustered on countries). In column (iii), standard errors are bootstrapped with 1500 replications, where resampling is based on individual years for each country and the random-number seed is set to 1. ***, ** and * indicate significance at the 1 percent, the 5 percent and the 10 percent levels respectively. Constant terms and time dummies not reported.

Source: WIFO calculations.

Overall, we conclude from the OLS results in Tables 4 and 5 that on the “input” side, a narrow focus on the price component of competitiveness neglects important other aspects of the concept. In addition to wages, we also find that economic structure and capabilities on aggregate are significantly related to outcomes under new perspectives as well as to traditional outcomes. For high-income economies like the EU-27, a purely cost-based strategy for improving outcomes is therefore unlikely to be as successful as one that also leverages the

positive effects of a favourable economic structure and strong capabilities. Clearly however, compared to wage cuts, improvements in the other two factors require a longer time horizon to materialise.

On the "outcome" side, the distinction we have made between traditional and new perspectives appears to be less crucial for the results. Similar input factors seem to matter for both types of outcomes, adding more weight to the importance of considering a wider range of inputs than factor prices only. One difference between the two outcomes measures is the importance of ecological capabilities for achieving new perspectives outcomes, while institutions dominate for traditional outcomes.

8.3.1 Actual versus predicted levels of outcome competitiveness under new perspectives

To provide some further quantitative interpretation of our preferred specification in column (v) of Table 4, we compute the predicted levels of NPO for each EU-27 country based on their values of *wages*, *structure* and *capabilities* as well as the estimated coefficients in column (v). We call the time average of this measure $\widehat{NPO}_i$ and compare it with the actual (time-averaged) values of NPO_i computed in section 8.2.

Table 7 **Actual vs. predicted levels of NPO, time averages 2000-2010**

Country	NPO_i	$\widehat{NPO}_i$	Rank	Country	NPO_i	$\widehat{NPO}_i$	Rank
Belgium	0.475	**0.654**	9	Lithuania	-0.633	**-0.553**	22
		(0.104)				(0.101)	
Bulgaria	-1.155	**-0.855**	25	Hungary	0.026	-0.186	16
		(0.098)				(0.157)	
Czech Republic	0.048	-0.260	17	Malta	0.389	-0.158	15
		(0.127)				(0.209)	
Denmark	0.799	0.794	3	Netherlands	0.835	0.808	2
		(0.104)				(0.068)	
Germany	0.688	0.685	7	Austria	0.852	0.618	10
		(0.071)				(0.098)	
Estonia	-1.010	**-0.267**	18	Poland	-0.657	**-0.591**	24
		(0.154)				(0.088)	
Ireland	0.426	**0.725**	5	Portugal	-0.226	-0.271	19
		(0.183)				(0.089)	
Greece	-0.134	-0.295	20	Romania	-1.103	**-0.882**	26
		(0.078)				(0.103)	
Spain	0.064	**0.069**	12	Slovenia	0.236	-0.047	13
		(0.061)				(0.100)	
France	0.783	0.657	8	Slovakia	-0.176	-0.524	21
		(0.094)				(0.100)	
Italy	0.244	0.136	11	Finland	0.502	**0.725**	6
		(0.101)				(0.089)	
Cyprus	0.110	-0.070	14	Sweden	0.948	0.854	1
		(0.147)				(0.104)	
Latvia	-0.824	**-0.558**	23	United Kingdom	0.490	**0.791**	4
		(0.113)				(0.115)	

Notes: Standard errors in brackets; predicted values based on Table 4 column (v); predicted values that exceed actual values in bold; "rank" refers to predicted values.

Those countries for which the actual values NPO_i lie below the predicted values $\widehat{NPO_i}$ are given in bold font in Table 7. This indicates that these countries have, on average from 2000 to 2010, not achieved the level of "new perspectives" outcome competitiveness that our model in column (v) of Table 4 would predict. In other words, the regression residuals for these countries are negative. They could do better and have upward potential in terms of NPO given their price competitiveness, economic structure and capabilities. Estonia - one of the laggards in terms of average $\widehat{NPO_i}$, ranked at 18 among all countres - registers the largest negative gap between actual and predicted outcomes, followed by the UK and Bulgaria. Other new member countries from CEE like Latvia and Romania are also in this group, as is Finland - like the UK one of the top performers in terms of average $\widehat{NPO_i}$.

For Spain, Germany and Denmark, actual and predicted levels are very close, which one could interpret to suggest that they have made almost full use of their cost advantages, structure and capabilities and have come close to achieving their potential.

On the oher hand, the remaining countries in Table 7 have on average achieved higher levels of actual NPO_i than our model would predict between 2000 and 2010. These good positions may thus not be sustainable over the longer term. Small positive gaps between actual and predicted outcomes exist for the Netherlands, Portugal and Sweden, which attained the highest average level of new perspectives outcomes among all EU-27 countries. Malta has the largest gap, followed by Slovakia and the Czech Republic.[43] These countries could avoid medium- to long-term decline by tackling reforms in the areas of price competitiveness, economic structure and capabilities.

[43] DKPS (2012), how undertake a similar exercise, note that in their sample, Greece and Spain are among the countries with the largest positive gaps between actual and predicted levels of outcome competitiveness (GDP per working-age population in their case).

9. Executive summary

We redefine the term competitiveness for the purpose of monitoring the process of transition to a more dynamic, socially inclusive and ecologically ambitious economy. We then apply the new definition to assessing the post-crisis competitiveness of European countries, which we compare using individual indicators as well as a composite indicator on outcome competitiveness under new perspectives. This new competitiveness indicator is useful for monitoring socio-ecological transition; it is based on an income, a social and an ecological pillar. We provide a descriptive analysis of outcome competitiveness under new perspectives as well as traditional outcome competitiveness (incomes per head and employment only). Finally, we employ factor analysis and panel data econometrics to relate outcome competitiveness to its potential determinants.

Proposed definition

We define competitiveness as the "ability of a country (region, location) to deliver the beyond-GDP goals for its citizens". With this definition competitiveness has arrived at the country level, and the term is now closely connected to a welfare assessment in the tradition of the beyond-GDP literature. It combines an evaluation of inputs or processes on the one hand with an assessment of output and goals on the other. This approach has an advantage over welfare functions derived in social welfare theory in that it connects outcomes with measures that can be influenced by economic policy. Our new definition should help to avoid the misuse of the term by media and politicians in the narrow sense of price (cost) competitiveness, which has lead to the foregone conclusion that wages, taxes or energy costs should be reduced (“low road” to competitiveness). For high-income countries, growth and strategic management theory predict that productivity and capabilities determine long-term economic success. A productivity-enhancing social system and technology-based environmental ambition can support transition to a new path of development ("high road" to competitiveness).

Outcome competitiveness: traditional indicators

Traditionally, outcome competitiveness has been measured by GDP per capita, employment and unemployment rates (which represent goals of the social welfare function) and public deficits, debt and current account positions (which are not goals but become important policy issues and threaten welfare if not balanced in the long run).

According to this definition, Luxembourg, Sweden, the Netherlands, Denmark and Austria lead in terms of outcome competitiveness. The Netherlands lead on employment and come second on GDP and unemployment, but only occupy an average position on budget deficit and debt; the current account is in surplus. At the other end, Hungary has a low employment rate and GDP; Italy follows, also with a low employment rate accompanied by large public debts and a large current-account deficit. Interestingly, the Southern European countries register much higher unemployment and a lower performance on social indicators generally than the new member countries from Central and Eastern Europe. Germany and Finland are close to the top

group, while France takes a middle position for most indicators and an even less favourable one on its large public debt.

Outcome competitiveness under new perspectives

We relate competitiveness to the beyond-GDP goals, which is particularly relevant in view of the socio-ecological transition envisaged by the WWWforEurope project. We measure three pillars of outcome competitiveness: first, the income pillar starts with GDP but moves beyond it towards household income and consumption expenditure. Second, the social pillar reports on social indicators considered as an output of the social system. Third, the ecological pillar evaluates resource productivity, emissions, energy intensity and the share of renewable energy. All three pillars are constructed from sets of individual indicators using principal components analysis.

Income pillar

Deducting depreciation - a cost that does not contribute to welfare - from GDP to obtain net national income improves the position of countries with a large services sector. For example, the United Kingdom gains some ranks. Correcting for income transfers (profit shifting, remittances) limits to an extent the excellent GDP positions of Ireland and the Netherlands. Ranking countries by household consumption still leaves Luxembourg on top, followed by Germany, Austria and France. The Netherlands, which do very well on GDP per capita, drop to rank 10. The Scandinavian countries Denmark, Finland, and Sweden fall back to middle positions. Greece is in the top ten due to its high consumption share. This raises doubt whether the consumption indicator really gets us closer to welfare than GDP, as some of the beyond-GDP literature claims, since in some countries where household consumption is high, it is debt-financed and governments do not balance their budgets. In general, there is a high degree of correlation between the indicators in this group.

Social pillar

Scandinavian countries including the Netherlands take the first four places, closely followed by Austria. Some new member countries do rather well, such as the Czech Republic which leads on the three poverty indicators (poverty risk in the general population and amongst the elderly, poverty reduction through transfers). Slovenia and Hungary are among the top ten, scoring highly on poverty and distributional indicators. Germany and France hold middle positions. At the lower end are the two Eastern European countries Bulgaria and Romania, closely followed by Spain, Greece and Portugal. Italy's position is somewhat better due to high life expectancy and comprehensive health insurance. Youth and long-term unemployment are high in the Baltic countries; on the positive side, the gender employment gap is very small. This group of indicators appears uncorrelated with the income group, partly because some indicators are negatively related to income (unemployment, poverty, inequality, gender gap in employment).

Ecological pillar

Resource productivity is high in very small countries (Luxemburg and Malta) but also in large countries with a small manufacturing base (United Kingdom, France and Italy). It is lowest in the new member counties. Further, CO2 emissions are low in countries that use nuclear energy, hydropower or solar energy (Spain and Portugal). The share of renewable energy is highest in Austria, Sweden, and Portugal; in the first, this is driven by a high share of hydropower; Portugal actively promotes alternative energies. The use of renewables is low in new member countries but also in the United Kingdom.

Sweden is among the top countries due its ambitious environmental policy. Other countries score highly for diverse reasons (climate, use of nuclear energy, a small industrial sector). The indicators are not closely correlated with each other within this pillar, but overall, the ecological pillar is positively related with the income pillar.

Comprehensive indicators

As far as catch-all indicators are concerned, life expectancy at birth is highest in Southern Europe (Spain, Italy, Cyprus). The countries with the lowest life expectancy are the Baltic and new member countries. Healthy life years at birth are particularly high in Sweden and Denmark, and Greece jumps from eleventh place in life expectancy to fifth place. Surveys on life satisfaction yield the best results for Sweden, Denmark and Finland, three countries with welfare states of the Scandinavian type. The Netherlands and Austria are also among the top five. On the other hand, Greece, Portugal and the new member states are at the bottom. Work-life balance as measured by employees usually working over 50 hours a week is best in the Netherlands, Sweden and Denmark; Luxembourg, Hungary and Italy also do well. Unfavourable results are reported in Portugal, Austria, France and the United Kingdom.

Sweden, the Netherlands and Denmark are among the top for several comprehensive indicators, followed by Ireland and Luxemburg. Germany, France, and the United Kingdom take middle ranks. Most of the comprehensive indicators are positively correlated with income and overall competitiveness under new perspectives. Happiness is loosely correlated with the other indicators within the group; work-life balance is least related to income. Comprehensive indicators may be helpful as complementary information alongside our other indicators on competitiveness under new perspectives.

Determinants of competitiveness

As drivers of competitiveness (inputs), we start with elements of price competitiveness (costs and productivity). However, we emphasise elements of quality competitiveness as more important for industrialised countries with high incomes aiming for socio-ecological transition. In turn, quality competitiveness may be divided into structure of production and exports and five types of capabilities or sources of competitive advantages.

Prices and costs

Wages vary widely across Europe. For example, they are four times higher in the top-ranking countries compared to the new member countries. However, the wage differences are for the most part paralleled by differences in productivity, so that unit labour costs are not too dissimilar. In Ireland, Sweden and Finland, the productivity lead is larger than the margin in wages. For most new member countries, the lag in productivity is much smaller than that in wages, yielding an excellent overall position in terms of unit labour costs. The UK, France and the Netherlands, on the other hand, have a rather unfavourable relationship between wages and productivity. Following their wage restraint since the crisis, Southern European countries currently still lag behind on productivity, but wages relative to productivity are now back to 2000 levels (with the exception of manufacturing in Italy).

Structure of production and exports

We assess countries' economic structure by analysing the shares of sophisticated industries (technology-driven, high-skill, eco industries etc.).

Five countries have very advantageous production structures: Sweden, Germany, Ireland, the UK and France. Ireland excels in manufacturing; its main weakness is an underrepresentation in industries in which quality competition dominates. France and the UK have deficits in innovation-intensive sectors and to some extent also in industries with high skill intensity. Finland has a deficit in high-skill industries and in those with high educational intensity. Greece is the country with the largest structural problems. The share of innovation-intensive sectors is particularly low, while the country's position in education and knowledge-based services is somewhat better. For Lithuania, Romania, Bulgaria, Poland, but also for Portugal and Spain, most rankings indicate structural problems. Large countries and those in the Northern periphery seem to be in the top league more often than small countries.

Country rankings of export sophistication resemble those on production. Ireland obtains the top rank according to many export indicators due to high ICT and pharmaceuticals exports. Finland, Latvia and Estonia's export structures are much less favourable than their production structure. A more sophisticated export structure relative to production structure is reported for Hungary, Slovakia and the Czech Republic (due to export-oriented multinational firms). Regarding exports of eco- and renewables industries, the Scandinavian countries are in the lead, while France and the United Kingdom clearly lag behind, indicating a lower priority on sustainability.

Capabilities as sources of competitive advantage

We analyse five enablers of change and future growth discussed in modern growth and strategic firm theory. Denmark, Sweden and Finland excel in capabilities, closely followed by Austria and the Netherlands. Germany and France are in the top five on innovation and social capabilities, but they obtain less favourable ranks on education, ecological ambition and institutions. The positions of Greece, Italy, Romania and Bulgaria suggest that competitiveness could be improved especially if trust in government and governance structures were higher.

The lead of Finland in *innovation* is outstanding. Together with Sweden and Denmark, it excels in R&D expenditures and patent applications, followed by Germany and Austria, which have some weaknesses in tertiary education.

For *education* the positions of Germany, the United Kingdom and Ireland are less favourable than for innovation. France has deficits in vocational training, lifelong learning and women's share in tertiary education. Latvia has a good position due to high preschool expenditures and female shares in tertiary education. Slovenia does well because of its top-ten ranks in vocational training, lifelong learning and women's participation in tertiary education.

The country that stands out as a star performer regarding an enabling *social system* is Denmark: it is at or near the top regarding all indicators studied. Belgium, Sweden, France and the Netherlands also do well, while the new member states, especially from Central and Eastern Europe, lag behind considerably. Denmark also leads in terms of *ecological ambition*, followed by Slovenia and Austria. With Hungary, Romania and Bulgaria, several new member countries lag behind on environmental ambition; similarly, Finland registers low recycling rates, few environment-related patent applications and low environmental investment. Ecological ambition is the only indicator group among capabilities where Finland is not ranked in first place.

On the *institutional indicators*, the three Scandinavian countries (Denmark, Sweden, Finland) are in the lead, closely followed by Austria and the Netherlands. The positions of Greece, Italy, Romania and Bulgaria suggest that competitiveness could be improved if governance structures and trust were higher. Institutional convergence occurs insofar as the five countries with the fastest improvements in institutions between 2000 and 2010 are all new members (Czech Republic, Slovakia, Latvia, Bulgaria and Estonia).

Comparison between EU and US

Wages and per-capita productivity in the EU-27 are, on average, about one third lower than in the US, so that overall unit labour costs are similar. Productivity differences are smaller for the total economy but larger in manufacturing. Differences to Japan are smaller, but differences to Switzerland are larger than to the US. Regarding technology-driven and skill-intensive exports, Europe no longer trails the US; rather, it enjoys trade surpluses in all sophisticated sectors, while the US has deficits. Europe has a far larger export share in eco-industries and renewables. It lags behind the US on R&D expenditure and higher education. On the other hand, Europe invests more in early education, vocational training and active labour market policies. As far as institutions are concerned, Europe has stricter rules for labour and business, lower regulatory quality, and the rule of law in general is seen to be less stringent than in the US. On the other hand, voice and accountability (quality of the parliamentary system) is better in Europe and control of corruption is considered to be stricter. Environmental ambition is much more pronounced in Europe, as shown by higher environmental taxes, more recycling, a higher share of environment-related technology patents and a high share of organic farming. Summarizing all five capability groups, Switzerland does well on all. Europe, Japan and the US have different strengths, with Europe lagging on R&D and higher education – the two most important indicators for frontier countries – while it leads on indicators that are important for the transition to a more socially inclusive and ecologically sustainable economy.

The traditional output indicators give a lead to the US: GDP per capita (less in GDP per hour) and employment rates are higher, unemployment is lower. Higher public deficits and debts, as well as a negative current-account balance are limitations. Japan does better than Europe on the traditional indicators, the exception being its extremely high public debt ratio; Switzerland performs best on all traditional indicators. For the beyond-GDP goals, the picture is different. The US still leads on the income pillar; it trails on poverty prevention and equality but has lower youth and long-term unemployment, thus overall yielding mixed results on the social pillar. The US clearly lags behind Europe on the ecological pillar. Regarding comprehensive indicators, Europe does better on life expectancy, while self-reported life satisfaction, work-life balance and happiness are higher in the US.

Explaining outcomes econometrically

The variety of indicators used and their correlation with each other suggests extracting information using principal components factor analysis. We do this for outcomes (traditional and new perspectives) and for the groups of determinants (price competitiveness, structure, capabilities). Regressing outcomes on its determinants indicates that not only labour costs, but also economic structure and capabilities matter for competitiveness. Therefore, a narrow focus on the price component of competitiveness neglects other aspects of the concept that are likely to be particularly important for high-income economies such as the EU-27 countries.

On the other hand, our distinction between traditional and new perspectives outcomes appears less crucial for the results, as similar input factors seem to matter for both types of outcomes. One difference between the two is the importance of ecological capabilities for achieving new perspectives outcomes, while institutions dominate for traditional outcomes.

Conclusion

This is work in progress. We have developed a new definition of competitiveness that we hope will be useful for assessing transition to a new path of more dynamic, socially inclusive and ecologically sustainable growth. In addition, the definition should be useful for revealing individual countries' strengths and weaknesses, particularly those related to a "high road" to competitiveness. We have applied the new framework to analyse the performance of the EU-27 member states and to compare it to the US. Both descriptive and econometric analyses have offered new insights that the old concept of cost competitiveness and traditional outcome evaluations could not provide.

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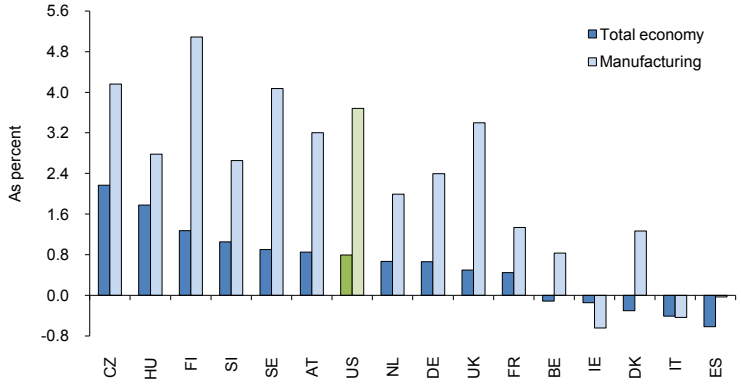
Annex

Table I **Definitions of competitiveness: Proposition and related previous definitions**

New definition: "The ability of a country (region, location) to deliver the beyond-GDP goals for its citizens, today and tomorrow"
Related previous definitions:
Uri (1971): "…the ability to create the preconditions for high wages".
The German Sachverständigenrat (1981): "…ability to develop specialty products and technical solutions which generate income growth under full employment".
Scott - Lodge (1985): "…a nation state's ability to produce, distribute and service goods in the international economy...., and to do so in a way that earns a rising standard of living".
Aiginger (1987): "Competitiveness of a nation is the ability to (i) sell enough products and services (to fulfil an external constraint); (ii) at factor incomes in line with the (current and changing) aspiration level of the country; and (iii) at macro-conditions of the economic, environmental, social system seen as satisfactory by the people."
Fagerberg (1988): "the ability of a country to realise central economic policy goals, especially growth in income and employment, without running into balance of payment difficulties"
Hatsopoulos et al. (1988): "The proper test of competitiveness, then, is not simply the ability of a country to balance its trade, but its ability to do so while achieving an acceptable rate of improvement in its standard of living."
Porter (1990): "The only meaningful concept of competitiveness at the national level is national productivity".
Competitiveness Policy Council (1994): "The ability to sell products on international markets, while incomes in the domestic markets increase in a sustainable way."
IMD (1994): "World competitiveness is the ability of a country or a company to, proportionally, generate more wealth than its competitors in the world markets".
European Commission (1995): "…ability to increase or to maintain the living standard relative to comparable economies (e.g. developed industrialised countries), without long run deterioration of external balance".
OECD (1995): "…the ability of companies, industries, regions, nations or supra-national regions to generate, while being and remaining opened to international competition, relatively high factor income and factor employment levels".
Von Tunzelmann (1995): "Historians have tended to equate competitiveness ... with political, technical, commercial leadership".
Oughton - Whittam (1997): "long run growth in productivity and hence rising living standards, consistent with increasing employment or the maintenance of near full employment"
World Economic Forum (2000): "Competitiveness is the set of institutions and economic policies supportive of high rates of economic growth in the medium term."
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."
Porter (2004): "True competitiveness, then is measured by productivity … Here, we define competitiveness concretely, show its relationship to a nation's living standard…. The micro-economic foundations of productivity rest on … the sophistication of competition in the country … and the quality of micro-economic business environment in which they operate."
European Commission (2011): "Ultimately, competitiveness is about stepping up productivity, as this is the only way to achieve sustained growth in per capita income – which in turn raises living standards".
Janger et al. (2011): "… define competitiveness as the ability to raise standards of living and employment, while maintaining a sustainable environment and sustainable external balances"
Delgado et al. (2012): "Foundational competitiveness" is "the expected level of output per working-age individual that is supported by the overall quality of a country as a place to do business" and "Competitiveness is what underpins wealth creations and economic performance".
Peneder (2001): "ability ... to create high factor incomes along a sustainable path, taking into consideration a society's social, ecological and economic constraints with respect to long-term development."

Figure I **Further indicators on price competitiveness**

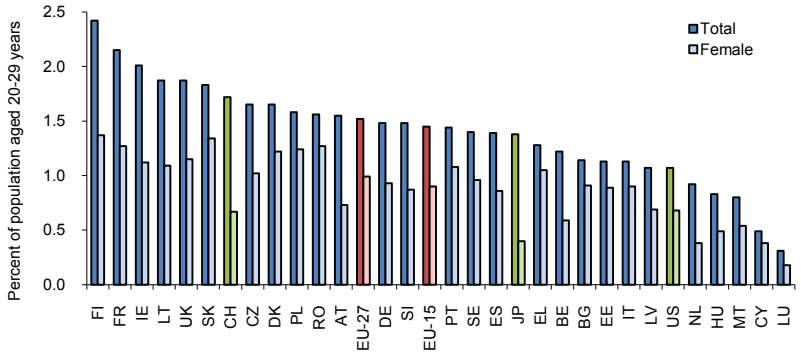
Average annual growth rate of total factor productivity, 2000-2007



Notes: Data for Slovenia cover 2000-2006. Countries ranked by total economy values. Manufacturing data classification is NACE rev.1.1.
Source: EU KLEMS (2009 release, 2011 update, NACE rev. 1.1), WIFO calculations.

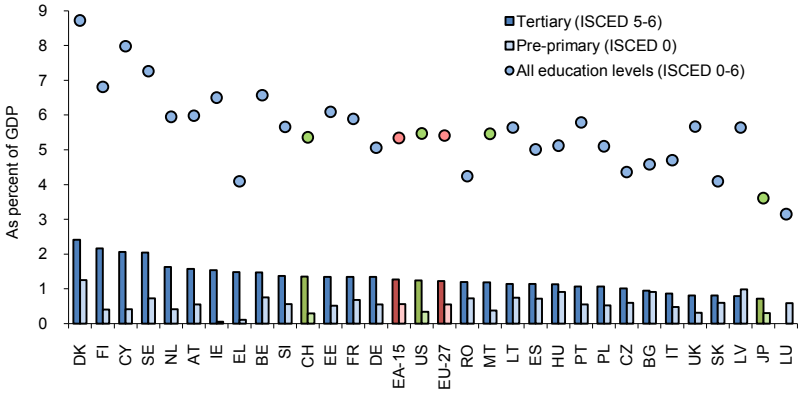
Figure II **Further innovation and education indicators**

Tertiary education graduates in mathematics, science and technology, 2010



Notes: Countries ranked by the percentage of graduates from tertiary education (ISCED 5-6) programmes in mathematics, science and technology fields in the total population aged 20-29 years. Data for Italy cover 2008.
Source: Eurostat, WIFO calculations.

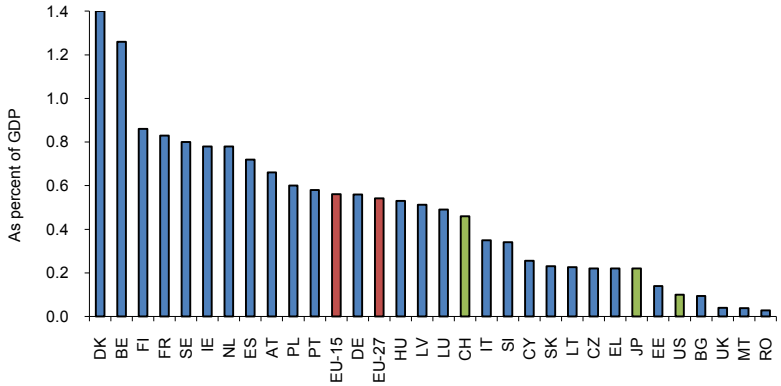
Public expenditure on education, 2009



Notes: Countries ranked by percentage of GDP spent on tertiary education (ISCED 5-6). Data for Luxembourg cover 2007; for Greece, expenditure data for tertiary education and all levels combined cover 2005, data for pre-primary education expenditure cover 2004.
Source: Eurostat.

Figure III **Indicators on the social system as an enabling force**

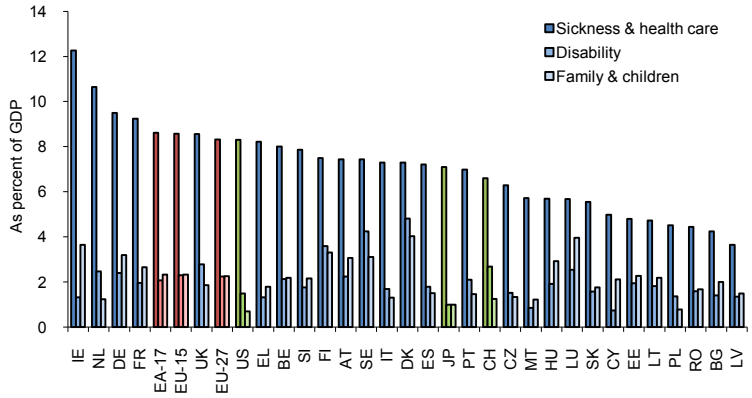
Public expenditure on active labour market policy, 2010



Notes: Countries ranked by percentage of GDP spent on total active labour market policy measures. Data for UK, EU-15 and EU-27 cover 2009.

Source: Eurostat, OECD.

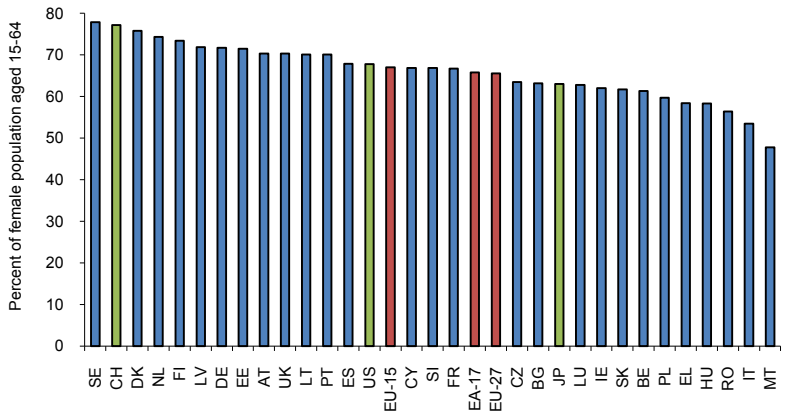
Public expenditure on social protection benefits, 2010



Notes: Countries ranked by percentage of GDP spent on sickness and health care. Data for USA and Japan cover 2009.

Source: Eurostat, OECD.

Female labour force participation rate, 2012

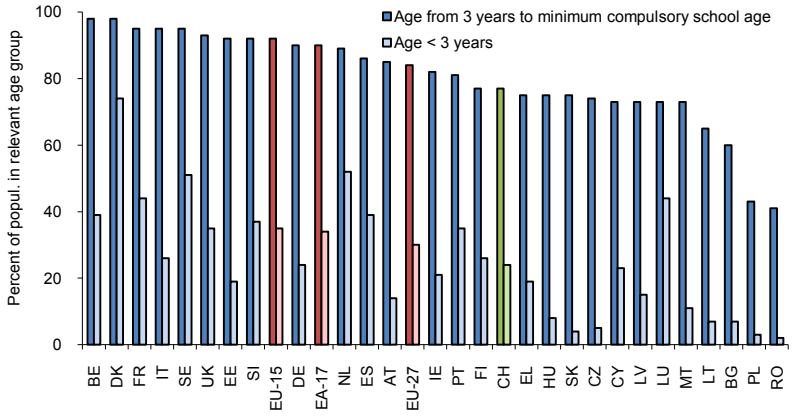


Notes: Countries ranked by percentage of the female population aged 15-64 years that is economically active. Data for the USA and Japan refer to 2011.

Source: Eurostat, OECD.

Figure III **Continued**

Children in formal childcare institutions, 2011

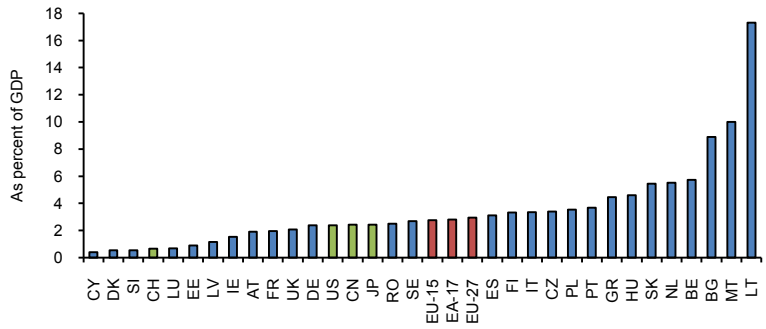


Notes: Countries ranked by percentage of children aged from 3 years to minimum compulsory school age who attend formal childcare institutions.

Source: Eurostat (EU SILC), WIFO calculations.

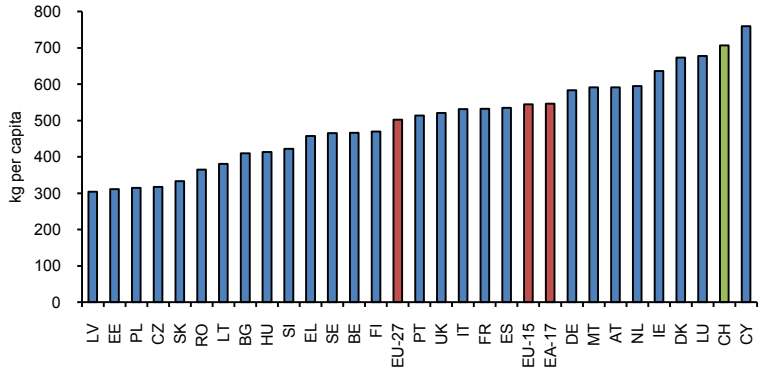
Figure IV **Ecological capabilities**

Oil and gas imports, 2010



Source: OECD, WIFO calculations.

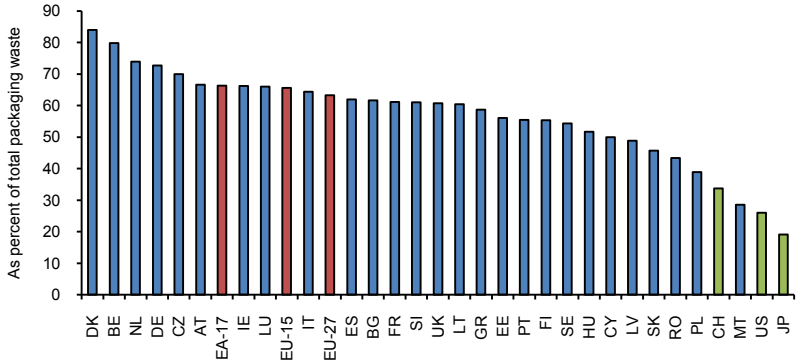
Municipal waste generation, 2010



Source: Eurostat, WIFO calculations.

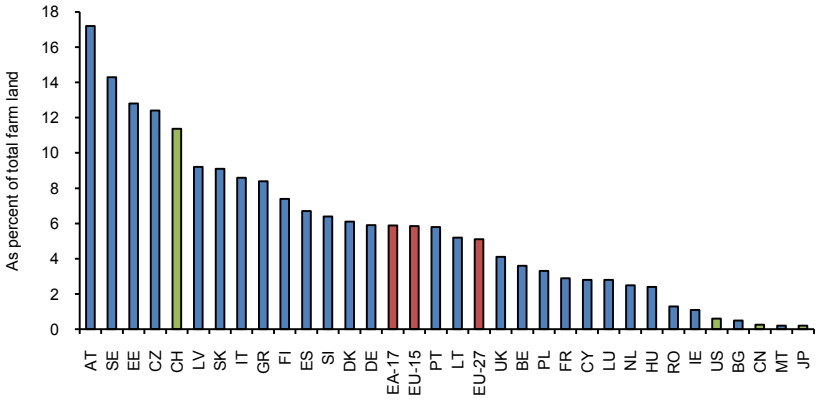
Figure IV **Continued**

Recycling rates for packaging waste, 2010



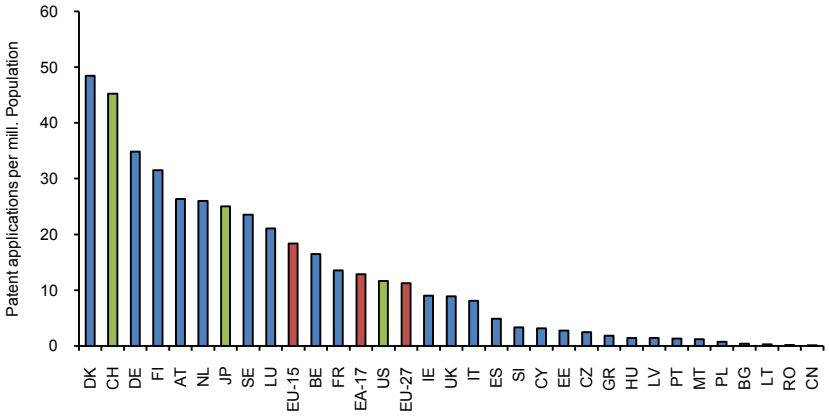
Source: Eurostat, WIFO calculations.

Share of organic farming in total farm area, 2010



Source: Eurostat, WIFO calculations.

Applications of environment-related technology patents, Ø 2005-2009

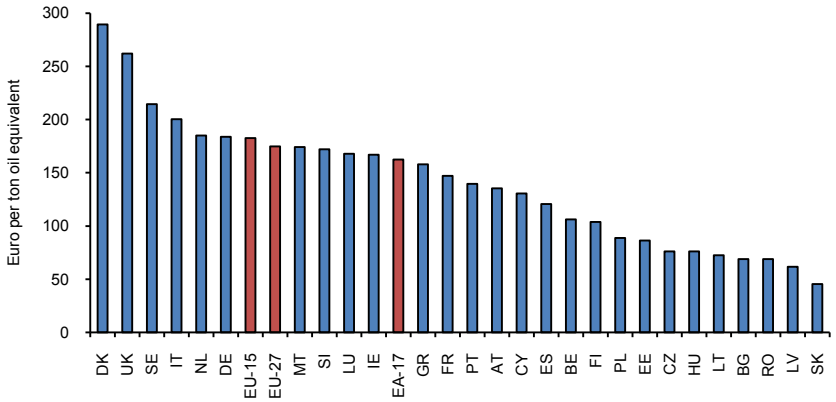


Notes: WIPO classification.

Source: OECD, REGPAT Database, January 2013, OECD, Citations Database, January, 2013, WIFO calculations.

Figure V **Capability-increasing environmental expenditures**

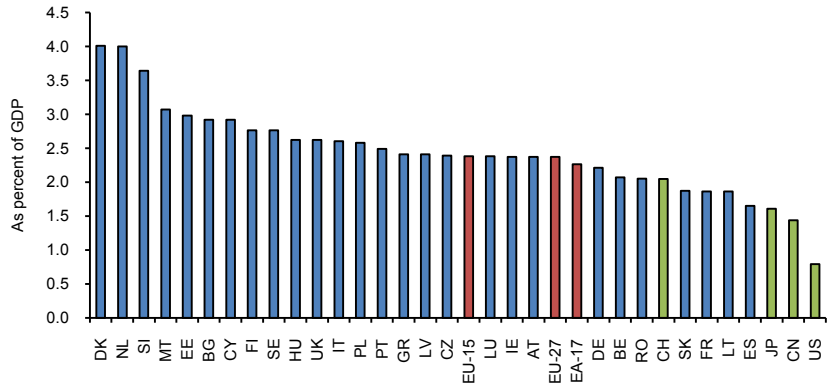
Energy tax rate, 2010



Notes: The indicator expresses energy tax revenues in relation to final energy consumption (euro per ton oil equivalent, deflated with the final demand deflator).

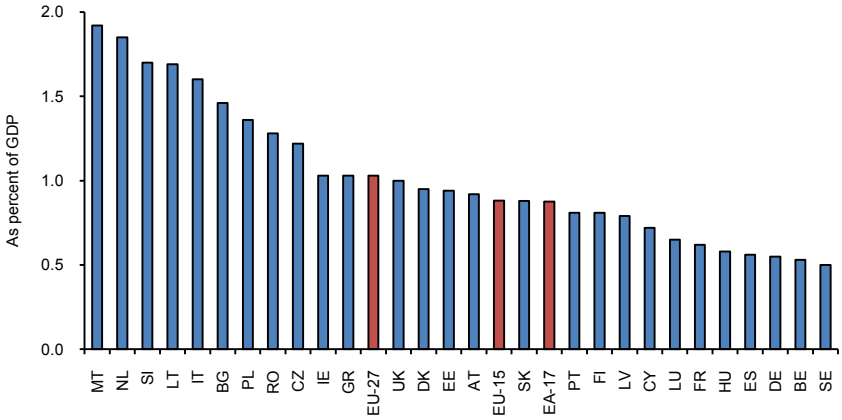
Source: Eurostat, WIFO calculations.

Total environmental tax revenues, 2010



Source: Eurostat, WIFO calculations.

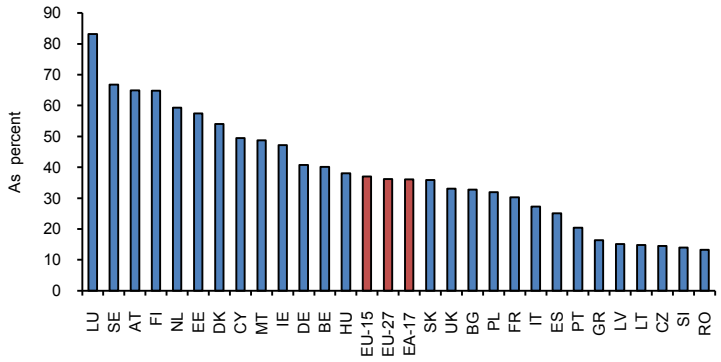
Current environmental expenditure and investment, 2009



Source: Eurostat, WIFO calculations.

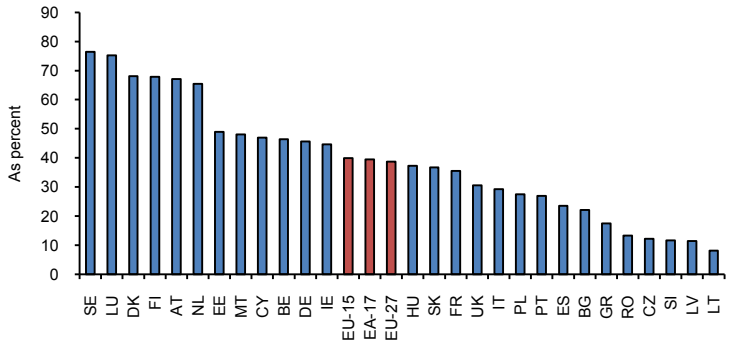
Figure VI **Supportive institutions**

Trust in government, 2011



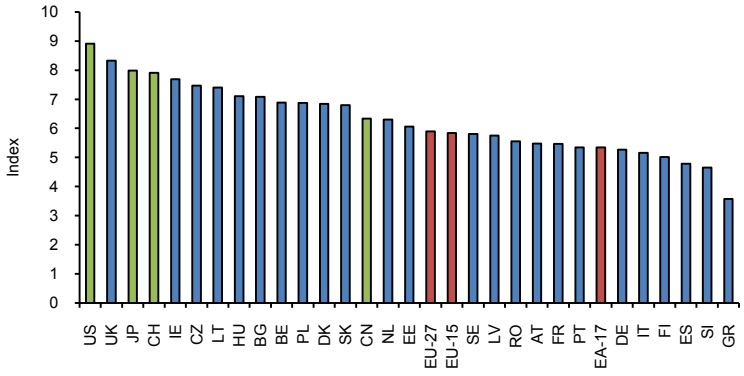
Source: Eurobarometer 2011.

Trust in parliament, 2011



Source: Eurobarometer 2011.

Labour market deregulation index, 2010

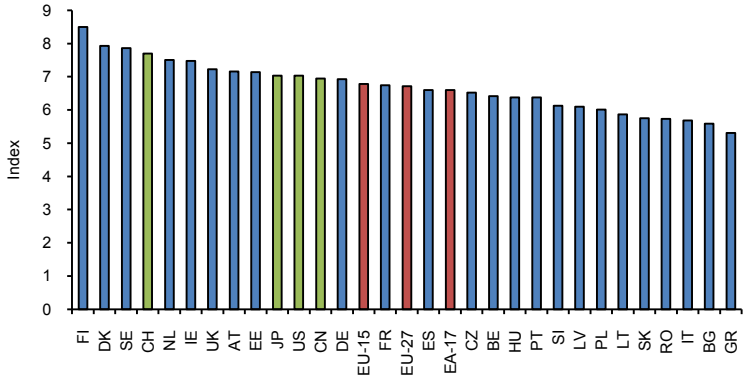


Notes: The index ranges from 0 to 10, with high values indicating less regulation.

Source: *Gwartney et al*. (2012) based on data from Frazer Institute.

Figure VI **Continued**

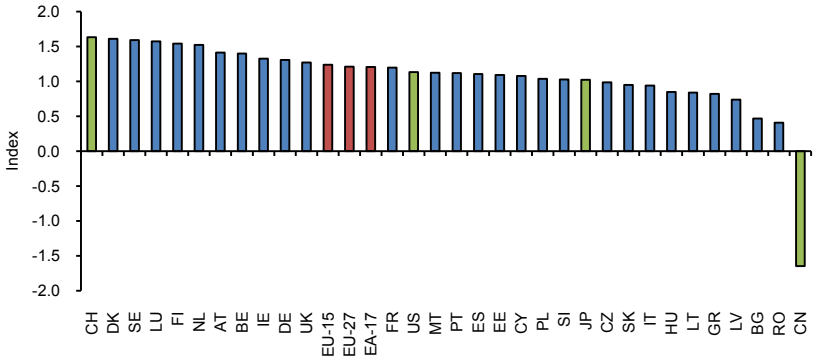
Business deregulation index, 2010



Notes: The index ranges from 0 to 10, with high values indicating less regulation.
Source: *Gwartney et al.* (2012).

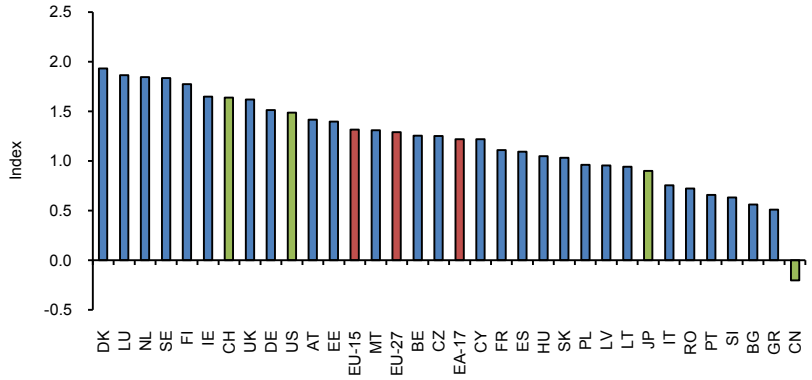
Figure VII **Indicators on quality of governance**

Voice and accountability, 2010



Notes: Index ranges from -2.5 to 2.5, with more positive values indicating better performance.
Source: The Worldwide Governance Indicators, 2012 Update.

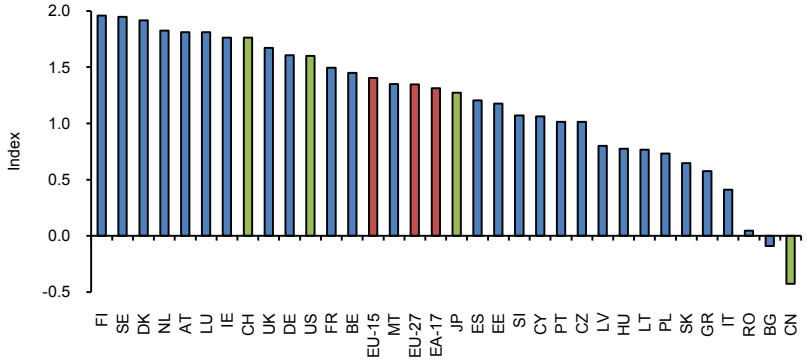
Regulatory quality, 2010



Notes: Index ranges from -2.5 to 2.5, with more positive values indicating better performance.
Source: The Worldwide Governance Indicators, 2012 Update

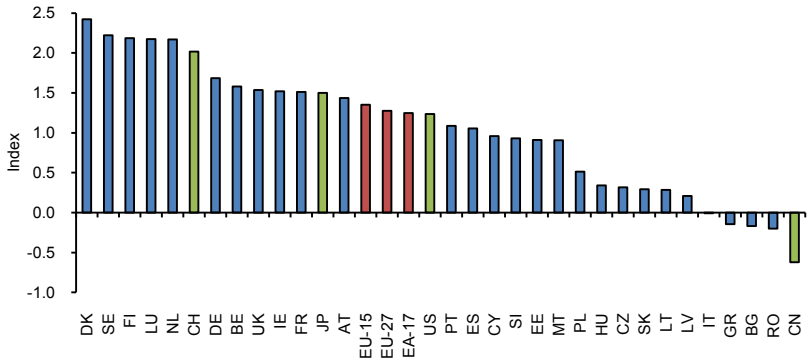
Figure VII **Continued**

Rule of law, 2010



Notes: Index ranges from -2.5 to 2.5, with more positive values indicating better performance.
Source: The Worldwide Governance Indicators, 2012 Update

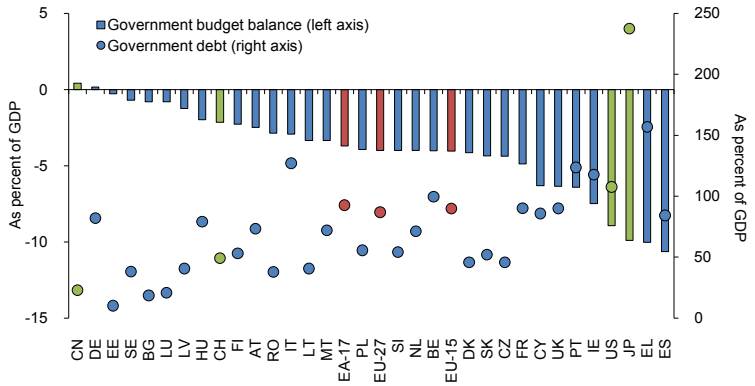
Control of corruption, 2011



Notes: Index ranges from -2.5 to 2.5, with more positive values indicating better performance.
Source: The Worldwide Governance Indicators, 2012 Update.

Figure VIII **Further traditional outcome indicators: constraints**

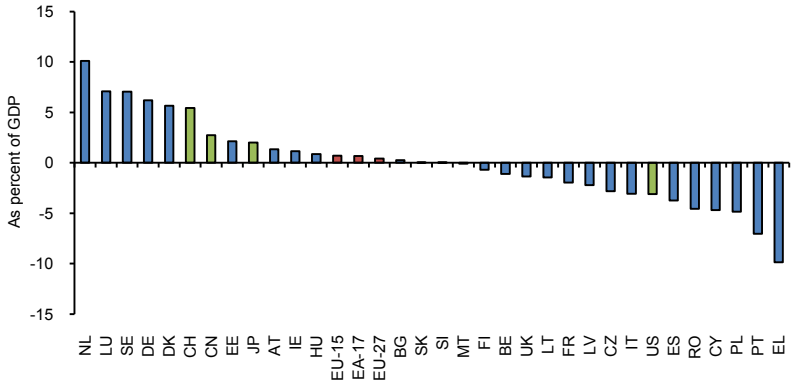
Government budget balance and government debt, 2012



Notes: Countries ranked by values for government budget balance as percent of GDP (left axis).
Source: European Commission, IMF.

Figure VIII **Continued**

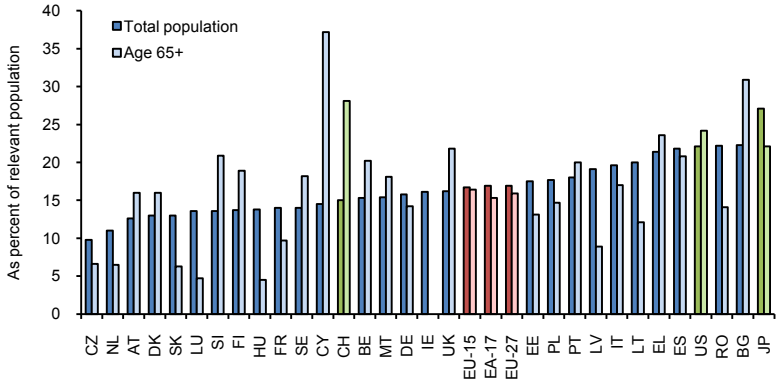
Current account balance, 2011



Source: IMF, OECD, OeNB.

Figure IX **New perspectives outcomes, further indicators: Social pillar**

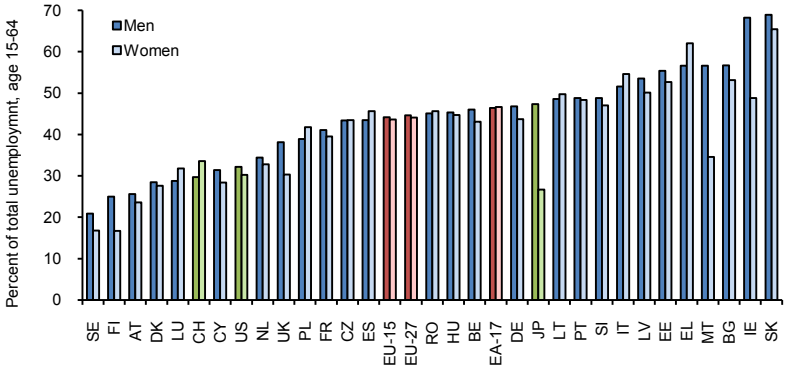
At-risk-of-poverty rates after social transfers, 2011



Notes: Countries ranked by values for at-risk-of-poverty rates after social transfers in the total population. For both series, the poverty threshold is defined as 60 percent of median equivalised income after social transfers. The series "Age 65+" describes old-age poverty. Data for the USA and Japan cover 2010 and 2009 respectively.

Source: Eurostat, OECD.

Long-term unemployment as percent of total unemployment, 2012

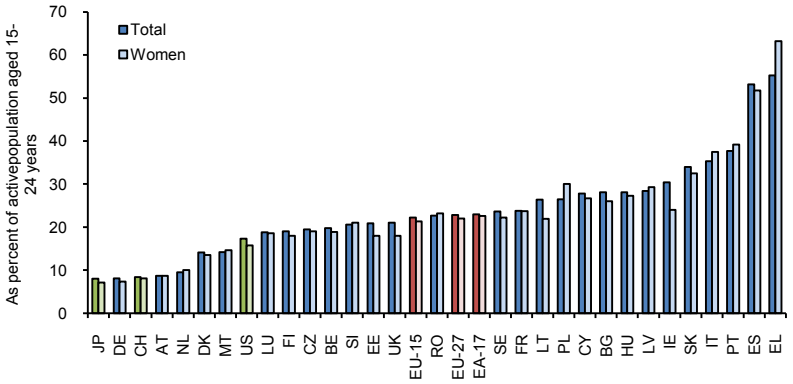


Notes: Long-term unemployment refers to unemployment spells of 12 months' duration or longer. Countries ranked by percentage of male long-term unemployed in the total unemployed population aged 15 to 64 years. Data for the USA and Japan cover 2011.

Source: Eurostat, OECD.

Figure IX **Continued**

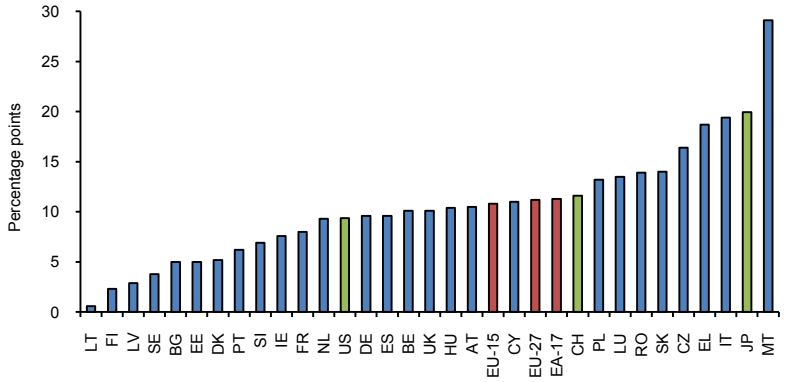
Youth unemployment rate, 2012



Notes: Countries ranked by percentage of unemployed persons in the total active population aged 15-24 years. Data for the USA and Japan cover 2011.

Source: Eurostat, OECD.

Employment gender gap, 2012

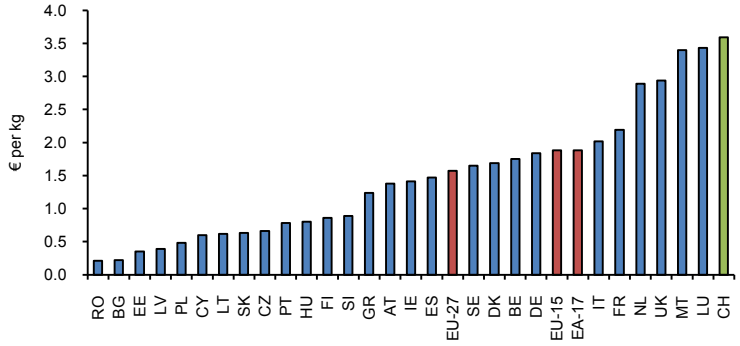


Notes: The employment gender gap is defined as the difference in percentage points between the male and female employment rates in the age group 15-64 years. Data for the USA and Japan cover 2011.

Source: Eurostat, OECD.

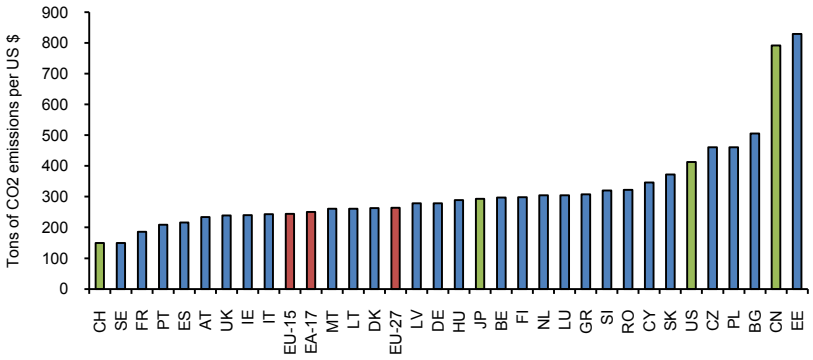
Figure X **New perspectives outcomes: Ecological pillar**

Resource productivity, 2010



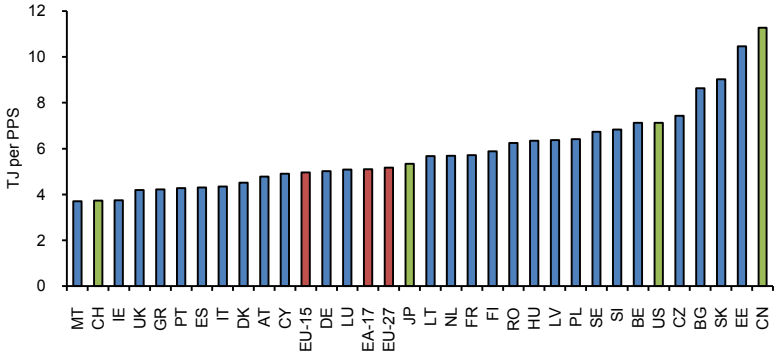
Notes: Euro in current prices.
Source: Eurostat.

CO2 intensity (CO2 emissions over GDP), 2010



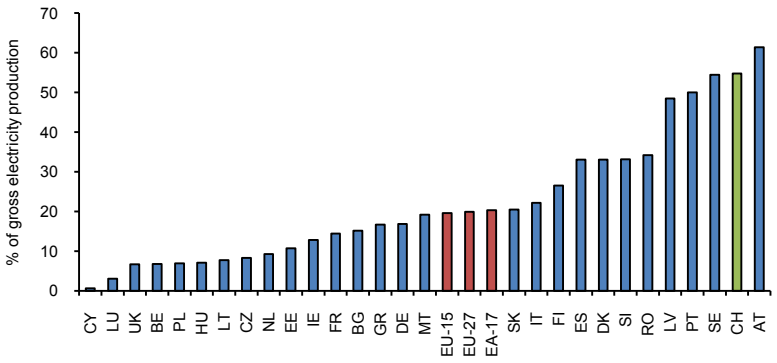
Notes: CO2 emissions from fuel combustion relative to GDP at PPS.
Source: IEA, Energy Balances.

Energy intensity, 2010



Notes: Total Primary Energy Supply relative to GDP at PPS.
Source: IEA, Energy Balances.

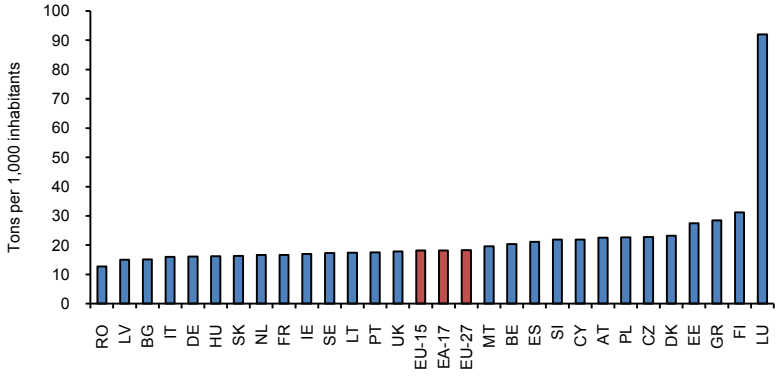
Electricity produced from renewable energy sources, 2010



Notes: Euro in current prices. CO2 emissions from fuel combustion relative to GDP at PPS. Total Primary Energy Supply relative to GDP at PPS.

Source: Eurostat.

NOx emissions per 1000 inhabitants, 2010



Source: Eurostat.

Table II **List of indicators in sections 3 to 6 Ec struct box: Nr. 12+14 bitte nicht kursiv**

Note: Indicators in italics (15) are dropped following principal components analysis

No.	Indicator name	Units	Source	Years available
PRICE COMPETITIVENESS				
1	Compensation per employee, total economy	2005 euros	AMECO	2000-2010
2	Compensation per employee, manufacturing			
3	GDP per person employed, total economy			
4	GDP per hour worked, total economy			
5	GVA per person employed, manufacturing			
6	Unit labour costs nominal, total economy: compensation per employee (current prices) / GDP per person employed (constant prices)	Percent		
7	Unit labour costs real, total economy: compensation per employee (current) / GDP per person employed (current)			
8	Unit labour costs real, manufacturing: compensation per employee (current) / GVA per person employed (current)			
Note: Unit labour cost definitions according to AMECO database.				
ECONOMIC STRUCTURE - VALUE ADDED SHARES + EXPORT SHARES				
9	Share of technology-driven industries in total manufacturing value added	Percent	Eurostat (Structural Business Statistics	2000-2008 (extrapolated to 2010)
10	Share of high-skill industries in total manufacturing value added			
11	Share of industries using knowledge-based services inputs in total manufacturing value added			
12	*Share of industries with high RQE in total manufacturing value added*			
13	Share of industries with high innovation intensity in total manufacturing + services value added			
14	*Share of industries with high education intensity in total manufacturing + services value added*			
15	Share of technology-driven industries in total manufacturing exports		EU (Comext, EBOP), UN (Comtrade), IMF (BOP)	2000-2010
16	Share of high-skill industries in total manufacturing exports			
17	Share of industries using knowledge-based services inputs in total manufacturing exports			
18	*Share of industries with high RQE in total manufacturing exports*			
Note: Shares of industries with high innovation and education intensity in total manufacturing and services exports, and shares of eco-industries and renewables in total exports were excluded as they are available only from 2003/4 onwards.				
CAPABILITIES - INNOVATION+EDUCATION				
19	Tertiary educational attainment in the population aged 25-64	Percent	Eurostat, OECD	2000-2010 (some interpolated)
20	R&D expenditure in the public sector as share of GDP (GOVERD+HERD)			
21	R&D expenditure in the private sector as share of GDP (BERD)			
22	Patent applications to the European Patent Office	Per billion GDP in 2005 PPS		
23	Higher education (ISCED5-6) graduates from maths, science and technology (MST) programmes as share of population aged 20-29	Percent		
24	Total public expenditure on tertiary education as share of GDP			
25	*Total public expenditure on pre-primary education as share of GDP*			
26	Participants in early education (4-years-old to starting age of compulsory education)	Percent of age group		
27	Students in upper secondary education with vocational orientation (ISCED 3-VOC) as share of all students at ISCED level 3	Percent		
28	*Women among students in ISCED 5-6 as share of all students at this level*			
29	Share of the population aged 25-64 participating in education and training (lifelong learning)			
CAPABILITIES - SOCIAL SYSTEM				
30	Public expenditure on active labour market policies as share of GDP	Percent	Eurostat, OECD	2000-2010 (some interpolated)
31	Social protection benefits as share of GDP: sickness & health care			
32	Social protection benefits as share of GDP: disability			
33	Social protection benefits as share of GDP: family & children			
34	Female labour force participation in the age group 15-64			

Table II **Continued**

No.	Indicator name	Units	Source	Years available
CAPABILITIES - INSTITUTIONS				
35	*Labour market deregulation index*	Index	Economic Freedom of the World Database (Frazer Institute)	2000-2010, interpolated
36	Business deregulation index			
37	Voice and accountability		"Worldwide Governance Indicators", *Kaufman et al.* (2010)	
38	Regulatory quality			
39	Rule of law			
40	Control of corruption			
Note: Trust in government and parliament excluded since data only available from 2004 onwards.				
CAPABILITIES - ECOLGICAL				
41	*Energy dependence: share of oil/gas imports in GDP*	Percent	Eurostat, OECD, IEA	2000-2010 (some interpolated)
42	Municipal waste generation	kg / GDP		
43	Recycling rates for packaging waste as share of total packaging waste	Percent		
44	*Environmental tax revenues as share of GDP*			
45	Share of organic farming as share of total land area used for farming			
46	*Share of eco-innovations in total patents as share of total PCT patent applications*			
Note: Implicit tax rate on energy and environmental expenditure + investment as share of GDP excluded due to insufficient data availability.				
OUTCOME INDICATORS - TRADITIONAL				
47	GDP per capita	2005 PPS	Eurostat, OECD	2000-2010
48	Employment rate in the population aged 15-64	Percent		
49	Unemployment rate as share of active population of all ages			
50	*Budget deficit as share of GDP*		EC, IMF, OECD, OeNB	
51	*Gross national debt as share of GDP*			
52	Current account balance as share of GDP			
OUTCOME INDICATORS - NEW PERSPECTIVES - INCOME PILLAR				
47	GDP per capita	2005 PPS	AMECO, Eurostat	2000-2010 (some interpolated)
53	Net national income per capita			
54	Net disposable household income per capita			
55	Household final consumption expenditure per capita			
OUTCOME INDICATORS - NEW PERSPECTIVES - SOCIAL PILLAR				
56	At-risk-of-poverty rate after social transfers in the total population	Percent	Eurostat, OECD	2000-2010 (some interpolated)
57	At-risk-of-poverty rate in the population aged 65 years or over			
58	Impact of social transfers: Comparison between at-risk-of-poverty rate before and after social transfers (total): % reduction			
59	S80/S20 income quintile share ratio	Ratio		
60	Gini coefficient of equivalised disposable income	Index		
61	*Long-term unemployment (12 months +) as share of total unemployment, age 15-64*	Percent		
62	*Youth unemployment rate*			
63	*Employment gender gap*	Percentage points		
OUTCOME INDICATORS - NEW PERSPECTIVES - ECOLOGICAL PILLAR				
64	Resource productivity	€ / kg	Eurostat, AMECO, IEA	2000-2010
65	CO2 intensity (CO2 emissions from fuel combustion per GDP)	Tons / DP PPP		
66	Energy intensity (total primary energy supply per GDP)	TJ / GDP PPP		
67	*Share of electricity production from renewable energy sources*	Percent		
68	*NOx emission intensity*	Tons / 1,000 inhabitants		

Table III **Scale transformation of indicators in section 8**

Note: As in Table II, indicators in italics (15) are dropped following principal components analysis

Log transformation:

No.	Indicator name
5	GVA per person employed, manufacturing
22	Patent applications to the European Patent Office
29	Share of the population aged 25-64 participating in education and training (lifelong learning)
32	Social protection benefits as share of GDP: disability
36	Business deregulation index
41	*Energy dependence: share of oil/gas imports in GDP*
46	*Share of eco-innovations in total patents as share of total PCT patent applications*
47	GDP per capita
49	Unemployment rate as share of active population of all ages
64	Resource productivity

Square-root transformation:

13	Share of industries with high innovation intensity in total manufacturing + services value added
21	R&D expenditure in the private sector as share of GDP (BERD)
23	Higher education (ISCED5-6) graduates from maths, science and technology (MST) programmes as share of population aged 20-29
30	Public expenditure on active labour market policies as share of GDP
45	Share of organic farming as share of total land area used for farming
53	Net national income per capita
57	At-risk-of-poverty rate in the population aged 65 years or over
59	S80/S20 income quintile share ratio
62	*Youth unemployment rate*
63	*Employment gender gap*
66	Energy intensity (total primary energy supply per GDP)
67	*Share of electricity production from renewable energy sources*

Inverse square-root transformation:

17	Share of industries using knowledge-based services inputs in total manufacturing exports
42	Municipal waste generation
65	CO2 intensity (CO2 emissions from fuel combustion per GDP)
68	*NOx emission intensity*

Note: To obtain correct indicator orientation, the z-scores are also negated due to inverse - except for last three where inverse yields correct orientation

Inverse transformation:

11	Share of industries using knowledge-based services inputs in total manufacturing value added
24	Total public expenditure on tertiary education as share of GDP
44	*Environmental tax revenues as share of GDP*

Note: To obtain correct indicator orientation, the z-scores are also negated due to inverse

Square transformation:

8	Unit labour costs real, manufacturing: compensation per employee (current) / GVA per person employed (current)

Cubic transformation:

34	Female labour force participation in the age group 15-64

Table IV **Overview of factor analysis results: Properties of first common factors**

	Eigenvalue	Proportion of variance explained	Average SMC	Overall KMO	Alpha
Price competitiveness	5.31	0.66	0.79	0.81	0.91
Wages	1.97	0.98	0.94	0.50	0.98
Economic structure	4.85	0.54	0.68	0.74	0.89
Capabilities total	3.05	0.76	0.66	0.80	0.89
Innovation+Education	4.48	0.50	0.59	0.82	0.85
Social system	2.92	0.58	0.41	0.82	0.81
Institutions	4.07	0.81	0.77	0.89	0.94
Ecological ambition	1.81	0.60	0.25	0.63	0.67
Traditional outcomes	2.47	0.62	0.48	0.66	0.77
NPO - Income pillar	3.86	0.97	0.96	0.80	0.99
NPO - Social pillar	3.83	0.64	0.73	0.75	0.87
NPO - Ecological pillar	2.24	0.75	0.48	0.72	0.82

Notes: NPO is short for "new perspectives outcomes". SMC is the squared multiple correlations statistic, which is available for each indicator in the group; we report the average. KMO is the Kaiser-Meyer-Olkin measure of sampling adequacy. *Kaiser* (1974) suggests the following categorisation of KMO values: 0.90 to 1 - "marvelous", 0.80 to 0.89 -"meritorious", 0.70 to 0.79 - "middling" and 0.60 to 0.69 - "mediocre". Alpha stands for Cronbach's alpha, a measure of internal consistency. To interpret it, one rule of thumb suggests that values above 0.90 are "excellent", between 0.70 and 0.89 "good" and 0.60 to 0.69 "acceptable". However, the statistic is not robust to the number of indicators, so it should be interpreted with caution.

Source: WIFO calculations.

Table V **Summary statistics and correlation matrix of composite indicators**

Summary Statistics

Composite indicator	Mean	Std. Dev.	Min	Max
Price Competitiveness	0.014	0.196	-0.459	0.696
Wages	-0.185	1.060	-1.816	1.308
Structure	0.100	0.775	-1.405	1.933
Capabilities	0.160	0.701	-1.358	1.639
Innovation/Education	0.184	0.788	-1.514	1.966
Capabilities: Social	0.130	0.757	-1.383	1.990
Capabilities: Institutions	0.007	0.818	-2.153	1.525
Capabilities: Ecological	0.392	0.777	-1.502	1.883
Traditional outcomes	0.142	0.733	-1.559	1.674
New perspectives outcomes	0.107	0.666	-1.449	1.276
NPO: Income	0.262	0.874	-1.768	2.480
NPO: Social	-0.147	0.925	-2.397	1.405
NPO: Ecological	0.209	0.823	-2.077	1.616

Notes: 297 observations (27 countries, 11 years)

Table V **Continued**

Correlation matrix

	Price Competitiveness	*Wages*	***Structure***	***Capabilities***	*Innovation/ Education*	*Capabilities: Social*	*Capabilities: Institutions*	*Capabilities: Ecological*	***Traditional outcomes***	***New perspectives outcomes***	*NPO: Income*	*NPO: Social*	*NPO: Ecological*
Price Competitiveness	1												
Wages	-0.706***	1											
Structure	0.652***	-0.695***	1										
Capabilities	0.582***	-0.846***	0.601***	1									
Innovation/Education	0.492***	-0.791***	0.615***	0.960***	1								
Capabilities: Social	0.489***	-0.768***	0.457***	0.938***	0.880***	1							
Capabilities: Institutions	0.685***	-0.832***	0.741***	0.897***	0.852***	0.769***	1						
Capabilities: Ecological	0.361***	-0.556***	0.213***	0.702***	0.583***	0.612***	0.453***	1					
Traditional outcomes	0.700***	-0.846***	0.658***	0.833***	0.774***	0.719***	0.857***	0.556***	1				
New persp. outcomes	0.734***	-0.870***	0.719***	0.805***	0.725***	0.718***	0.820***	0.555***	0.849***	1			
NPO: Income	0.799***	-0.901***	0.685***	0.735***	0.642***	0.601***	0.787***	0.567***	0.850***	0.888***	1		
NPO: Social	0.309***	-0.391***	0.351***	0.552***	0.530***	0.567***	0.461***	0.362***	0.494***	0.634***	0.301***	1	
NPO: Ecological	0.605***	-0.737***	0.641***	0.573***	0.500***	0.485***	0.657***	0.351***	0.623***	0.796***	0.778***	0.111*	1

Notes: 297 observations (27 countries, 11 years); *** and * indicate significance at the 1 percent and the 10 percent levels respectively.

Table VI **OLS regressions: New perspectives outcomes vs. price, structure, capabilities**

Table 4 columns (ii) and (vii), introducing sub-components of capabilities separately

Dependent variable: NPO_{it} (Standard errors)	(i) **OLS** (robust)	(ii) **OLS** (robust)	(iii) **OLS** (robust)	(iv) **OLS** (robust)	(v) **OLS ex LU** (robust)	(vi) **OLS ex LU** (robust)	(vii) **OLS ex LU** (robust)	(viii) **OLS ex LU** (robust)
$Price_{i,t-1}$								
$Wages_{i,t-1}$					-0.329**	-0.270***	-0.311**	-0.307**
					(0.126)	(0.092)	(0.118)	(0.112)
$Structure_{i,t-1}$	0.382***	0.428***	0.199*	0.544***	0.210*	0.260**	0.149	0.287**
	(0.105)	(0.090)	(0.111)	(0.081)	(0.120)	(0.115)	(0.104)	(0.125)
$Capabilities_{i,t-1}$								
$InnoEdu_{i,t-1}$	0.383***				0.142			
	(0.096)				(0.131)			
$Social_{i,t-1}$		0.438***				0.214**		
		(0.089)				(0.083)		
$Institutions_{i,t-1}$			0.529***				0.212*	
			(0.098)				(0.111)	
$Ecological_{i,t-1}$				0.395***				0.180*
				(0.077)				(0.102)
R^2	0.656	0.726	0.717	0.715	0.785	0.800	0.794	0.802
Time dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country dummies	No	No	No	No	No	No	No	No
Country number	27	27	27	27	26	26	26	26
Observations	270	270	270	270	260	260	260	260

Notes: Standard errors in all columns are robust to heteroskedasticity and serial correlation (Huber-White sandwich estimator of variance, with standard errors clustered on countries). ***, ** and * indicate significance at the 1 percent, the 5 percent and the 10 percent levels respectively. Constant terms and time dummies not reported.

Source: WIFO calculations.

Table VII **OLS regressions: Traditional outcomes vs. price, structure, capabilities**

Table 5 columns (ii) and (vii), introducing sub-components of capabilities separately

Dependent	(i)	(ii)	(iii)	(iv)	(v)	(vi)	(vii)	(viii)
variable: TO_{it}	**OLS**	**OLS**	**OLS**	**OLS**	**OLS ex LU**	**OLS ex LU**	**OLS ex LU**	**OLS ex LU**
(Standard errors)	(robust)	(robust)	(robust)	(robust)	(robust)	(robust)	(robust)	(robust)
Price$_{i,t-1}$								
Wages$_{i,t-1}$					-0.229**	-0.292**	-0.238***	-0.357***
					(0.095)	(0.118)	(0.082)	(0.102)
Structure$_{i,t-1}$	0.266***	0.388***	0.019	0.528***	0.121	0.205**	-0.014	0.228**
	(0.091)	(0.075)	(0.095)	(0.080)	(0.073)	(0.083)	(0.081)	(0.084)
Capabilities$_{i,t-1}$								
InnoEdu$_{i,t-1}$	0.564***				0.416***			
	(0.102)				(0.095)			
Social$_{i,t-1}$		0.516***				0.273**		
		(0.089)				(0.126)		
Institutions$_{i,t-1}$			0.749***				0.493***	
			(0.111)				(0.090)	
Ecological$_{i,t-1}$				0.449***				0.198**
				(0.088)				(0.088)
R^2	0.669	0.669	0.753	0.641	Yes	Yes	Yes	Yes
Time dummies	Yes	Yes	Yes	Yes	No	No	No	No
Country dummies	No	No	No	No	26	26	26	26
Country number	27	27	27	27	260	260	260	260
Observations	270	270	270	270	Yes	Yes	Yes	Yes

Notes: Standard errors in all columns are robust to heteroskedasticity and serial correlation (Huber-White sandwich estimator of variance, with standard errors clustered on countries). ***, ** and * indicate significance at the 1 percent, the 5 percent and the 10 percent levels respectively. Constant terms and time dummies not reported.

Source: WIFO calculations.

Table VIII **WG regressions: New perspectives outcomes vs. price, structure, capabilities**

Table 6 columns (ii) and (vii), introducing sub-components of capabilities separately

Dependent variable: NPO_{it} (Standard errors)	(i) **WG** (robust)	(ii) **WG** (robust)	(iii) **WG** (robust)	(iv) **WG** (robust)	(v) **WG ex LU** (robust)	(vi) **WG ex LU** (robust)	(vii) **WG ex LU** (robust)	(viii) **WG ex LU** (robust)
Price$_{i,t-1}$								
$Wages_{i,t-1}$					-0.311**	-0.297**	-0.296**	-0.335***
					(0.123)	(0.134)	(0.129)	(0.100)
Structure$_{i,t-1}$	-0.034	-0.034	-0.029	-0.035	0.029	0.039	0.035	0.031
	(0.058)	(0.067)	(0.058)	(0.049)	(0.069)	(0.077)	(0.069)	(0.057)
Capabilities$_{i,t-1}$								
$InnoEdu_{i,t-1}$	0.070				0.110			
	(0.115)				(0.114)			
$Social_{i,t-1}$		0.031				-0.011		
		(0.129)				(0.100)		
$Institutions_{i,t-1}$			0.020				0.029	
			(0.085)				(0.078)	
$Ecological_{i,t-1}$				0.140**				0.170***
				(0.057)				(0.053)
R^2	0.978	0.978	0.978	0.979	0.979	0.978	0.978	0.980
Time dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country number	27	27	27	27	26	26	26	26
Observations	270	270	270	270	260	260	260	260

Notes: Standard errors in all columns are robust to heteroskedasticity and serial correlation (Huber-White sandwich estimator of variance, with standard errors clustered on countries). ***, ** and * indicate significance at the 1 percent, the 5 percent and the 10 percent levels respectively. Constant terms and time dummies not reported.

Source: WIFO calculations.

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 a change: The financial crisis has exposed long neglected deficiencies in the present growth path, most visibly in 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 foundations for a new development strategy that enables 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 started in April 2012. The consortium brings together researchers from 33 scientific institutions in 12 European countries and is coordinated by the Austrian Institute of Economic Research (WIFO). Project coordinator is Karl Aiginger, director of WIFO.

For details on WWWforEurope see: www.foreurope.eu

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