MEASURING INSTITUTIONAL COMPETITIVENESS IN EUROPE

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ABSTRACT

While there are many methods to measure the competitiveness of an economy, most of these concepts ignore the fact that competitiveness can change because of market processes like wage negotiation but also because of political decision-making. Governments that compete with others for factors of production face the incentive to adjust key policy variables to improve their competitive position. Disentangling market-induced and politics-induced changes in competitiveness is not easy, but strongly warranted given current discussions that some EMU Member States should improve their competitive position within the euro area by adjusting policy variables. Increasing country competitiveness is one of the key objectives currently discussed by policy makers in the context of creating an economic union in the euro area, to complement monetary union. We propose a new competitiveness index that captures the dimensions in which politics can influence competitiveness beyond factor price adjustments. Our index shows that the individual components of institutional competitiveness have developed heterogeneously among EMU Member States. To explain these divergent developments, the uneven integration within the EU Single Market may play a role.

NON-TECHNICAL SUMMARY

While unsound fiscal policies in several euro area countries have been one of the main triggers for the current sovereign debt crisis in Europe, fiscal imprudence was not the only cause. In fact, some of the countries in the euro area which have been hardest hit by the current financial turbulences – for example Ireland and Spain – have featured comparatively low government debt levels and even run fiscal surpluses before the crisis. A closer look at countries' current and financial account development reveals that imbalances of another form had been building up since the start of EMU, largely unnoticed – or benignly neglected – by policy makers: large current account deficits and surpluses.

Current account deficits are often interpreted as reflecting a lack of competitiveness. In this context, it is however important to distinguish between the impact a government can have on competitiveness, on the one hand, and the general impact of market processes like wage negotiations and interest rate developments on competitiveness, on the other hand.

Disentangling market-induced and politics-induced changes in competitiveness is not easy, but strongly warranted given that some euro area countries are currently under pressure to improve their competitive position both at the factor price level and through adjusting policy variables. A better distinction between factor price-induced and policy-induced competitiveness developments may also be relevant in the context of the Macroeconomic Imbalances Procedure that was recently introduced as a new instrument of EU economic surveillance. More generally, increasing country competitiveness is one of the key objectives currently discussed by policy makers in the context of strengthening economic union in the euro area, to complement monetary union.

Governments competing among themselves for factors of production face the incentive to adjust key policy variables like market regulations to improve their competitive position. The theory of systems competition gives guidance regarding the intuitional variables that determine a country's competitive position and which are under the direct influence of governments.

Against this background, we argue that for well-founded policy recommendations the political dimension should be evaluated separately from factor price-driven developments. To obtain a better understanding of what drives competitiveness within countries and across countries, we construct a new measure of competitiveness for the EU and some OECD countries that provides an exclusive focus on the policy variables. We introduce the term 'institutional competitiveness' for this new concept of competitiveness. The new 'index of institutional competitiveness' only contains variables under direct influence by policy makers.

The index shows that the individual components of institutional competitiveness have not developed homogenously among euro area countries. To explain these divergent developments, the uneven integration within the EU Single Market may play a role. Systems competition among euro area countries seems to have had a stronger impact in areas that are of particular relevance for the single market such as infrastructure, and in areas where the single market had been most consistently implemented, in particular capital movements. In contrast, system competition appears to have had less of an impact in markets which are less integrated, in particular labour markets.

Institutional Competitiveness of euro area countries has increased most strongly since the mid-1990s. Our paper finds that 'Southern' euro area countries caught up in the 1990s in terms of Institutional Competitiveness with 'Northern' euro area countries. However, as they could not ensure a pronounced institutional competitive edge, the gap between 'Northern' and Southern' euro area countries in terms of Factor Price Competitiveness ultimately remained constant. Indeed, as factor price differentials result from different returns to investment, relative factor prices should not change if relative fundamentals do not change.

Our analysis of the Institutional Competitiveness Index suggests that competitiveness is not only a decision variable for firms, but perhaps even more so, for governments.

I INTRODUCTION

While the on-going sovereign debt crisis in Europe is often primarily associated with fiscally imprudent policies in a number of euro area countries, the underlying economic developments are surprisingly heterogeneous and difficult to pin down. Indeed, some of the countries in the euro area which have been hardest hit by the current financial turbulences – for example Ireland and Spain – have featured comparatively low government debt levels and even run fiscal surpluses before the crisis. A closer look at countries' current and financial account development reveals that imbalances of another form had been building up since the start of EMU, largely unnoticed – or benignly neglected – by policy makers: large current account deficits and surpluses.

Often enough current account deficits are taken as a sign of a lack of competitiveness. In this context, it is however important to distinguish between the impact a government can have on competitiveness, on the one hand, and the general impact of market processes like wage negotiation and interest rate developments on competitiveness, on the other hand. In this paper we construct a new measure of competitiveness that provides an exclusive focus on institutional competitiveness. We construct a new 'index of institutional competitiveness' which only contains variables under direct influence by policy makers. The comparison with established indicators for competitiveness such as the WEF Global Competitiveness Index shows that largely factor-price driven indicators capture indeed only insufficiently institutional developments that have an impact on the relative competitive positions of countries.

The index also allows exploring more in detail the underlying drivers of competitiveness within countries and across countries. For instance, while EMU Member States were able to maintain a competitive edge over non-EMU EU countries in terms of factor price competitiveness, the latter caught up in terms of institutional competitiveness. Similar developments occurred within EMU between 'Northern' and 'Southern' euro area countries. A better distinction between factor price-induced and policy-induced competitiveness developments may also be relevant in the context of the Macroeconomic Imbalances Procedure that was recently introduced as a new instrument of EU economic surveillance to identify and address adverse developments in competitiveness.

The paper is structured as follows. Section 2 presents our motivation and explains the theoretical considerations underlying the paper. Section 3 explains how the new Index for Institutional Competitiveness is constructed. In Section 4 we explore the value added that the index brings for empirical analysis. Section 5 concludes.

2 MOTIVATION AND THEORETICAL CONSIDERATIONS

When countries form an integrated market, they most importantly abolish barriers to trade of goods and services, but – as in the case of the EU Single Market – they have also facilitated the free flow of capital and labour across borders. As a consequence, countries face increased international competition for capital and labour. The effect can be expected to be even more pronounced when this process of economic integration is accompanied by monetary integration. Monetary union lowers the transaction cost for cross-border capital relocations even more and abolishes the exchange rates risk, especially for periphery countries with a history of nominal devaluations. This further intensifies competition for capital and, importantly, foreign direct investment (FDI). Hence, by entering monetary union governments enter a competition for capital inflows, not only carried out through factor costs – wages and interest rates – but also through the optimal set of institutions, i.e. regulation, taxation or infrastructure. The competition for the best set of institutions has been termed 'systems competition' (Sinn 2003).

The following variables are typically considered as the key drivers of capital flows into a certain economy (see inter alia Furceri et al. 2011; Jevčák et al. 2010; Fratzscher 2011):

     I.   foreign exchange rate

    II.   interest rate

   III.   capital account openness

   IV.   financial development

    V.   the market size

   VI.   supply and production factors (such as labour, capital and natural resources),

  VII.   geographical factors (distance)

 VIII.   institutional factors (quality of the legal system, infrastructure etc).

Upon entry into a monetary union such as the euro area, the first three factors – the exchange rate, the interest rate and capital account openness – cease to be relevant for decisions of market participants choosing between one of the member countries of the monetary union as investment destination. The exchange rate risk naturally disappears. Furthermore, through the conduct of a single monetary policy, interest rate differentials at the short end disappear in a monetary union. Beyond that, as witnessed in EMU, a very strong convergence of interest rates at the long end set in, driven by capital flows from 'core' to 'periphery' countries' as a consequence of optimistic market perceptions and a widespread neglect of country risks. While typically the

reserve account will force adjustment upon countries that finance large current account deficits through capital imports over prolonged periods, this direct constraint is absent within a monetary union. That said, as the current crisis has illustrated, other constraints will materialise over time, given that EMU is not a fiscal transfer union.

The disappearance of exchange rate and interest rate differentials implies that relatively more weight will be put on the remaining factor listed above. As geographical factors fall outside the remit of policy discretion, policy makers trying to make their country more competitive are likely to concentrate on production factors and institutional factors to influence market conditions and attract investment. Policy makers can react to increased competition for capital within a monetary union with two sets of strategic variables which are at the core of 'systems competition'. First, they can set policy variables like tax rates on labour, social benefits and wage setting mechanisms to affect unit labour costs. In addition, governments can reduce tax rates on capital income or exempt certain profit streams from taxation in order to decrease the cost of capital. As a consequence, governments end up in a competition for investment that drives down tax rates and social benefits, potentially to inefficiently low levels (Zodrow and Mieszkowski 1986; Haufler and Wooton 1999; Köthenbürger 2002; Devereux et al. 2008; Oates 2001 provides an overview of the debate).

Second, policy makers can affect the competitive position of national firms in the international market by relaxing regulation. In a closed economy it is sensible to have laws that endorse competition in various sectors of the economy. In a globalised world, however, governments may refer to active industrial policies to promote 'national champions'. For example, governments can relax anti-trust legislation to increase the market share of a national conglomerate (Sinn 2003) or relax the regulation of certain economic sectors to establish national companies as key players on the European market (Dell'Ariccia and Marquez, 2006).

However, while deregulation of economic sectors may unleash growth potential, such policy steps are undesirable in particular if a government relaxes regulation where it initially was in place to overcome market failure because of market power or external effects (Sinn 1997). In other words, while more competition at firm level can enhance overall welfare through higher productivity, more competition at regulatory level can prove counterproductive when regulation was intended to improve the functioning of markets. Looking beyond the domestic perspective, such beggar-thy-neighbour policies constitute a negative externality on other countries and can foster the building up of current and financial accounts imbalances. In this vein, the overall economic and welfare effects of enhanced system competition among governments need to be assessed from a broader perspective that goes beyond a purely microeconomic analysis (Sinn 2003).

By exploiting the leeway offered by differing systems of national governance, countries try to gain or maintain a comparative advantage through targeting key macroeconomic variables. These different national 'systems' could be described as different 'business models' that compete for investment and growth (one possible schematic classification of such country models, and their efficiency, is provided in Sapir 2006). In a country with a high savings rate and low domestic consumption, it is natural to seek a comparative advantage in export-driven growth by maintaining low relative labour costs (Wyplosz 2010).

Other countries may choose to build up a comparative advantage by setting very low (corporate) tax rates. While the theoretical evidence on the relationship between regional integration and tax competition is mixed (c.f. Ludema and Wooton 2000), we find some evidence for enhanced competition in the area of capital taxation, as argued in Section 4. This suggests that governments set policy parameters as an answer to systems competition).

3   CONSTRUCTION OF THE INSTITUTIONAL COMPETITIVENESS INDEX

In this section, we present our approach to measures of institutional competitiveness in quantitative terms. To this end, we develop a composite index of institutional competitiveness for 26 EU countries and 10 non-EU OECD countries over the period from 1990 to 2009. We recall a number of methodological considerations and theoretical foundations of index building before selecting our empirical data, normalising it and aggregating it to an index. Finally, we provide descriptive statistics for our index.

3.1   THE METHODOLOGY OF COMPOSITE INDICES

For the construction of an index of institutional competitiveness this study relies on the relevant literature. In particular, it follows the guidelines of the Handbook on Constructing Composite Indicators (OECD & JRC, 2008) that synthesises the many contributions on composite indices into a tractable framework. Empirical measures of competitiveness are as manifold as definitions of competitiveness in theory. Narrow definitions of competitiveness describe the position of an economy in terms of a single economic variable, such as for example wages or long-term interest rates, which may influence the decision-making of economic agents. More elaborate concepts of competitiveness encompass a broader range of variables. They may range from important variables in a firm's cost function, such as for example wages, to more general aspects related to the overall environment in which a firm operates, such as the availability of well-trained workers, the quality of the public transportation infrastructure or the functioning of the legal system.

However, the advantages of composite indicators come at the cost of strong methodological assumptions (e.g. Sharpe 2004 and Saisana et al. 2005). Assumptions are imposed when selecting, scaling, aggregating and weighting the underlying variables of the index. In addition, any composite index is only as good as the data quality of its underlying variables. If the original variables suffer from measurement errors, missing data or sample errors, then the composite index reflects the same limitations although they may not be visible at first glance. In essence, composite indices serve as a powerful instrument for certain applications, provided that the user keeps in mind the underlying assumptions and caveats. Our decision to construct a composite index is motivated by the fact that there is simply no better method of expressing the complex concept of institutional competitiveness of a specific country in a single number that can subsequently be employed as a variable for further econometric analyses.

3.2   THEORETICAL FOUNDATIONS

In section 2 we have defined the concept of institutional competitiveness as the attractiveness of the overall institutional framework of a country for economic agents who engage in economic activities there. According to classical economic theory, an economic agent is interested in optimising the profit of his/her activities. The institutional competitiveness of a country is therefore closely related to the profit maximisation problem of a firm. An investor prefers the country among several which offers the best conditions for the firm's specific profit maximisation problem.

In a simple form, the profit maximisation problem of a firm reads

$$\max \quad p\, f(z) - w \bullet z$$

where

p	scalar denoting a firm's output price
w	vector of input prices
z	vector of input goods
$f(z)$	production function giving the maximum amount of output that can be produced with the input vector z

The institutional framework of a country can affect the profit maximisation problem in a variety of ways by altering either the availability and prices of inputs, the production technology or the output price. For example, the availability and price of the important input factor labour may be affected by labour market regulation. Or the decision by the government to build a new highway may increase the availability and decrease the price of an important raw material. Therefore, an index of institutional competitiveness should capture how the institutional framework of a country influences the different elements of a firm's production function.

Figure 1: Components of institutional competitiveness
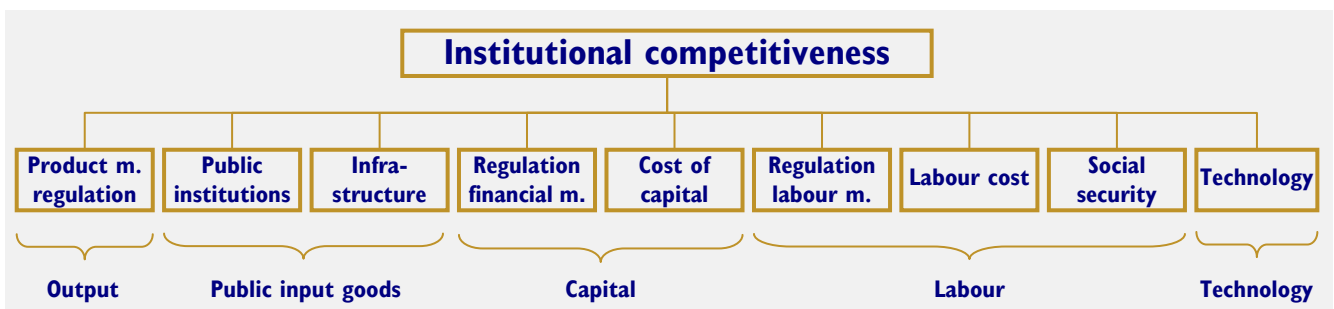
Based on these theoretical considerations we decide to structure our index of institutional competitiveness along the components of the profit maximisation problem. For the output side we consider product market regulation. Among the public input goods, we include public institutions as "soft" production factors and the public infrastructure as "hard" production factors. For both capital and labour, we distinguish between the regulation of the factor market, which determines access to the production factor, and the legal provisions that affect the factor price directly. Under technology we capture public spending on R&D. In the construction of our composite index of institutional competitiveness, these nine components represent the first hierarchical level of sub-indices.

3.3 SELECTION OF DATA

This section operationalises the structure of the Institutional Competitiveness Index (ICI) motivated through theory by backing up each of the sub-indices with empirical data. While it would be desirable to compile data that fully express the economic content of each of the sub-indices, this exercise is in reality strongly constrained by the availability of appropriate data sources. In addition, it should be recalled that our index intends to measure institutional competitiveness and not competitiveness overall. For example, in the case of labour cost the respective sub-index only includes taxation and not the net wage, or in the case of technology only public financing of technology is included but not the amount of patent applications.

In order to serve the purpose of our index, each of the variables we select fulfils the following criteria:

1. The variables measure some aspect of institutional competitiveness. Hence, the following two questions are answered positively for each variable:

   a. Can the executive and/or legislative influence the variable more or less directly through legislative or administrative acts?

   b. Is the variable only indirectly affected by market processes outside the control of executive and legislative?

2. The variable should be available for as many countries of interest as possible and ideally cover the full period from 1990 to 2009. The reason for the choice of this time period is that we want to enable analyses covering the entire period since the first steps towards Economic and Monetary Union until the start of the recent economic and financial crisis.

3. We gave preference to variables that were either collected in surveys or stem from Statistical Authorities. We use Eurostat, the OECD, the World Bank and the World Economic Forum as our main sources.

In some cases, we accepted variables that did not fully satisfy all three criteria if they added important information to the index and if we were convinced that this would not result in a deterioration of the overall results. When several redundant variables were available, we chose the one of highest quality judged by the above criteria. When several similar variables were available we accepted all of them under the same element. If we did not detect any variables of satisfying quality for some element of competitiveness we chose to drop that aspect from our definition, thus preferring a narrow definition at higher empirical quality over a broader definition at lower empirical quality. We did not impute any missing data.

Our resulting index covers 36 countries from 1990 to 2009. The countries are classified in three groups: Sixteen EMU countries[1] (Belgium, Germany, Estonia, Ireland, Greece, Spain, France, Italy, Cyprus, Luxembourg, Netherlands, Austria, Portugal, Slovenia, Slovakia and Finland), 10 non-EMU EU countries (Bulgaria, Czech Republic, Denmark, Latvia, Lithuania, Hungary, Poland, Romania, Sweden and the United Kingdom) and 10 OECD countries (Australia, Canada, Iceland, Japan, South Korea, New Zealand, Norway, Switzerland, Turkey, USA). The structure of the full index including all variables and their sources is pictured in Table 1. Below the sub-indicators derived from the profit maximisation problem, we inserted sub-sub-indicators that bundle certain similar variables into logical aggregates. Below those sub-sub-indicators we list the individual variables and their respective source.

Moreover, for the purpose of comparison (see Section 4), we also use a Price Competitiveness Index (PCI) which includes factor prices and measures of innovation. For factor prices, we include the domestic credit to the private sector, the domestic credit granted by the banking sector, real unit labour costs, nominal unit labour costs, hourly earnings, the short-term interest rate and the long-term interest rate. To measure innovation, we include the number of internet users, the availability of latest technologies, firm-level technology absorption, FDI and technology transfer.

Finally, the Total Competitiveness Index (TCI) includes all of the above variables (both ICI and PCI variables).

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[1] Malta is omitted in spite of EMU membership due to data constraints.

Table 1: Composition and sources of the Institutional Competitiveness Index

Sub-indicator	Sub-sub-indicator	Variable	Source	Institutional variable
Regulation of product markets	Product market taxation	Implicit taxation on consumption	Eurostat	ICI
		Taxes on goods and services	OECD Revenue Statistics	ICI
Public institutions	Soundness of public finances	General government debt	Eurostat	ICI
		General government deficit	Eurostat	ICI
		Long term bond yield	Eurostat	ICI
	Democracy	Perceptions of the extent to which a country's citizens are able to participate in selecting their government, as well as freedom of expression, freedom of association, and a free media.	The Worldwide Governance Indicators, World Bank	ICI
		Perceptions of the likelihood that the government will be destabilized or overthrown by unconstitutional or violent means.	The Worldwide Governance Indicators, World Bank	ICI
	Policy quality	Perceptions of the quality of public services, the degree of its independence from political pressures, the quality of policy formulation and implementation, and the credibility of the government's commitment to such policies.	The Worldwide Governance Indicators, World Bank	ICI
		Perceptions of the government's ability to formulate and implement policies that promote private sector development.	The Worldwide Governance Indicators, World Bank	ICI
	Law enforcement	Perceptions of the quality of contract enforcement, property rights, the police, and the courts, as well as the likelihood of crime and violence.	The Worldwide Governance Indicators, World Bank	ICI
		Perceptions of the extent to which public power is exercised for private gain, as well as "capture" of the state by elites and private interests.	The Worldwide Governance Indicators, World Bank	ICI
Infrastructure	Transport infrastructure	Motorway index	Eurostat	ICI
		Railway index	Eurostat	ICI
		Airtravel passengers	Eurostat	ICI
		Investment in airports	OECD	ICI
		Investment in railways	OECD	ICI
		Investment in roads	OECD	ICI
	Communication infrastructure	Fixed telephone lines	UNdata	ICI
		Mobile phone subscriptions	World Bank	ICI
		Internet users	World Bank	PCI
Regulation of financial markets	Access to financial markets	Domestic credit to private sector	World Bank	PCI
		Domestic credit provided by banking sector	World Bank	PCI
	Trust in financial markets	Soundness of banks	Global Competitiveness Index (8.06), World Economic Forum	ICI
		Loan to capital ratio	ECB	ICI
Cost of Capital	Interest rate	Short-term interest rate	OECD	PCI
		Long-term interest rate	OECD	PCI
	Tax on capital	Implicit tax rate on capital, of which on capital and business income	Eurostat	ICI
		Taxes on property	OECD Revenue Statistics	ICI
		Taxes on income, profits and capital gains total	OECD Revenue Statistics	ICI
		Taxes on income, profits and capital gains, corporations only	OECD Revenue Statistics	ICI
Regulation of labour markets	Labour market flexibility	Strictness of employment protection	OECD Labour Statistics	ICI

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Labour cost	Wages	Real unit labour cost	Eurostat	PCI
		Nominal unit labour cost	Eurostat	PCI
		Hourly earnings (MEI)	OECD	PCI
		Unit labour cost	OECD	PCI
	Taxes on labour and contributions	Implicit taxation on labour	Eurostat	ICI
		Social security contributions	OECD Revenue Statistics	ICI
		Taxes on payroll and workforce	OECD Revenue Statistics	ICI
Social security	Public pension	Retirement age	OECD	ICI
Technology	Access to technology	Availability of latest technologies	Global Competitiveness Index (9.01), World Economic Forum	PCI
		Firm-level technology absorption	Global Competitiveness Index (9.02), World Economic Forum	PCI
		FDI and technology transfer	Global Competitiveness Index (9.03), World Economic Forum	PCI
	Financing of R&D	Government budget appropriations or outlays on R&D (GBAORD)	Eurostat	ICI
Notes: ICI = Institutional Competitiveness Index; PCI = Price Competitiveness Index				

3.4 NORMALISATION

We normalise all variables onto the same scale from 0 to 1 in order to make them comparable without losing information about the relative differences of data points between units and over time. Among the method available for normalisation, we prefer the min-max transformation as it relies on ancillary statistics that do not depend on any unknown population parameter. Hence, the min-max transformation can be computed by solely using the observations of the sample at hand (Wackerly et al., 2002).

In particular we use a variant of the min-max method that selects the minimum and maximum of each indicator over both countries and years (OECD & JRC, 2008). This way not only cross-section but also time-series comparisons are made possible. The transformation function reads

$$y^r_{i,t} = (x^r_{i,t} - \min_t \min_i (x^r)) / (\max_t \max_i (x^r) - \min_t \min_i (x^r))$$

where

$x^r_{i,t}$ observation of variable x^r in country i at time t, with $r \in R$, the set of all variables that enter the index

$y^r_{i,t}$ observation of transformed indicator y^r in country i at time t

$\min_\delta(x^r)$ minimum of variable x^r over δ, with $\delta = i$ or $\delta = t$

$\max_\delta(x^r)$ maximum of variable x^r over δ, with $\delta = i$ or $\delta = t$

As result of this transformation the largest realisation of x^r is transformed to the value of 1, the smallest realisation receives the value of 0. Hence, the indicator y^r varies between 0 and 1, which holds true for all r indicators.

On the downside, the min-max transformation suffers from sensitivity for large outliers. As outliers enter the scaling formula directly they significantly affect the representation of all other observations of the same variable. Fortunately, due to the macro nature of the data used in this study, an inspection of the dataset has not revealed any large outliers that would endanger the appropriate scaling of the variables involved. The distribution of the variables or indicators has not been corrected for skewedness. The descriptive statistics provided in Table 2 confirm that this is not necessary as the group as the group of countries in the sample is sufficiently homogenous.

3.5   WEIGHTING AND AGGREGATION

For the aggregation of variables to a sub-index or sub-sub-index, we use the arithmetic average as all indicators measure the same element of institutional competitiveness in a different way. Likewise, all sub-sub-indices enter their sub-index as arithmetic average, and all sub-indices enter the overall index of institutional competitiveness in a simple arithmetic average. This choice is motivated by theoretical underpinning of our index and intends to give all components of the profit maximisation problem equal weight. In section 3, we conduct a factor decomposition analysis that shows that this assumption is justified and does not lead to the undue over- or under-representations of particular index components.

3.6   DESCRIPTIVE STATISTICS

The resulting index ranges from 0.0327 to 0.9306 and has a mean of 0.5341 and a median of 0.5430. These descriptive statistics as well as those of the sub-index of the full composite index can be retrieved from Table 2. Overall, the index values are very reasonable and unexpected values can be explained reasonably. The indices present little skewedness and it can be excluded that large outliers drive the data. Further descriptive statistics on the sub-sub-indices and individual variables in their original scaling and unit are provided in Table 10 and Table 11 in the annex.

Table 2: Descriptive statistics of the Institutional Competitiveness Index and its sub-indices

Index/sub-index	Minimum	Mean	Median	Maximum	Standard Deviation
Institutional Competitiveness Index	0.0327	0.5341	0.5430	0.9306	0.1345
Regulation of product markets	0.0000	0.5228	0.5087	1.0000	0.2162
Public institutions	0.0000	0.6758	0.6925	0.9792	0.1739
Infrastructure	0.0000	0.2759	0.2591	1.0000	0.1873
Regulation of financial markets	0.0142	0.7759	0.8328	0.9994	0.1913
Cost of capital	0.0034	0.7385	0.7433	1.0000	0.1196
Regulation of labour markets	0.0000	0.5360	0.5527	1.0000	0.2518
Labour cost	0.2139	0.6640	0.6920	1.0000	0.1910
Social security	0.0000	0.4216	0.4025	1.0000	0.1775
Technology	0.0000	0.3204	0.2993	1.0000	0.1755
Total Competitiveness Index	0.0327	0.5075	0.5084	0.8295	0.1279

Notes: For some sub-indices the minimum and maximum equal the extremes of the index scale 0 and 1 respectively. This is only the case if an observation of the index exist for which all the underlying sub-indices and their respective underlying variables are also the minima and maxima.

In addition, Table 3 and Table 4 exhibit the number of observations behind each of the sub-indices on a per-country and a per-year aggregation respectively. The number of observations per country is quite balanced as also indicated by the totalling column at the right hand side, except for a few countries for which lower scores are obtained. Similarly, the number of observations per sub-index is reasonable, with the notable minimum of the technology sub-index that is based on one single variable only.

Table 3: Number of observations per sub-index and country

Country	Regulation of product markets	Public institutions	Infrastructure	Regulation of financial markets	Cost of capital	Regulation of labour markets	Labour cost	Social security	Technology	Total No. observations
AT	20	20	20	13	20	19	20	20	19	171
AU	19	14	20	13	19	19	19	20	0	143
BE	20	20	20	13	20	19	20	20	19	171
BG	11	14	20	11	3	0	11	20	9	99
CA	20	14	20	13	20	19	20	20	0	146
CH	20	14	20	13	20	19	20	20	0	146
CY	14	15	20	6	14	0	14	20	5	108
CZ	17	15	20	13	17	16	17	14	7	136
DE	20	20	20	13	20	19	20	14	19	165
DK	20	20	20	13	20	19	20	20	19	171
EE	14	15	20	9	14	0	14	20	10	116
ES	20	20	20	13	20	19	20	20	14	166
FI	20	20	20	13	20	19	20	20	19	171
FR	20	20	20	13	20	20	20	20	19	172
GR	20	18	20	13	20	19	20	20	18	168
HU	19	15	20	13	19	19	19	20	4	148
IE	20	20	20	13	20	19	20	20	19	171
IS	20	14	20	13	20	1	20	20	0	128
IT	20	20	20	13	20	19	20	20	16	168
JP	20	14	20	13	20	19	20	20	0	146
KR	0	14	20	13	20	0	20	0	0	87
LT	14	15	20	9	14	0	14	16	8	110
LU	20	15	20	13	20	1	20	20	9	138
LV	14	15	20	9	14	0	14	16	16	118
NL	19	20	20	13	19	19	19	20	19	168
NO	20	14	20	13	20	19	20	20	0	146
NZ	20	14	20	13	20	19	20	20	0	146
PL	18	15	20	13	18	19	18	20	16	157
PT	19	20	20	13	19	20	19	20	19	169
RO	11	15	20	9	0	0	11	20	14	100
SE	20	20	20	13	20	19	20	20	14	166
SI	15	14	20	9	15	1	15	14	13	116
SK	15	15	20	13	15	16	15	0	16	125
TR	20	14	20	13	20	19	20	20	0	146
UK	20	20	20	13	20	19	20	20	19	171
US	20	14	20	13	20	19	20	20	0	146
Grand Total	**639**	**596**	**720**	**439**	**640**	**493**	**659**	**654**	**379**	**5219**

Notes: The table denotes in how many years between 1990 and 2009 the sub-index can be observed for each country.

On an annual basis, the data base is somewhat thinner in the first half of the 1990s and in 2009. This is mainly driven by the low availability of some data sources during that period, which in particular affect the public institutions sub-index and the regulation of financial markets. The factor decomposition analysis in Section 4 highlights how this may drive the overall index.

Table 4: Number of observations per sub-index and year

Country	Regulation of product markets	Public institutions	Infrastruc- ture	Regulation of financial markets	Cost of capital	Regulation of labour markets	Labour cost	Social security	Technology	Total No. observations
1990	24	13	36	0	25	24	25	29	12	**188**
1991	26	13	36	0	27	24	27	29	13	**195**
1992	26	14	36	0	27	24	27	29	13	**196**
1993	27	14	36	0	28	26	28	29	16	**204**
1994	27	14	36	0	28	26	28	31	16	**206**
1995	33	24	36	0	34	26	34	31	18	**236**
1996	33	36	36	0	34	26	34	34	19	**252**
1997	33	36	36	29	34	26	34	34	18	**280**
1998	35	36	36	29	34	26	36	34	19	**285**
1999	35	36	36	30	34	26	36	34	21	**288**
2000	35	36	36	30	34	26	36	34	23	**290**
2001	35	36	36	35	34	26	36	34	23	**295**
2002	35	36	36	35	34	26	36	34	20	**292**
2003	35	36	36	35	34	26	36	34	21	**293**
2004	35	36	36	36	35	26	36	34	24	**298**
2005	35	36	36	36	34	26	36	34	26	**299**
2006	35	36	36	36	35	26	36	34	26	**300**
2007	35	36	36	36	35	26	36	34	26	**300**
2008	35	36	36	36	34	29	36	34	25	**301**
2009	25	36	36	36	26	2	26	34	0	**221**
Grand Total	**639**	**596**	**720**	**439**	**640**	**493**	**659**	**654**	**379**	**5219**

Notes: The table denotes in how many countries the sub-index can be observed for each year.

4 VALUE ADDED FROM THE INSTITUTIONAL COMPETITIVENESS INDEX

The common practice of constructing competitiveness indices does not sufficiently capture the political and institutional factors that determine a country's competitive position. Traditional competitiveness indices largely reflect factor price adjustments, while the Institutional Competitiveness Index (ICI) reflects policy adjustment.

As explained in Section 3, we have constructed the Total Competitiveness Index (TCI) to emulate the construction of other commonly used competitiveness indices by including political and institutional variables as well as variables related to factor prices. Consistent with the above assumption, the TCI is highly correlated with the WEF GCI, whereas the ICI is not as highly correlated with the WEF GCI (see Subsection 5.1). We pick the WEF GCI as an example because it is widely used.

Political and institutional variables play a significant role in determining a country's relative competitive position, and should therefore receive more attention when constructing competitiveness indices. Section 5.2 provides a factor decomposition analysis of the TCI that confirms the importance of political and institutional variables. Section 5.3 explores Factor Price Competitiveness and Institutional Competitiveness for EMU countries, non-EMU EU countries and other OECD countries. Section 5.4 takes a closer look at the development of the sub-indices over time.

4.1 INSTITUTIONAL COMPETITIVENESS AND THE WEF GLOBAL COMPETITIVENESS INDEX

To show similarities and differences between the Institutional Competitiveness Index (ICI) and traditional approaches to measuring competitiveness, we compare the widely-acknowledged WEF GCI with the Price Competitiveness Index (PCI), the ICI and the Total Competitiveness Index (TCI). First, the correlation is highest between the PCI and the WEF GCI. Second, the correlation is lower between the TCI and the WEF GCI. Third, the correlation is lowest between the ICI and the GCI.

To illustrate the correlation between the WEF and the TCI, we show the correlation for the last year in our sample: 2009. Figure 2 presents the correlation between the WEF GCI and the PCI in the top panel, the correlation between the WEF GCI and the ICI in the middle panel and the correlation between the WEF GCI and the TCI in the bottom panel, all for 2009. The correlation coefficients do not differ markedly for the years before 2009.

Figure 2: Correlation between the Price Competitiveness Index, the Institutional Competitiveness Index, the Total Competitiveness Index and the WEF Global Competitiveness Index
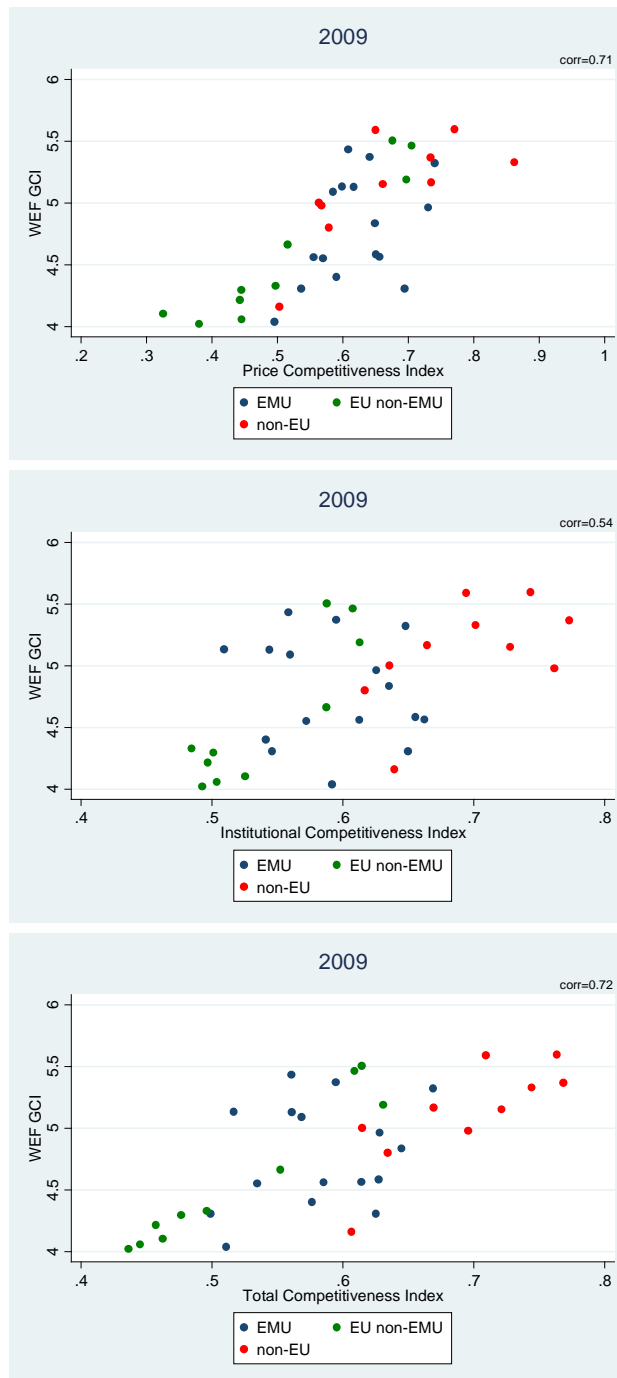
Source: WEF, own calculations. EMU countries: Belgium, Germany, Greece, Estonia, Ireland, Spain, France, Italy, Cyprus, Luxembourg, the Netherlands, Austria, Portugal, Slovenia, Slovakia, and Finland. Malta is excluded because of insufficient observations in the sub-categories. Non-EMU EU countries: Bulgaria, Czech Republic, Denmark, Latvia, Lithuania, Hungary, Poland, Romania, Sweden, and the United Kingdom. The selection of non-EU OECD countries includes Australia, Canada, Switzerland, Iceland, Japan, Croatia, Norway, New Zealand, Turkey, and the United States.

The average correlation coefficient for years 2004 to 2009 is always highest for the correlation between PCI and WEF GCI, followed by the correlation between TCI and WEF GCI and the

correlation is lowest for the ICI and the WEF GCI, as illustrated in table 5. As the average correlation is lowest for EMU countries for all three indices, PCI, ICI and TCI, the WEF GCI seems to capture fewer of the factors that play a role in EMU countries.

The lower correlation between the ICI and the WEF GCI confirms that the ICI measures a different trend. Since we include only one WEF indicator in the ICI, but none in the PCI, finding a lower correlation for the ICI than for the PCI may even seem surprising. This suggests that the factors driving the trend in the WEF GCI are related to factor prices rather than policy changes.

Table 5: Correlation coefficients by region

Correlation of WEF GCI with …	EMU	Non-EMU EU	Other OECD
PCI	0.47	0.92	0.71
ICI	0.06	0.46	0.69
TCI	0.23	0.72	0.73
Notes: ICI = Institutional Competitiveness Index; PCI = Price Competitiveness Index			

Put differently, the factor price component dominates the institutional component. We draw as a first tentative conclusion that including factor prices in measures of competitiveness dilutes the impact of political and institutional variables. To substantiate this claim, we evaluate the drivers of Factor Price Competitiveness, Total Competitiveness and Institutional Competitiveness in the next subsection.

4.2   FACTORS DRIVING COMPETITIVENESS

To evaluate the drivers of competitiveness we use a factor decomposition analysis that is usually applied to indicators of inequality (e.g. Shorrocks 1982, 1980, 1984, 1988; Fields 2003).

4.2.1   FACTOR DECOMPOSITION ANALYSIS

Our approach is similar to the decomposition by components (e.g. Shorrocks 1982), because we would like to analyse the extent to which a sub-component causes variation in the aggregate competitiveness index. Thus, we apply a factor decomposition approach to a measure of variance.

We do not have the usual problems related to choosing the optimal inequality measure for decomposition. Ideally, such an indicator has the properties useful for decomposition if it is a sum of contributing components. The ICI has such properties, because the sub-indicators are

summed up and then normalised. Analogously to the requirements for the decomposition by components the variance of competitiveness increases if the variation in a sub-component increases.

Consider the following illustration, which is based on Shorrocks (1982). If C_h denotes the type of competitiveness index with $h \in \{P, I, T\}$, then we can write the variance in the respective competitiveness index as

$$\text{var}(C_h) = \sum_k \text{var}(SC_k) + \sum_{j \neq k} \sum_k \rho_{jk} \, \text{var}(SC_j) \, \text{var}(SC_k)$$

with $\text{var}(SC_k)$ denoting the variance of sub-component k, ρ_{jk} the correlation coefficient between sub-component k and sub-component j. The straightforward approach also discussed in Cowell and Fiorio (2009) is to assign half of the contribution of all correlations involving sub-component k to sub-component k such that the part of total variance that can be attributed to sub-component k is

$$S_k(\text{var}(C_h)) = \text{var}(SC_k) + \sum_{j \neq k} \rho_{jk} \, \text{var}(SC_j) = \text{cov}(SC_k, SC)$$

such that

$$S_k(\text{var}(C_h)) + \sum_{j \neq k} S_j(\text{var}(C_h)) = \text{var}(C_h).$$

This means that the contribution share of sub-component k is

$$s_k(\text{var}(C_h)) = \frac{S_k(\text{var}(C_h))}{\text{var}(C_h)} = \frac{\text{cov}(SC_k, C_h)}{\text{var}(C_h)}.$$

We report these contribution shares in the tables below.

We apply the Shorrocks type decomposition to the variance of the respective competitiveness index. As our data set contains information on competitiveness by country and by year, we compute the variance over time and over countries. The variance over time indicates the most important drivers of competitiveness over time with the country-dimension fixed, while the variance over countries indicates the most important common driver. For the factor decomposition analysis, we look at the whole sample as well as sub-samples with the EMU, non-EMU EU and other OECD countries.

The linear structure of the decomposition by factor source is similar to a linear regression approach, which is why regression-based factor decomposition is common (Cowell and Fiorio 2009). In this paper we use a regression-based factor-decomposition approach. Similar to the use of such methods for decomposing income by the contributions of different components we

focus on the contribution of each sub-category to the variation in competitiveness. We estimate the following model: $\mathrm{var}(C_h) = \beta_0 + \sum_{k=1}^{K} \beta_k x_k + v$, where β_k is the contribution of each sub-component and x_k denotes the sub-component.

4.2.2 FACTOR DECOMPOSITION: USUAL MEASURES OF COMPETITIVENESS MASK DIFFERENCES IN INSTITUTIONAL VARIABLES

The usual non-institutional variables included in competitiveness indices reflect cross-country differences in development. Those variables typically include factor prices, like labour costs and interest rates, but also technological variables like the diffusion of technical knowledge or the distribution of internet coverage.

As shown in table 6, the variation between EMU, non-EMU and other OECD countries is largely driven by the infrastructure sub-indicator, which for the PCI only contains information on the number of internet users. We interpret the number of internet users as a proxy for heterogeneity in development, because it contributes more than 40% to the variation if we compare country groups (column 1), but only about 1% if we compare developments *within* countries, shown in in column (2). When we compare countries, it is possible that the contribution of internet users is even lower than shown in column (3), given that the residual contributes more than 95% in this case.

Table 6: Contribution of sub-indicators to Price Competitiveness Index (%)

Sub-indicator	(1) Variation between country groups	(2) Variation within countries (time dimension variable)	(3) Variation between countries (country dimension variable)
Access to financial markets	-2.323	-0.280	0.452
Infrastructure	43.082	0.953	2.952
Cost of labour	6.208	8.585	0.519
Cost of capital	2.573	0.850	0.480
Technology	-3.516	2.544	-0.035
Residual	53.97	87.348	95.633
Total	100	100	100
Observations	373	373	373

Notes: Regression-based factor decomposition analysis with OLS. Coefficient and corresponding standard errors as well as factor shares can be obtained from the authors upon request. Column (1) gives the contributions to the variation between EMU, non-EMU EU and other OECD countries. Column (2) gives the contributions to the variation within a country in the sample over time. Column (3) gives the contributions to the variation between all countries in the sample for a given year.

The three most important drivers for the variation of a country's Total Competitiveness over time are domestic credit, short and long term interest rates and the taxation of goods and services, as shown in table 7 (column 2). Note that the names of the sub-indicators differ from

the sub-indicators in the previous table. As we separate institutional components from price components in this decomposition, we have to use sub-sub-indicators for this decomposition. The impact of the taxation of consumption, goods and services is lower than the impact of the factor price components. Yet, the contribution of the taxation of consumption, goods and services shows that political variables have an impact on the variation in competitiveness.

Political and institutional variables are the strongest driver of the variation of Total Competitiveness between country groups (column 1). We find that the strictness of employment protection and the taxation of capital contribute between 16-17% to the variation in Total Competitiveness between country groups. As political and institutional variables are similar within a region, the contrast in terms of these variables is stronger between country groups than between countries. This may explain the larger contribution of political and institutional variables to the regional variation in Total Competitiveness. The variation between countries (column 3) is overwhelmingly driven by what we take to be a proxy for economic development, followed by factor price variables.

Table 7: Contribution of sub-indicators to Total Competitiveness (%)

Sub-indicator	(1) Variation between country groups	(2) Variation within countries (time dimension variable)	(3) Variation between countries (country dimension variable)
Public institutions	0.721	1.014	3.112
Pension system	1.759	-0.220	0.156
Taxation: consumption, goods, services	2.571	2.776	-0.004
Regulation of financial markets	7.358	0.176	3.977
Strictness of employment protection	16.604	-0.120	0.329
Infrastructure	-3.770	-0.234	-7.147
Explicit and implicit taxation of labour (incl. social security contributions)	-0.7463	-0.385	-0.385
Taxation of capital	16.227	0.0001	1.490
Spending on R&D	-0.277	-0.0002	0.196
Domestic credit	7.232	9.980	-1.176
Internet users	4.029	0.683	59.261
Unit labour costs, hourly earnings, productivity	1.636	-0.0248	6.020
Short-term and long-term interest rates	6.221	4.590	13.905
Technology	-0.168	1.421	-1.115
Residual	40.603	80.354	21.381
Total	100	100	100
Observations	180	180	180

Notes: Regression-based factor decomposition analysis with OLS. Coefficient and corresponding standard errors as well as factor shares can be obtained from the authors upon request. Column (1) gives the contributions to the variation between EMU, non-EMU EU and other OECD countries. Column (2) gives the contributions to the variation within a country in the sample over time. Column (3) gives the contributions to the variation between all countries in the sample for a given year.

The ICI helps to detect the contribution of political and institutional variables that can otherwise be masked by country differences in economic development or factor price movements. While the between-country analysis in column (3) in table 7 suggests that when adding up the contributions of the institutional sub-indicators to Total Competitiveness, their total contribution may be as low as 1.7%, the between-regions analysis in column (1) in table 7 shows that the cumulative contribution can be as high as 40%.

The taxation of capital and the strictness of employment protection are not only the main determinants of between-regions variation in Total Competitiveness, but – together with the regulation of financial markets – also the main determinants of between-regions variation in Institutional competitiveness. Column (1) in table 8 shows that the taxation of capital contributes about 12% and the strictness of employment protection contributes about 9% to the between-regions variation in Institutional Competitiveness. The regulation of financial markets contributes almost 13%.

The between-country variation in Institutional Competitiveness is largely driven by financial market regulation and infrastructure variables. Column (3) in table 8 highlights that these variables together explain about 42% of the between-country variation in Institutional Competitiveness. As the contribution of the residual is around 51%, the contribution of the other sub-sub-indicators is comparatively small. We can also compare whether countries' relative competitiveness position has changed over time and how this relates to Institutional Competitiveness. Countries seem to influence their relative competitiveness position largely by the taxation of production factors. Column (2) in table 8 shows that the within-country variation of Institutional Competitiveness over time appears to be mainly driven by the explicit and implicit taxation of labour, public policy variables and the taxation of consumption, goods and services.

Table 8: Contribution of sub-sub-indicators to Institutional Competitiveness (%)

Sub-indicator	(1) Variation between country groups	(2) Variation within countries (time dimension variable)	(3) Variation between countries (country dimension variable)
Public policy	0.614	6.184	1.562
Pension system	0.459	-0.171	0.498
Taxation: consumption, goods, services	1.187	3.855	-0.234
Regulation of financial markets	12.806	-1.474	18.181
Strictness of employment protection	9.737	-0.342	1.736
Infrastructure	7.298	1.845	23.946
Explicit and implicit taxation of labour (incl. social security contributions)	1.203	8.340	0.918
Taxation of capital	12.107	0.343	0.789
Spending on R&D	0.232	-1.133	1.177
Residual	54.357	82.553	51.427
Total	100	100	100
Observations	185	185	185

Notes: Regression-based factor decomposition analysis with OLS. Coefficient and corresponding standard errors as well as factor shares can be obtained from the authors upon request. Column (1) gives the contributions to the variation between EMU, non-EMU EU and other OECD countries. Column (2) gives the contributions to the variation within a country in the sample over time. Column (3) gives the contributions to the variation between all countries in the sample for a given year.

4.3 COMPETITIVENESS BETWEEN COUNTRY GROUPS

Figure 3: Developments in Institutional Competitiveness and Factor Price Competitiveness
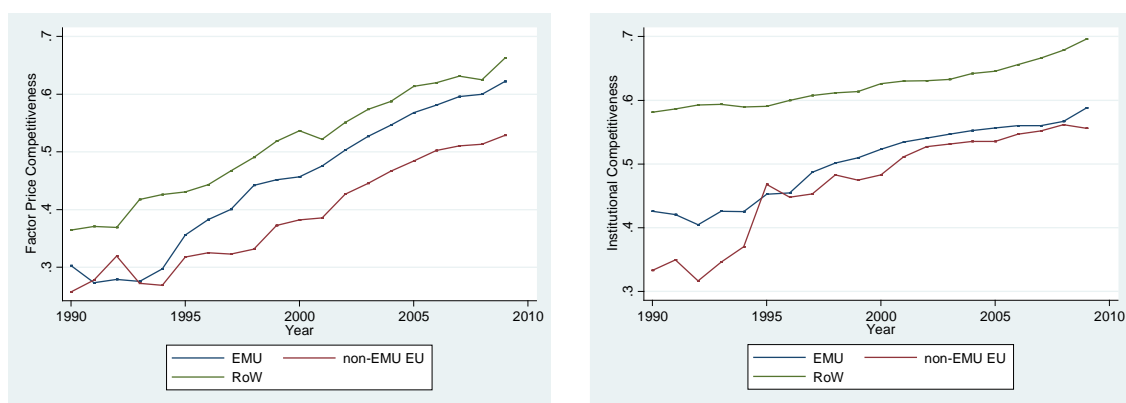
Source: own calculations.

Source: own calculations.

While the Price Competitiveness Index suggests that competitiveness diverged between EMU and non-EMU countries between 1990 and 2009, the Institutional Competitiveness Index suggests that this divergence decreased. Only considering Factor Price Competitiveness as shown in the left panel of Figure 3 would thus suggest that EMU countries improved their competitiveness more strongly than non-EMU EU countries after the Maastricht Treaty was signed. Only considering Institutional Competitiveness as shown in the right panel of Figure 3 would suggest instead that non-EMU EU countries underwent a rapid competitiveness

adjustment between 1992 and 1995, whereas their relative competitiveness position to EMU countries remained unchanged thereafter.

After 1993, Factor Price Competitiveness increased in both EMU and non-EMU EU, albeit more strongly in EMU. The improvement in Factor Price Competitiveness of EMU Member States could be related to intensified factor flows, facilitated by the Single Market and later by the single currency. The improvement of Institutional Competitiveness among non-EMU EU Member States could be related to the intensified need to improve the institutional framework in response to the closer ties among EMU Member States. Moreover, the starting points for institutional reforms were substantially different: the non-EMU EU sample includes many countries from Central and Eastern Europe which, after the fall of the Iron Curtain, underwent significant institutional change and improved their institutional frameworks significantly, while EMU countries started from a higher level so that institutional change occurred in a more incremental manner. In short, while EMU gained in relative Factor Price Competitiveness, it lost in relative Institutional Competitiveness.

Notwithstanding differences between EMU and non-EMU EU countries, we would expect Institutional Competitiveness developments within EMU to be uneven, as a consequence of systems competition. As explained in Section 2, systems competition comes into effect when sovereign states form a common market and factors of production can move across borders without constraints (Sinn 2003). By virtue of the EU Treaties, free movement of products, services, labour and capital should hold for every country within the EU. However, progress in achieving these four freedoms has been uneven. While capital controls were officially abolished already in 1990, marking the start of the EMU process, labour market restrictions have only been lifted gradually and are still in place for some of the new Member States.[2] In addition to these formal restrictions, a number of other barriers (e.g. difficulties in the cross-border transfer of pension claims, language barriers) also work against full labour mobility in the Single Market. As a consequence, effects of EMU on labour markets should not be expected to be as clear-cut as the effects triggered by the abolition of capital controls on capital markets (see Subsection 4.4). Our observation of more limited relative improvements in Institutional Competitiveness in EMU is in line with the uneven achievement of all four freedoms.

We argue that the two observations on Factor Price Competitiveness and Institutional Competitiveness are linked. In fact, the limited achievement of all of the four freedoms could be related to increased competition among EMU Member States. As a consequence of the increased mobility of factors, especially capital, governments enter systems competition and

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2   Bulgarian and Romanian citizens currently face labour market restrictions in 8 EU Member States, which need to be lifted by 2014.

need to improve their institutional set-up in order to attract production factors. Governments' response to systems competition can however lead to increased instead of decreased domestic market protection. The ICI helps to isolate the components that drive such developments.

When compared to 1990, all EMU countries have improved their Institutional Competitiveness as well as their Factor Price Competitiveness. Both 'Northern' and 'Southern' Member States can be found among those with the largest variation in Institutional Competitiveness (see table 9). For example, we measure the largest variations for Slovenia, Slovakia and Estonia, but the variation is also high in Finland, Cyprus and Italy. Those countries with more modest variation in Institutional Competitiveness, for example Germany, France and Ireland, however record higher minimum levels than those countries with a higher variation. The maximum value of Institutional Competitiveness is reached in Finland, followed by Luxembourg and Austria.

Table 9: Variation in Institutional Competitiveness

Euro area				non-EMU EU				Other OECD		
	VAR	MIN	MAX		VAR	MIN	MAX		VAR	MIN	MAX
de	0.00	0.51	0.74	uk	0.00	0.58	0.74	is	0.00	0.56	0.68
fr	0.00	0.45	0.71	pl	0.00	0.43	0.73	jp	0.00	0.62	0.77
ie	0.00	0.51	0.66	hu	0.00	0.37	0.71	kr	0.00	0.50	0.65
es	0.00	0.48	0.71	dk	0.01	0.46	0.81	kr	0.00	0.50	0.65
nl	0.00	0.48	0.77	se	0.01	0.45	0.83	us	0.00	0.61	0.78
pt	0.00	0.42	0.70	ro	0.02	0.18	0.64	ch	0.00	0.65	0.83
be	0.00	0.37	0.70	bg	0.02	0.11	0.70	ca	0.00	0.55	0.76
lu	0.01	0.47	0.84	cz	0.03	0.05	0.76	au	0.00	0.57	0.80
gr	0.01	0.35	0.62	lv	0.03	0.06	0.64	tr	0.00	0.40	0.64
at	0.01	0.45	0.83	lt	0.03	0.05	0.77	nz	0.01	0.54	0.83
it	0.01	0.38	0.75					no	0.01	0.40	0.83
cy	0.01	0.41	0.70								
fi	0.01	0.45	0.93								
ee	0.02	0.29	0.77								
si	0.03	0.07	0.67								
sk	0.04	0.03	0.71								
Source: Own calculations											

In the context of deteriorating current account balances in the 'South', an improvement in Institutional Competitiveness in these countries may seem surprising. In fact, 'Southern' Countries have improved more strongly in terms of Institutional Competitiveness while the gap between 'Northern' and Southern' countries in terms of Factor Price Competitiveness remained constant, as illustrated in Figure 4.

Figure 4: Developments in Institutional Competitiveness for selected euro area countries
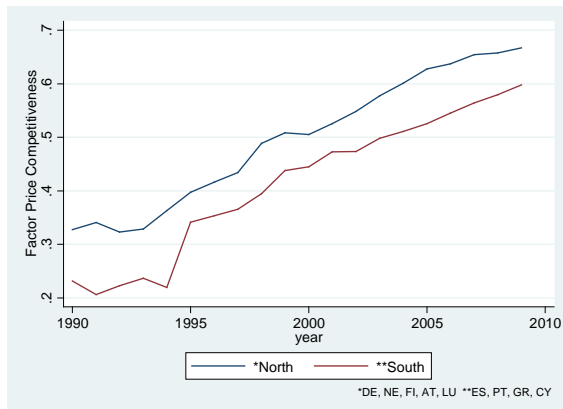
Source: own calculations.
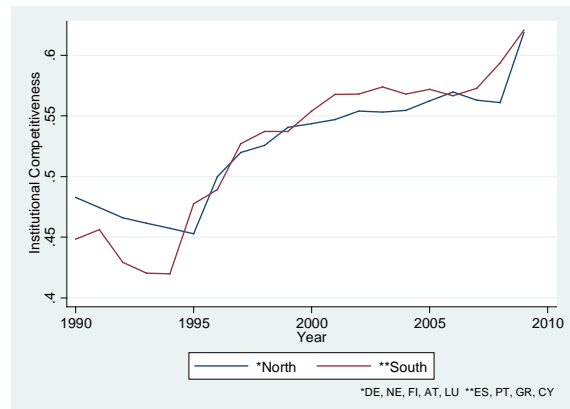
Source: own calculations. The picture emerging does not change much if we change the composition of 'Northern' and 'Southern' countries.

However, we can explain the unchanged differential in Factor Price Competitiveness between the 'North' and the 'South' with improvements in Institutional Competitiveness in both the 'North' and the 'South'. As factor price differentials result from different returns to investment, relative factor prices should not change if relative fundamentals do not change. We can see from that shortly after Maastricht 'Southern' Member States improved their Institutional Competitiveness, which is also when the gap in Factor Price Competitiveness narrowed slightly. However, 'Southern' Member States could not ensure a pronounced competitive edge in terms of Institutional Competitiveness. Against this background, a persistent gap in Factor Price Competitiveness seems logical. These observations suggest that there might be a link between the institutional set-up and factor prices.

Figure 5: Developments in Institutional Competitiveness for selected euro area countries
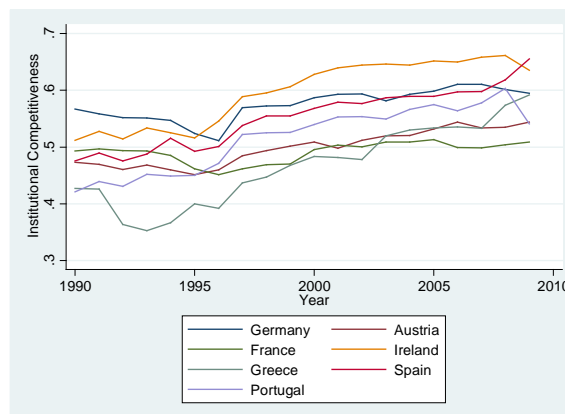
Source: own calculations. The selection of non-EU OECD countries includes Australia, Canada, Switzerland, Iceland, Japan, Croatia, Norway, New Zealand, Turkey and the United States.

A between-country comparison for EMU countries confirms that relative Institutional Competitiveness between EMU countries has remained largely constant. Figure 5 provides the same information as the right panel of Figure 4 above, only for selected EMU countries. All countries have improved their Institutional Competitiveness, but the position relative to each other has not changed significantly.

Therefore, the Institutional Competitiveness Index also helps us to gauge the factors of importance for the institutional adjustment process. We look at the different factors that matter for the changes in Institutional Competitiveness in the next subsection.

4.4   INSTITUTIONAL COMPETITIVENESS AND SYSTEMS COMPETITION

While we can map competitiveness developments over time for the sub-indicators in the ICI, we cannot draw conclusions about the effects of system competition within EMU. The theoretical predictions of the systems competition literature suggest that, first, systems competition is stronger where the factors of production are more mobile (e.g. Sinn 1997). For example, a higher mobility of capital should lead to stronger systems competition in the capital, as opposed to more limited effects of system competition in labour markets which remain more regulated. Against this background we evaluate whether Institutional Competitiveness in terms of capital taxation has increased more strongly than Institutional Competitiveness in terms of labour taxation. However, while higher competitiveness is associated with lower taxes, this does not need to be the most efficient outcome in terms of social welfare.[3]

On average, EMU countries have improved their competitiveness in terms of capital taxation between 1996 and 2009, while competitiveness in terms of labour taxation dropped before 1996 and remained constant largely constant since then, as shown on Figure 6. Institutional Competitiveness in terms of public institutions deteriorated in most countries, also shown on Figure 6, while the social security sub-index remained largely constant. Competitiveness in labour market regulation has until recently improved, though very gradually. Some recent indicative data suggest that labour market mobility may have remarkably increased since the start of the crisis in the euro area (Bräuninger and Majowski 2011). This may lead to a broader and long-term improvement of institutional competitiveness of EMU Member States compared to the situation before the financial and sovereign debt crisis.

In those areas of importance for competing in the single market, competitiveness has improved most: product market regulation, infrastructure, and technology. Competitiveness in

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[3] This also applies to the case when competition among political parties in fact leads to a more *efficient* outcome, for example, whenever there is underprovision of a public good because of an intervention by lobby group, and systems competition would enhance the influence of lobby groups.

infrastructure increases most strongly compared to the other sub-indices. We see a clear change in trend during the second half of the 1990s. In particular, there were general improvements in communication infrastructure during this time, but the development is also driven by infrastructure investments other than in communication. However, this should not be surprising given that a well-developed infrastructure is important for reaping the benefits from the single market. The increase in R&D spending, though less pronounced, fits this picture.

Figure 6: Developments in Institutional Competitiveness sub-indices
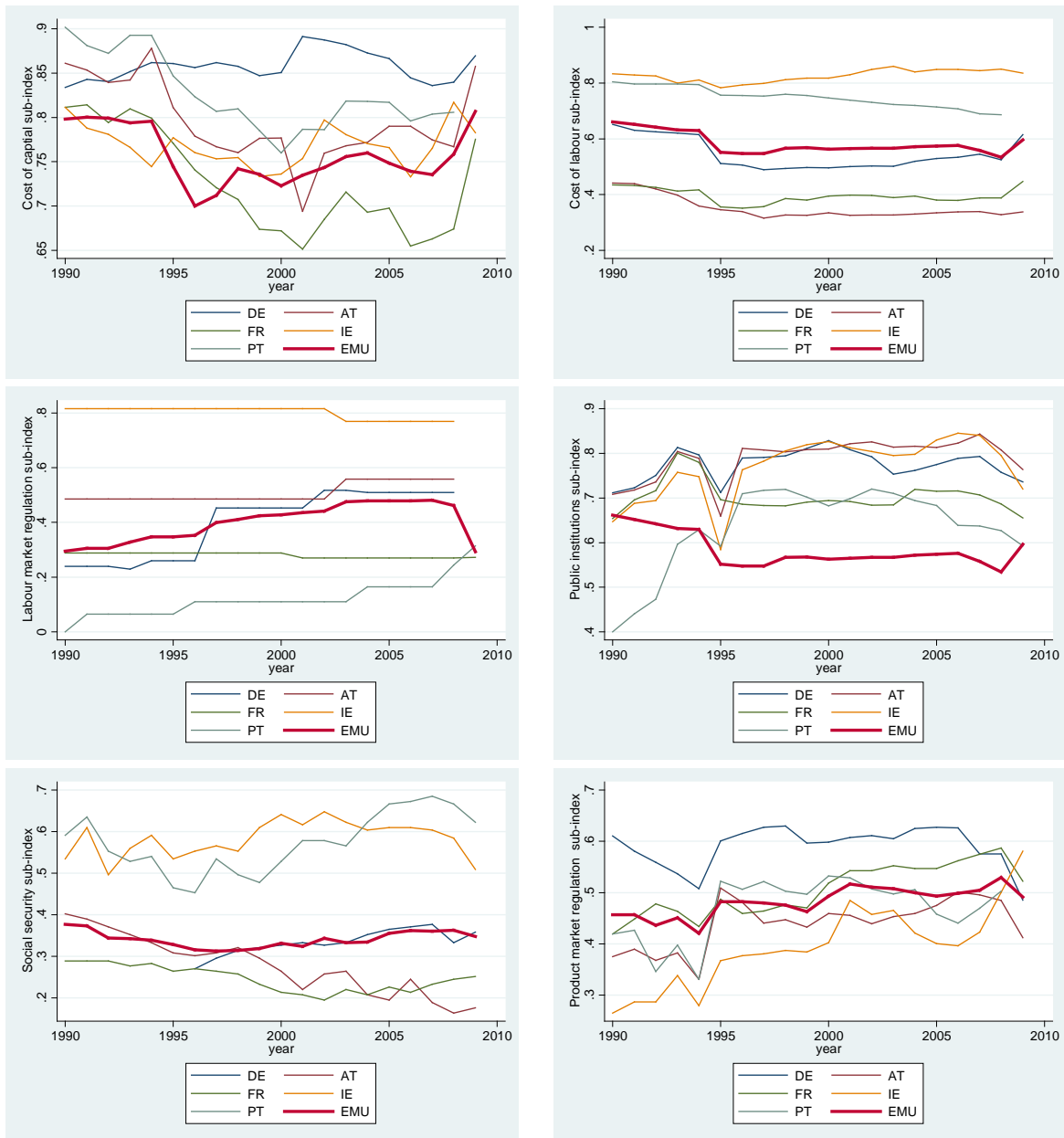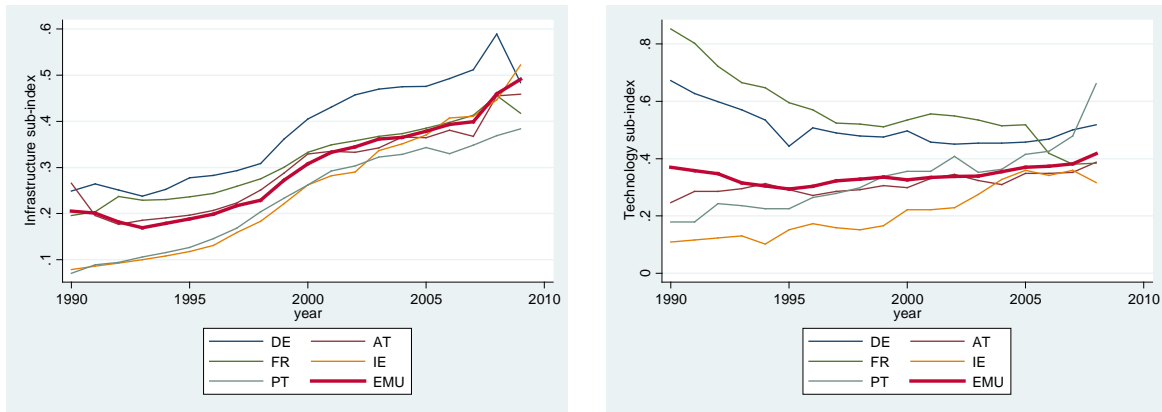
Source: own calculations. "Cost of capital sub-index" and "cost of labour sub-index" only contain taxation variables.

The comparison of competitiveness in terms of labour taxation vs. capital taxation suggests that the lack of systems competition in labour markets may be a reason for more heterogeneity in labour market competitiveness within EMU. The importance of competitiveness in product market regulation, infrastructure and technology hints to a significant impact of competition in the single market. However, Figure 6 also indicates important differences between countries. While developments in infrastructure followed a similar trend, R&D spending seems to have converged. In contrast, developments in social security have diverged, while persistent differences are visible in labour market regulation. For explaining intra-EMU differences, these developments deserve a closer look. While the Institutional Competitiveness Index can serve as a helpful tool for doing so, such a detailed analysis is beyond the scope of this paper.

5 CONCLUSIONS

Competitiveness is often perceived as the silver bullet in the quest to reduce fiscal deficits and current account imbalances in Europe. However, it is not clear to which extent governments can influence overall competitiveness by setting policy variables. Still, this is of utmost importance when giving policy recommendations. Therefore, it is important to measure competitiveness not in terms of factor flows – like current account deficits and surpluses, which are commonly included in competitiveness indices – but in terms of the causes for such developments. The theory of systems competition gives guidance regarding the aspects that determine a country's competitive position, which a government can influence: institutional variables, eventually to attract investment. We have developed a new index of institutional competitiveness for the EU and some OECD countries that includes all variables available to governments, but not such variables that merely capture factor price adjustments, as these factor price adjustments can either be the result of the setting of policy variables or even the result of an economic adjustment process.

The Institutional Competitiveness Index goes beyond the usual approaches in that it measures the effects governments can have on competitiveness. We argue that for well-founded policy recommendations, the political dimension should be evaluated separately from factor price-driven developments. This becomes all the more important in the context of the new EMU governance framework, which includes a Macroeconomic Imbalances Procedure that, if such imbalances become excessive and agreed policy recommendations are not followed, can lead to sanctions for the EMU country concerned.

 A first look at the developments of the index and its sub-indices suggests that system competition among EMU countries had a stronger impact in areas that are of particular relevance for the single market such as infrastructure, and in areas where the single market had been most consistently implemented, in particular capital movements. In these areas, Institutional Competitiveness of EMU countries had increased most strongly since the mid-1990s. Our paper also finds that 'Southern' EMU countries caught up in the 1990s in terms of Institutional Competitiveness with 'Northern' EMU countries. However, as they could not ensure a pronounced institutional competitive edge, the gap between 'Northern' and Southern' EMU countries in terms of Factor Price Competitiveness remained constant. Indeed, as factor price differentials result from different returns to investment, relative factor prices should not change if relative fundamentals do not change. Further research could explore to what extent institutional competitiveness drives factor price competitiveness, and also whether there is a significant correlation between institutional competitiveness and financial flows.

While we do not argue that our index should be used in isolation, we call for researchers and policy makers alike to thoroughly analyse the cause of a development and distinguish this cause from the results before giving policy recommendations. Above all, our paper shows that competitiveness is not only a decision variable for firms, but perhaps even more so, for governments.

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LIST OF SELECTED ABBREVIATIONS

ECB	European Central Bank
EMU	Economic and Monetary Union
EU	European Union
FDI	Foreign Direct Investment
GCI	Global Competitiveness Index
ICI	Institutional Competitiveness Index
JRC	Joint Research Centre
OECD	Organisation for Economic Co-operation and Development
PCI	Price Competitiveness Index
R&D	Research and development
TCI	Total Competitiveness Index
UN	United Nations
WEF	World Economic Forum
WGI	World Governance Indicators

ANNEX I – TABLES

Table 10: Descriptive statistics of the sub-sub-indices underlying the Institutional Competitiveness Index

Index/sub-index	Minimum	Mean	Median	Maximum	Standard Deviation
Democracy	0.0000	0.7270	0.7419	0.9843	0.1614
Policy quality	0.0355	0.6276	0.6745	0.9679	0.2158
Law enforcement	0.0080	0.6260	0.6657	0.9937	0.2650
Soundness of public finances	0.0000	0.7284	0.7400	0.9871	0.1410
Public pensions	0.0000	0.4216	0.4025	1.0000	0.1775
Product market taxation	0.0000	0.5228	0.5087	1.0000	0.2162
Trust in financial markets	0.0142	0.7759	0.8328	0.9994	0.1913
Labour market flexibility	0.0000	0.5360	0.5527	1.0000	0.2518
Transport infrastructure	0.0000	0.1103	0.0527	0.8587	0.1515
Communication infrastructure	0.0000	0.3992	0.4045	1.0000	0.2303
Taxes on labour and contributions	0.2139	0.6640	0.6920	1.0000	0.1910
Tax on capital	0.0034	0.7385	0.7433	1.0000	0.1196
Financing of R&D	0.0000	0.3204	0.2993	1.0000	0.1755

Notes: For sources for the composition of the indices in this table refer to Table 1.

Table 11: Descriptive statistics of the variables underlying the Institutional Competitiveness Index

Index/sub-index	Minimum	Mean	Median	Maximum	Standard Deviation
General government debt	3.70	49.80	48.80	130.40	28.48
General government deficit	-15.40	-1.97	-1.90	6.80	3.48
Long term bonds yield	2.49	6.56	5.48	24.01	3.08
Perceptions of democratic participation, freedom of expression, freedom of association, and a free media.	-0.73	1.17	1.28	1.83	0.41
Perceptions of the likelihood of political destabilisation	-1.31	0.81	0.94	1.66	0.54
Perceptions of the quality of public services	-0.62	1.28	1.52	2.34	0.69
Perceptions of the government's ability to promote private sector development.	-0.12	1.22	1.27	2.06	0.47
Perceptions of the quality of law enforcement	-0.36	1.18	1.32	2.01	0.66
Perceptions of the extent to which public power is exercised for private gain	-0.82	1.24	1.33	2.59	0.88
Retirement age	55.40	62.10	61.80	71.30	2.82
Implicit taxation on consumption	11.30	21.76	20.90	34.20	4.64
Taxes on goods and services	4.00	11.17	11.50	17.60	2.93
Soundness of banks	1.73	5.65	5.96	6.93	1.13
Loan to capital ratio	0.29	2.75	2.10	19.39	2.21
Strictness of employment protection	0.21	2.02	1.95	4.10	0.98
Motorway index	0.00	17.50	13.00	78.00	18.98
Railway index	0.00	5.05	0.10	124.00	19.10
Airtravel passengers	0.00	1.94	1.71	12.16	1.83
Investment in Airports	0.00	480.60	62.51	15048.96	1606.30
Investment in Railways	0.00	1358.59	320.26	10174.81	2199.40
Investment in Roads	1.51	6341.75	814.75	128123.70	18029.58
Fixed telephone lines	8.60	41.21	42.25	72.20	14.23
Mobile phone subscriptions	0.00	49.54	40.63	153.14	44.59
Implicit taxation on labour	20.80	35.67	36.90	47.80	6.19
Social security contributions	0.00	9.36	10.20	18.70	5.00
Taxes on payroll and workforce	0.00	0.39	0.00	5.70	0.76
Implicit rate on capital and business income	2.50	23.36	22.60	61.80	9.87
Taxes on property	0.30	1.87	1.80	7.70	1.02
Taxes in income, profits and capital gains	4.80	12.72	12.05	31.20	5.18
Taxes in income, profits and capital gains for corporations only	0.00	3.08	2.90	13.00	1.58
Government budget appropriations of outlays on research and development	0.34	1.25	1.19	3.18	0.50

Notes: For sources for the variables in this table refer to Table 1.

Table 12: Average values per sub-index and country

Country	Regulation of product markets	Public institutions	Infrastructure	Regulation of financial markets	Cost of capital	Regulation of labour markets	Labour cost	Social security	Technology	Institutional competitiveness index
AT	0.4395	0.7892	0.2956	0.8306	0.7959	0.5086	0.3519	0.2783	0.3115	**0.5112**
AU	0.7016	0.8205	0.1926	0.9467	0.6282	0.7694	0.8661	0.3959		**0.6651**
BE	0.5015	0.6915	0.3193	0.8058	0.7045	0.4029	0.5146	0.1500	0.2696	**0.4844**
BG	0.5391	0.3824	0.1784	0.6691	0.7605		0.5256	0.1638	0.1757	**0.4243**
CA	0.6493	0.8390	0.1151	0.9616	0.6230	0.8612	0.8013	0.4176		**0.6585**
CH	0.8368	0.8776	0.2601	0.9123	0.7440	0.7609	0.8120	0.6311		**0.7293**
CY	0.8001	0.6493	0.4227	0.8441	0.5500		0.9310	0.5601	0.1754	**0.6166**
CZ	0.4999	0.6306	0.1862	0.5642	0.7663	0.5575	0.4876	0.2951	0.3053	**0.4770**
DE	0.5901	0.7744	0.3786	0.7899	0.8577	0.3982	0.5456	0.3342	0.5082	**0.5752**
DK	0.1104	0.8250	0.3529	0.9178	0.5704	0.6075	0.8030	0.4255	0.3378	**0.5500**
EE	0.6026	0.6846	0.1796	0.8630	0.9117		0.4135	0.4774	0.2975	**0.5537**
ES	0.6859	0.6438	0.2655	0.8837	0.7394	0.2421	0.6787	0.4343	0.5116	**0.5650**
FI	0.2724	0.8153	0.2760	0.8870	0.7266	0.5171	0.5077	0.3123	0.5384	**0.5392**
FR	0.5047	0.7021	0.3131	0.7917	0.7262	0.2799	0.3956	0.2465	0.5686	**0.5032**
GR	0.5049	0.4309	0.2907	0.8068	0.8345	0.2168	0.6938	0.4192	0.0824	**0.4755**
HU	0.2176	0.5792	0.1622	0.6637	0.8377	0.7037	0.5021	0.1997	0.1602	**0.4473**
IE	0.3941	0.7679	0.2480	0.8749	0.7686	0.8003	0.8265	0.5830	0.2122	**0.6084**
IS	0.1544	0.8486	0.2029	0.7481	0.7510	0.7506	0.9186	0.8459		**0.6525**
IT	0.5757	0.5216	0.3279	0.7750	0.7041	0.3617	0.5516	0.2934	0.3226	**0.4926**
JP	0.9401	0.6366	0.3847	0.3804	0.7125	0.6454	0.7632	0.8119		**0.6593**
KR		0.3675	0.2041	0.4834	0.8599		0.8909			**0.5612**
LT	0.7152	0.5892	0.1732	0.7810	0.8945		0.4161	0.3526	0.1967	**0.5148**
LU	0.5224	0.8930	0.3773	0.7099	0.6040	0.2185	0.7146	0.2346	0.1146	**0.4877**
LV	0.6672	0.5645	0.1501	0.7915	0.7490		0.4638	0.4061	0.0920	**0.4855**
NL	0.4369	0.8146	0.4309	0.8877	0.7572	0.4381	0.5641	0.3035	0.4589	**0.5658**
NO	0.2372	0.8342	0.2325	0.8434	0.6398	0.3588	0.7421	0.5019		**0.5487**
NZ	0.4169	0.8835	0.1748	0.9201	0.6218	0.7596	1.0000	0.4792		**0.6570**
PL	0.4949	0.5453	0.1184	0.6458	0.7674	0.6603	0.5904	0.3786	0.3286	**0.5033**
PT	0.4690	0.6331	0.2319	0.8606	0.8266	0.1211	0.7488	0.5733	0.3308	**0.5328**
RO	0.7590	0.4273	0.0863	0.6946			0.6276	0.5390	0.1315	**0.4665**
SE	0.3400	0.7815	0.3720	0.8718	0.6805	0.4200	0.3837	0.4931	0.4150	**0.5286**
SI	0.3500	0.6454	0.2251	0.7727	0.8438	0.4087	0.4708	0.2309	0.2898	**0.4708**
SK	0.4906	0.5667	0.1344	0.6269	0.6803	0.6340	0.5424		0.1457	**0.4776**
TR	0.6456	0.2305	0.1347	0.4318	0.9340	0.0928	0.8864	0.4607		**0.4771**
UK	0.5405	0.7602	0.3572	0.8941	0.6541	0.8834	0.8343	0.4110	0.4817	**0.6463**
US	0.9430	0.7401	0.3445	0.8433	0.7088	1.0000	0.8184	0.5563		**0.7443**

Notes: Empty cells represent countries where the respective sub-index is not observed.

Table 13: Average values per sub-index and year

Country	Regulation of product markets	Public institutions	Infrastructure	Regulation of financial markets	Cost of capital	Regulation of labour markets	Labour cost	Social security	Technology	Institutional competitiveness index
1990	0.5144	0.5835	0.1359		0.7570	0.4750	0.7517	0.4763	0.3882	**0.5103**
1991	0.5059	0.6323	0.1353		0.7653	0.4795	0.7196	0.4771	0.4187	**0.5167**
1992	0.4878	0.6070	0.1260		0.7732	0.4795	0.7284	0.4533	0.3860	**0.5051**
1993	0.4758	0.6860	0.1256		0.7685	0.4968	0.7211	0.4444	0.3444	**0.5078**
1994	0.4641	0.6833	0.1343		0.7670	0.5060	0.7245	0.4279	0.3369	**0.5055**
1995	0.5245	0.6875	0.1470		0.7124	0.5170	0.6437	0.4198	0.2989	**0.4939**
1996	0.5301	0.6640	0.1572		0.7067	0.5192	0.6481	0.3885	0.3013	**0.4894**
1997	0.5276	0.6691	0.1750	0.6439	0.7217	0.5426	0.6400	0.3842	0.3026	**0.5119**
1998	0.5371	0.6744	0.1932	0.6750	0.7308	0.5482	0.6411	0.3859	0.3041	**0.5211**
1999	0.5289	0.6779	0.2288	0.6711	0.7286	0.5565	0.6275	0.3849	0.2969	**0.5224**
2000	0.5395	0.6818	0.2632	0.7492	0.7228	0.5525	0.6297	0.3851	0.2875	**0.5346**
2001	0.5591	0.6859	0.2868	0.7527	0.7378	0.5563	0.6366	0.3862	0.2935	**0.5439**
2002	0.5496	0.6883	0.2952	0.7578	0.7453	0.5605	0.6411	0.4010	0.3033	**0.5491**
2003	0.5354	0.6893	0.3112	0.7828	0.7506	0.5688	0.6430	0.3986	0.3122	**0.5547**
2004	0.5291	0.6986	0.3211	0.8245	0.7511	0.5681	0.6481	0.4023	0.3002	**0.5604**
2005	0.5141	0.6918	0.3390	0.8506	0.7318	0.5662	0.6563	0.4292	0.3085	**0.5653**
2006	0.5150	0.6943	0.3629	0.8621	0.7228	0.5650	0.6610	0.4421	0.3207	**0.5718**
2007	0.5165	0.6934	0.3806	0.8774	0.7154	0.5661	0.6561	0.4462	0.3314	**0.5759**
2008	0.5479	0.6788	0.4395	0.8486	0.7278	0.5616	0.6506	0.4619	0.3473	**0.5849**
2009	0.5106	0.6574	0.4977	0.7283	0.7687	0.2931	0.7021	0.4617		**0.5774**

Notes: Empty cells represent years where the respective sub-index is not observed.