

# Structural Indicators: A Critical Review

by

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*This article reviews and assesses, in terms of availability, reliability and transparency, existing policy and outcome indicators that have been found to be linked both directly and indirectly to economic growth and living standards. Indicators aiming at capturing the political and social situation of countries, as well as governance-related issues, are examined (e.g., political system, political stability, corruption, crime and violence). Topics also include product and labour markets, infrastructure, trade, financial indicators and composite indices of reform.*

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Differences in living standards (generally proxied by income) across OECD countries reflect both different structural policy settings and institutional characteristics. Although there is a broad consensus that institutions and policy matter for living standards, these are not always easily captured through reliable and timely structural indicators. In recent years, a large number of indicators have been developed to fill this gap.

The last three decades have witnessed an intensive effort, both in the production of policy and outcome indicators and in linking these indicators to economic growth and living standards. This work has contributed to developing a better understanding of growth-enhancing policies, but has sometimes relied on the misuse of indicators. For this reason, it is useful to undertake an evaluation of these indicators and their potential use in empirical work, relating them to growth and living standards.

Following on and expanding the work by Loayza and Soto (2003), this paper reviews and assesses, in terms of availability, reliability and transparency, existing policy and outcome indicators that have been used and found to be linked, both directly and indirectly, to economic growth and living standards.

In more detail, the focus of the paper is on indicators produced by international organisations (including the OECD), think tanks and researchers. Special attention is given to indicators that are widely used in the literature. Coverage of the indicators discussed in the paper is not intended to be comprehensive, but rather selective in a number of important areas. Topics examined include product and labour markets, infrastructure, trade, financial indicators and composite indices of reform. Moreover, indicators aiming at capturing the political and social situation of countries, as well as governance-related issues, are assessed (*e.g.*, political system, political stability, corruption, crime and violence).

The rest of the paper is organised in two main sections: the first presents a typology of indicators that will be used throughout the paper, and the second reviews existing policy and outcome indicators. A detailed annex documenting the main features of these indicators can be found in Furceri and Mourougane (2009).

## 1. Typology of indicators

A wide range of indicators is currently produced by international organisations as well as individual researchers. They differ not only on their time and geographical coverage, but also by their intrinsic nature. Structural indicators can be differentiated according to a number of criteria, which are discussed in turn below.

### 1.1. Perception-based versus fact-based

Perception-based indicators rely on subjective assessments, usually drawn from surveys. Typical examples are corruption indices. By contrast, fact-based indicators usually rely on “hard” data derived from the legislation or institutional settings. Examples include

the Product Market Regulation (PMR) indicators or indices of Employment Protection Legislation (EPL).

The distinction between perception-based and fact-based indicators is important, not least because fact-based indicators are replicable (Table 1). Yet fact-based does not mean objective, as these indicators also embody a significant degree of subjectivity (*e.g.*, in the choice of questions). Moreover, assessments of complicated rules are subject to errors of fact and judgement, particularly when the analyst has to determine the net effect of conflicting rules and regulations. Perception-based and fact-based indicators are complementary sources of information. Perception-based information can be internal (results based upon the views of respondents from within the country) or external (results based upon assessments made by non-residents of the country).

**Table 1. Fact- and perception-based measures**

	Fact-based measures	Perception-based measures
Advantages	<ul style="list-style-type: none"> <li>Do not rely on personal judgement</li> <li>Can be subject to peer review</li> <li>Exogenous to economic developments occurring at the time the data are collected</li> <li>Free of noise (other than measurement errors)</li> <li>Ownership more distinguishable</li> </ul>	<ul style="list-style-type: none"> <li>Easier to assemble a data base</li> <li>Answers reflect, in part, the way regulations are enforced</li> <li>Can cover all levels of regulation</li> </ul>
Drawbacks	<ul style="list-style-type: none"> <li>Require assembling a huge data base and assistance from governments and lawyers</li> <li>Often focus only on regulation at the national level (problem in federal countries where regulation can be carried out by local governments)</li> <li>Such measures cannot indicate certain ground-level features (how regulations are enforced)</li> <li>The quantification of regulations requires the construction and combination of various types of indexes, raising the questions of how to code the laws and how to weight them (entry point for subjectivity)</li> </ul>	<ul style="list-style-type: none"> <li>Rely on personal judgements</li> <li>Issue of comparability of answers between nations (most surveys ask questions that are specific to the country)</li> <li>No control on the type of questions asked</li> <li>Context specific</li> </ul>

Source: Based on Nicoletti and Pryor (2006).

### 1.2. Single versus composite indicator

A composite indicator combines different sub-indicators into a single measure. Composite indicators have a number of advantages over single indicators. For example, if the same concept is measured by different data sources, it is possible to increase the coverage and reliability by combining the sources. A widely cited example is the *Governance Matters Reports* from the World Bank, which draw together 25 data sources into six composite indicators. The main weakness of composite indicators is that they are not always well constructed or used. In particular, one of the main downsides of composite indicators is that unless the component data are shown, it is not clear how the rating is derived. Such a lack of clarity weakens the basis for inferring policy prescriptions. In addition, all the existing composite indicators fail to capture the necessity to ensure coherence among various economic policies. In most cases, the composite indicator is simply the aggregation of unrelated sub-indicators, and the existing interactions between these variables are ignored (Table 2). A notable exception is the summary measure of tertiary education set-up developed by Oliveira Martins *et al.* (2007).

The unit chosen of the component indicator and the conversion of the underlying information into a scale that can be aggregated are non-trivial and can sometimes be

Table 2. **Pros and cons of composite indicators**

Advantages	<ul style="list-style-type: none"> <li>Reduces multicollinearity</li> <li>Can summarise complex or multidimensional issues</li> <li>Easier to interpret than trying to find a trend in many separate indicators</li> <li>Facilitates the task of ranking countries</li> <li>Can assess progress of countries over time on complex issues</li> <li>Reduces the size of a set of indicators or includes more information</li> <li>Places issues of country performance and progress at the centre of the policy arena</li> <li>Facilitates communication with the general public and promotes accountability</li> </ul>
Drawbacks	<ul style="list-style-type: none"> <li>May send misleading policy messages if they are poorly constructed or misinterpreted</li> <li>May invite simplistic policy conclusions</li> <li>May be misused if the construction is not transparent and lacks sound statistical or conceptual principles</li> <li>The selection of indicators and weights could be the target of political challenge</li> <li>May disguise serious failing in some dimensions of policy and increase the difficulty of identifying proper remedial action</li> <li>May lead to inappropriate policies if dimensions of performance that are difficult to measure are ignored</li> </ul>

Source: OECD, "Handbook on Constructing Composite Indicators: Methodology and User Guide", OECD Statistics Working Paper 2005/3.

questioned. The choice of the weights is also not straightforward. Weights can be derived either from theory or empirical analysis, usually principal component analysis. Alternatively, equal weights could be applied. Although the first alternative is more attractive from an analytical point of view, it is not without drawbacks. Indeed, some indicators have weights varying over time and, as a result, the ranking between countries can reflect more a change in weights than a change in policy. Robustness tests run in the context of the re-estimation of OECD product market regulations suggest that it is preferable to use equal weights in the multilateral surveillance process (Woefl *et al.*, 2009).

Given the complexity of composite indicators, a number of characteristics have been identified to help users and to avoid misinterpretation. These relate to relevance, accuracy, timeliness, accessibility, interpretability and coherence (OECD, 2005).

### 1.3. Policy versus outcome measures

Policy indicators are instruments on which policy makers can have a direct impact (for instance, tax rates). However, these measures are often an imperfect proxy of the policy lever. Outcome measures capture the country performance in a specific domain and reflect the effects of national policy measures or institutional settings and the international environment. The indicator can be an intermediate, or a final, indicator of economic performance, for instance, the unemployment or employment rates. In general, reliable and timely measures are available, but policy makers can influence only indirectly such indicators via policy action.

## 2. Review of existing structural indicators

This section reviews the main policy and outcome indicators currently produced by international and other organisations. Indicators are discussed by policy topics (see the annex in Furceri and Mourougane, 2009, for a detailed and extensive description of the existing indicators by category).

### 2.1. Governance

The focus on governance has gained prominence over the last decade, following the move toward more open markets and less direct governmental control of business activities. Governance can be broadly defined as a system of values, processes, policies and

institutions by which a society manages its economic, political and social affairs. However, governance indicators are usually narrowed down to measure specific areas of governance, for instance, electoral systems, corruption, human rights, public service provision, civil society and gender equality.

Measuring governance is difficult, as this involves many institutions and players. Formal rules can be easily observed, but informal rules are non-observable, although they may have a greater influence on the quality of governance and require a deep understanding of society. Moreover, because the concepts are so broad, the same terms may be used in different ways.

Despite these difficulties, a large number of indicators have been constructed in recent years and cover both developed and developing economies. Among the hundreds of indicators that have emerged, the most widely used are policy, composite and perception-based indicators.

### **2.1.1. Institutional factors**

The first strand of governance indicators aims to measure some aspects of good governance through institutional factors. By shaping the economic environment and influencing the behaviour of economic agents, formal and informal institutions have an impact on long-term growth. They are also associated with good development outcomes, in particular poverty reduction. The World Bank Governance Matters indicators have been pioneers in this area. They are based on expert assessments and surveys of firms and are updated every year. They cover different areas of governance, ranging from citizens' freedom to political stability and regulatory effectiveness. These indicators are constructed in such a way that their average across all countries is always zero and the standard deviation is always one. As a result, their scale is arbitrary and they cannot be used to monitor changes in governance levels for a given country. Moreover, these indicators are subject to very large measurement errors. To address this issue, they are usually reported together with confidence intervals. However, despite all the precautions taken in the publications, these indicators are sometimes misused in comparisons over time or time-series analysis. The World Bank also publishes country information through its country policy and institutional assessment, which is based on the World Bank staff's assessment, but only part of this is publicly available.

The composite and sub-indicators of Governance Matters indicators are now widely reported in the press and used in academic research. These indicators are timely and cover a wide range of countries. Transparency in the methodology and in the source used has significantly improved over the years. Since 2006, underlying data from virtually all the individual data sources are available so that it is possible to replicate the data.

Governance indicators are strongly correlated with the current level of national income per capita (Table 3, Figure 1), whether the sample covers the world or is restricted to the OECD. By contrast, correlations between those indicators and GDP per capita growth are much lower and sometimes not significant. This is consistent with the concepts of absolute and conditional convergence (Barro and Sala-i-Martin, 1991; Sala-i-Martin, 1995; Furceri, 2006). Correlations should nonetheless be interpreted with caution as they do not control for the effects of additional variables.

Table 3. **Correlation between governance indicators and GDP per capita**

	log (GDP per capita)		Year
	World	OECD	
Voice and accountability	0.73***	0.82***	2005
Political stability	0.73***	0.82***	2005
Government effectiveness	0.87***	0.84***	2005
Regulatory quality	0.84***	0.85***	2005
Rule of law	0.83***	0.86***	2005
Control of corruption	0.82***	0.81***	2005
Corporate illegal corruption	0.75***	0.8***	2005
Corporate legal corruption	0.52***	0.69***	2005
Bribe	-0.2***	0.01	2005
Corruption perception index	0.8***	0.8***	2005
Corruption (WDI)	-0.28***		2005
Property rights (doing business)	-0.53***	-0.2	2008
Political constraint (Henniz, 2006)	0.31***	0.29	2004
Polity IV	0.42***	0.7***	2005
State fragility Index	-0.88***	-0.46***	2001

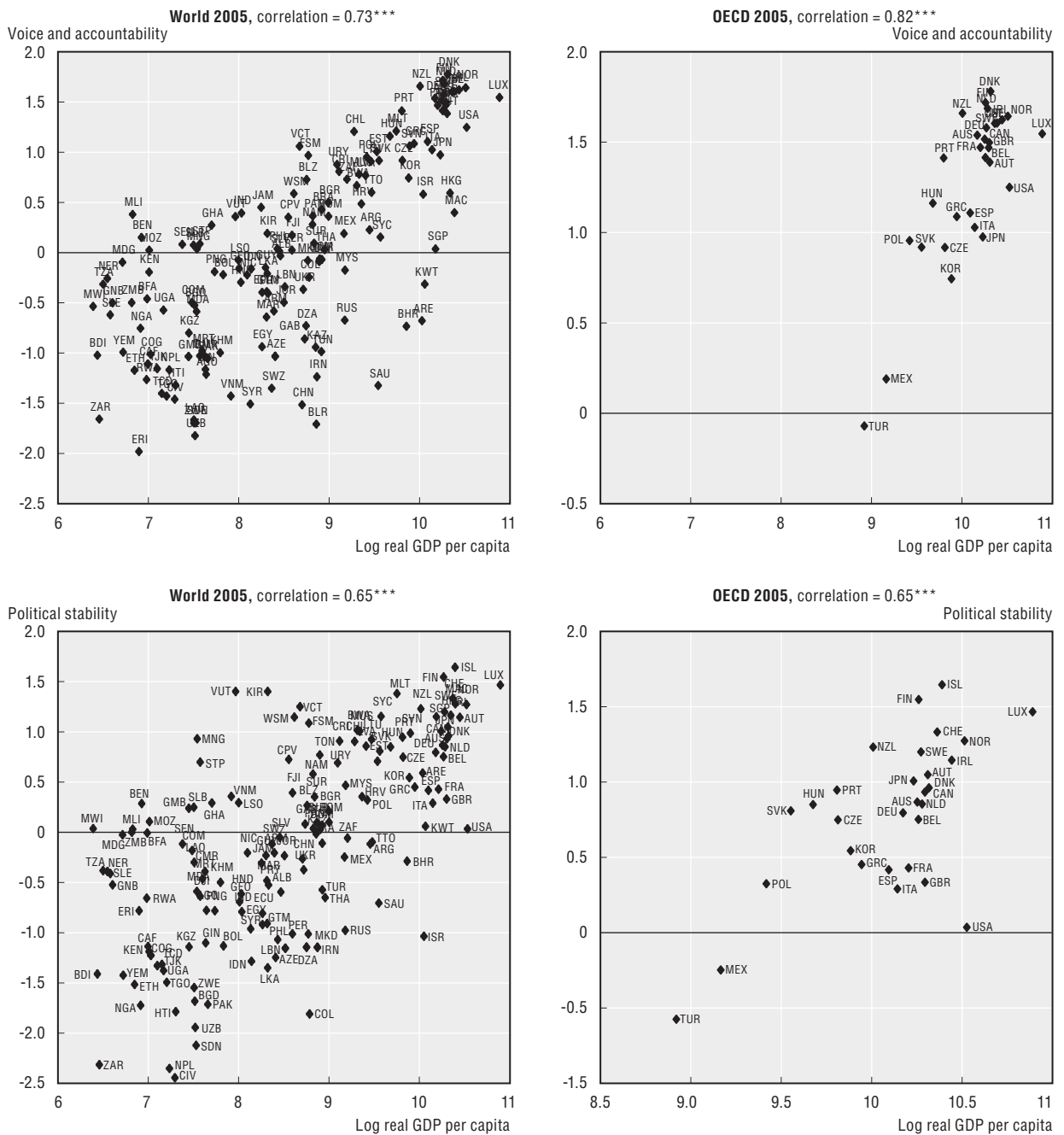
Note: \*\*\*, \*\* and \* denote significance at 1, 5 and 10%.

Source: OECD Secretariat.

However, the use of these indicators can be questioned on a number of grounds (Arndt and Oman, 2006):

- The indicators are inherently subjective and not grounded in theory. As a result, the same indicator can lead to very different interpretations.
- The data rely on a large variety of sources consisting of surveys of firms and individuals, as well as the assessments of commercial risk-rating agencies, non-governmental organisations and a number of multilateral aid agencies and other public sector organisations. The reliability of these sources is variable. In total the dataset draws on 33 sources.
- The indicators embody large measurement errors. For some developing countries, the indicator relies on a limited number of surveys, increasing further the risk of measurement error. To partially address these issues, confidence intervals around the main World Bank indicators are published. A change in an indicator over time is significant only when the confidence intervals of the new and old indicators do not overlap.
- The indicators do not permit the identification of trends over time. The changing composition of many of the indicators means that the indicator cannot be reliably used to compare levels of governance over time in a given country or among countries. This implies that monitoring of progress is not possible.
- The aggregation procedure assigns less weight to the sources that are less correlated with other sources. Typically, more weight is given to expert assessment and firm surveys than to population surveys, which often carry no weight. This suggests that measurement errors are uncorrelated across sources and are a questionable assumption. Moreover, weights attributed to different sources vary between countries, lowering cross-country comparability.

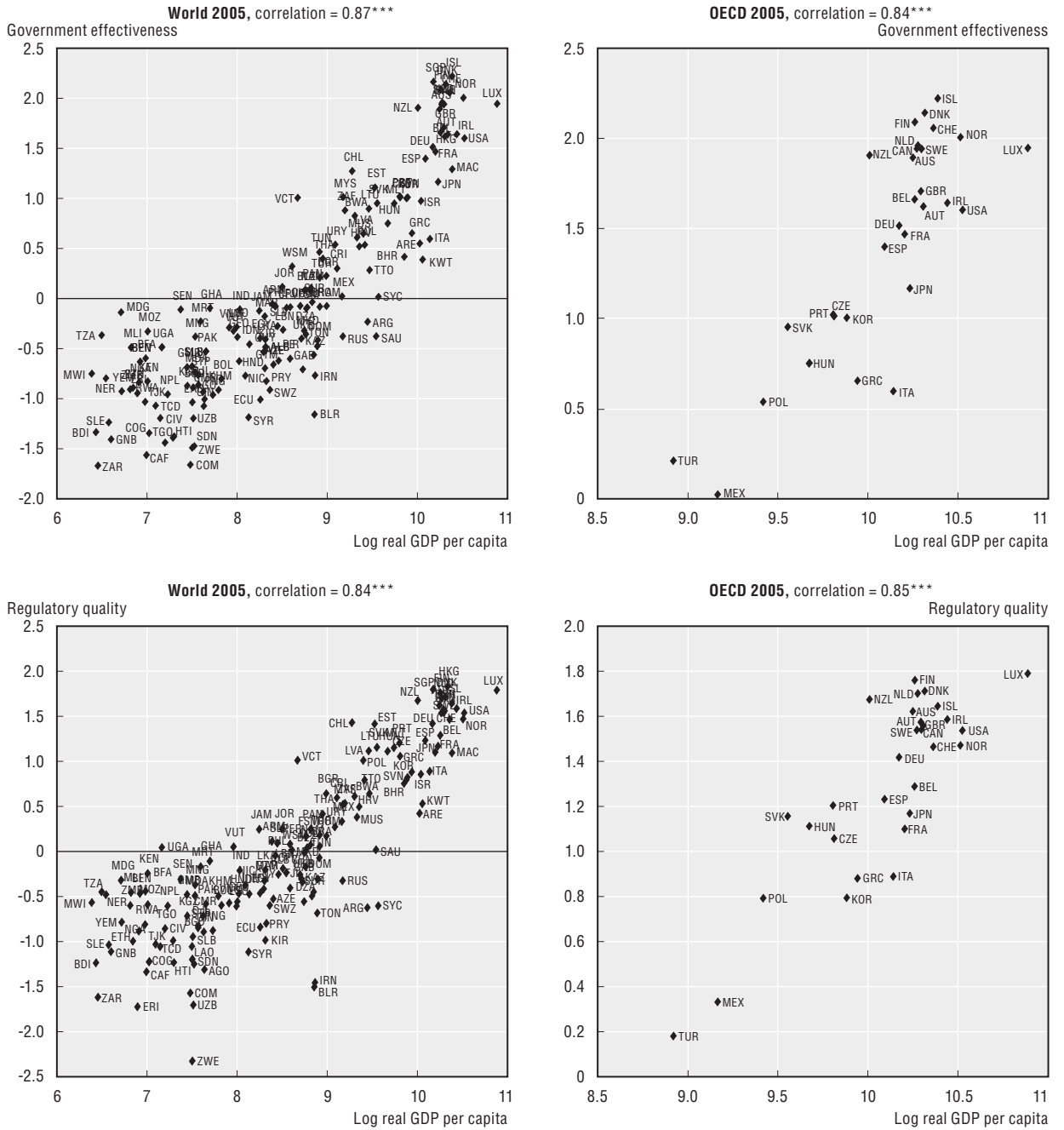
Figure 1. Correlation between selected governance matters indicators and GDP per capita



Note: \*\*\*, \*\* and \* denote significance at 1, 5 and 10%.

Source: World Bank.

Figure 1. Correlation between selected governance matters indicators and GDP per capita (cont.)

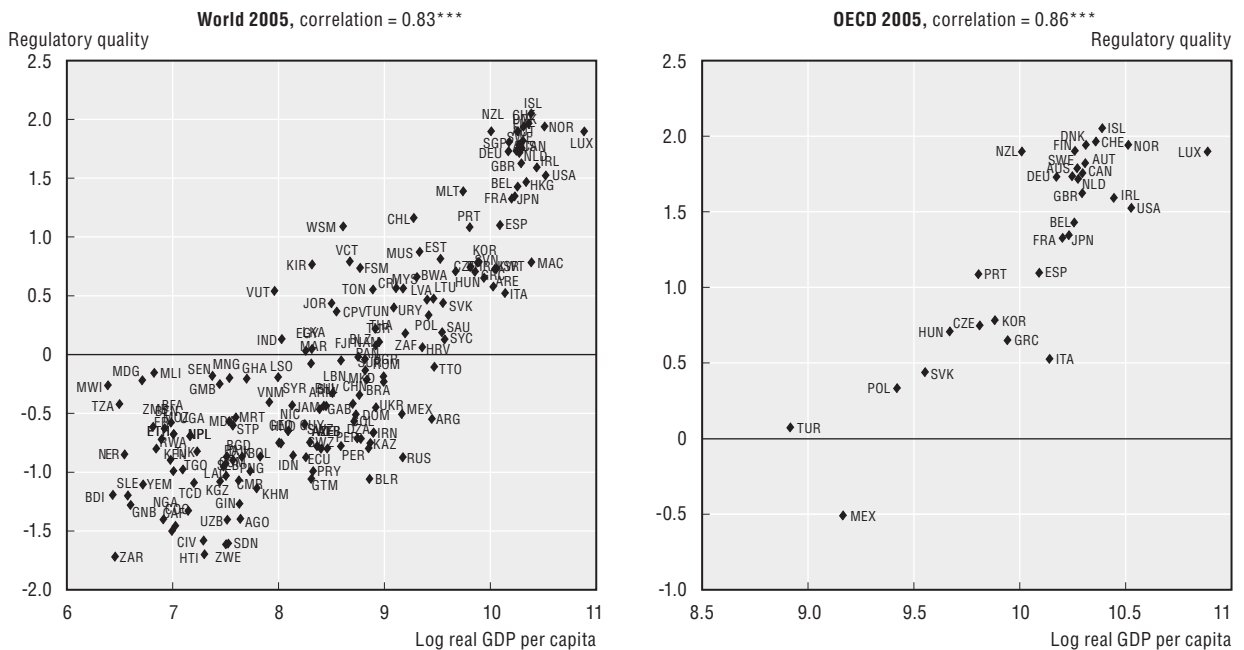


Note: \*\*\*, \*\* and \* denote significance at 1, 5 and 10%.

Source: World Bank.



Figure 1. Correlation between selected governance matters indicators and GDP per capita (cont.)



### 2.1.2. Public finances and tax

Given the size of government and its role in the economy, the contribution of government to national economic growth is of great significance (Folster and Henrekson, 2001; Alfonso and Furceri, 2008). Moreover, transparent budgeting institutions foster debate between different alternative policies. However, there are few reliable sources of comparative public management data. To fill this gap, twice a year, beginning in 2009, the OECD has published *Government at a Glance*. Information on the budget process, decentralisation and public sector efficiency has been gathered through questionnaires collected by the OECD. In addition, composite indicators measuring compliance with OECD good practice for the quality of regulatory management systems, according to 16 dimensions, have been calculated. The indicators rely on a principal component analysis using 1998 and 2005 data, and have then been interpolated to cover the period 1998-2006. The data will be updated using the 2008 questionnaire. Data are available for all OECD countries except Luxembourg, Poland and Slovakia, and are subject to peer review. The first component of the principal component analysis gathers information on institution, tool and capacity building, and preliminary results suggest that this indicator is well correlated with economic outcomes such as employment, GDP or labour productivity.

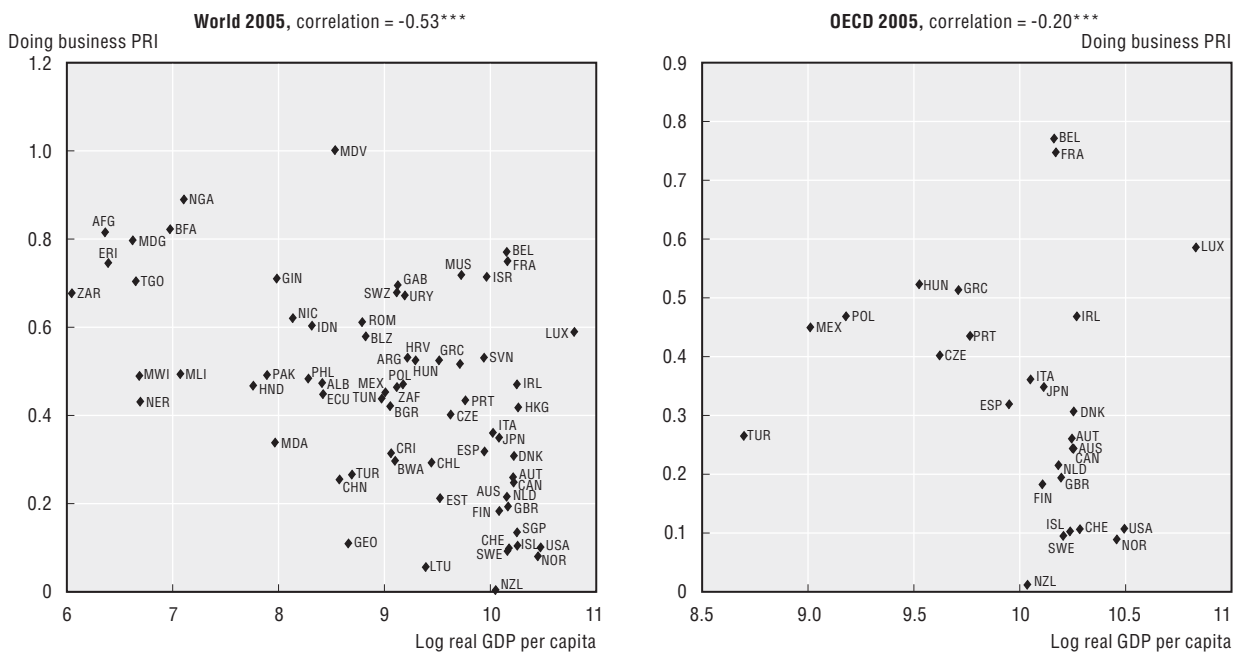
Another promising project to measure the quality of public finances along several dimensions is under way at the European Commission. Some composite measures have also been developed by the Centre of Budget and Policy Priorities (open budget index) and the Heritage Foundation (fiscal freedom), but their simplicity renders their interpretation difficult. Finally, the World Bank has constructed a perception-based indicator of government effectiveness in its *Governance Matters* publication.

The structure of tax systems also matters for growth (Johansson *et al.*, 2008; Arnold, 2008). A lot of data are available on the structure of the tax system, its efficiency and its redistributive impact (at least for some types of tax) in OECD publications. Updated information on the level and the structure of tax is available in *Tax and Benefit* and in *Revenue Statistics* for OECD countries. This includes standard data on corporate, income or consumption tax revenue and rates. More sophisticated indices such as the C-efficiency index, which seeks to capture the efficiency of consumption tax, are also constructed at the OECD. Information on tax rates can also be found in the OECD tax database, but the country coverage is usually limited and corporate rates are available only for specific groups of firms.

### 2.1.3. Property rights

Property rights refer to the degree to which private property is protected by institutions and policy. The overall effect on investment remains an empirical question. Moreover, the cost of reforming property rights can be high and can slow the reform process. Several measures of property rights are available. The Heritage Foundation index is the most widely used and is an assessment of the degree to which the country protects property rights and facilitates private contracting. Other indicators of property rights are commonly used in the literature, such as the indicator of protection against the risk of expropriation from the International Country Guide Risk. An indicator of investor protection is also available in the World Bank's Doing Business data base. This indicator is updated every year, covers a large number of countries and is based on official or quasi-official sources. The data are also subject to peer review. It is correlated with the level of GDP per capita, but the coefficient of correlation is small, especially when the analysis is restricted to the group of OECD countries (Figure 2). In addition, the Doing Business data

Figure 2. Correlation between doing business (property rights) and GDP per capita



Note: \*\*\*, \*\* and \* denote significance at 1, 5 and 10%.

Source: World Bank.

base focuses on specific geographical areas and types of firms, and may thus not be fully representative of property rights at the national level. Among indicators of property rights, the development of new technology has focused attention on intellectual property rights. Indeed, strong perceived property rights encourage firms to invest, but at the same time may slow the diffusion of technology. The first indicator of intellectual property rights was developed by Ginarte and Park (1997).

#### 2.1.4. Political institutions

Political institutions, including the type of regime or the electoral system, through their effect on the country political stability and/or government spending, are also crucial in investment decisions and long-term growth. Coding on the form of government and measure of government stability is currently available in many databases. In particular, the Polity IV project and the World Bank Database on Political Institutions gather updated information on a large set of countries. Other frequently used indicators cover civil and political rights and are based on expert assessments.

The Polity IV data set has a broad geographical and temporal scope. The correlation with the level of GDP per capita for countries is significant but not high. Each annual update of the Polity data series includes a systematic re-examination of country coding over the previous five years and a review of cases that have raised concerns and resulted in specific inquiries by data users. The underlying methodology is transparent. The construction of the overall Polity IV indicator ultimately relies on points that are assigned to qualify certain features of the political system (*e.g.*, on competitiveness of executive recruitment). This has the benefit of ensuring an equal treatment across countries and comparability over time, but also means the weights are arbitrarily imposed.

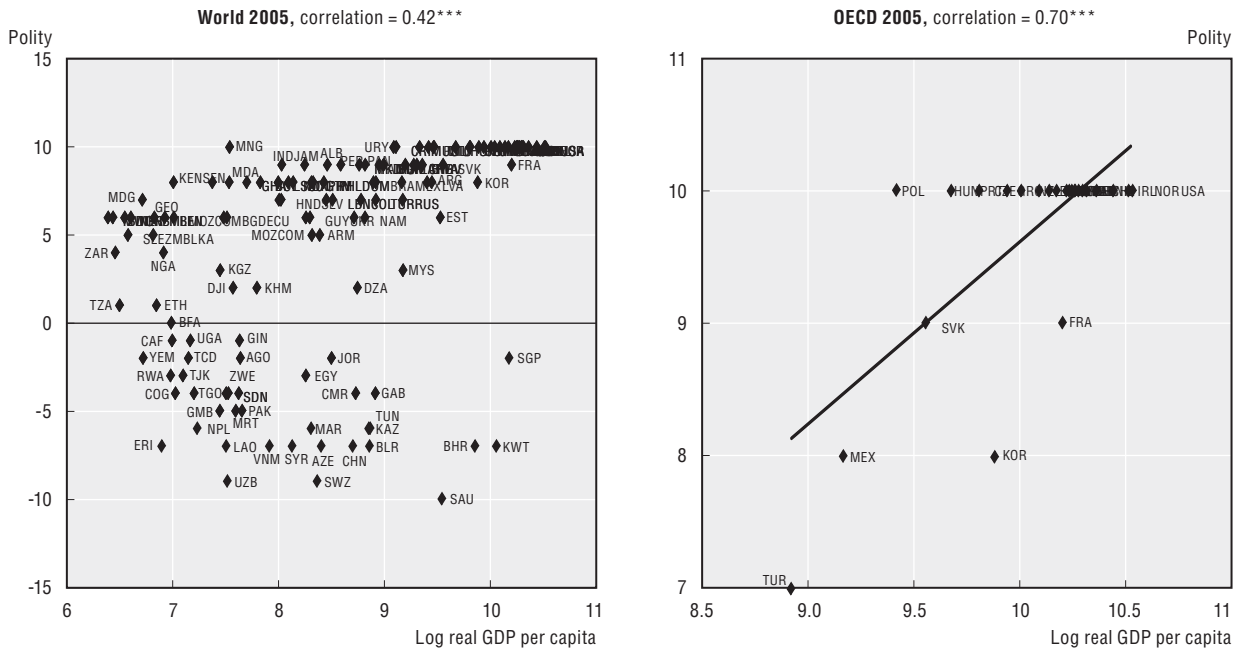
The World Bank's Database on Political Institutions data set contains objective information on different features of the political system and electoral rules. It is based on official sources. The more aggregate variables in this data base code the political regime using only three categories: direct presidential, strong president elected by assembly and parliamentary. These indicators may not be sufficiently precise to help in discriminating between political systems in OECD countries (Figure 3).

#### 2.1.5. Corruption

Another strand of governance indicators has sought to measure corruption, *i.e.*, the abuse of public office for private gains. This is an outcome of poor governance. It is found to influence a number of fundamental economic aggregates (Lambsdorff, 1999). In particular, corruption discourages private investment and distorts resource allocation. Reducing corruption is also found to have positive side effects, such as increasing the effectiveness of public spending. But measuring corruption is difficult, as those with direct knowledge of corruption are likely to keep silent about it. In particular, the extent to which political decisions are influenced by corruption is very difficult to estimate, as it lies outside the direct experience of citizens and small businesses.

A wide range of perception-based corruption indicators are currently available, using information from expert and business surveys. Two indicators are worth mentioning: the Corruption Perception Index (CPI) from Transparency International and the control of corruption index from Governance Matters. In response to the criticism that corruption indicators underestimate the extent of corruption in developed economies, Kaufmann *et al.* (2008) have also assessed the importance of legal<sup>1</sup> and illegal corruption. Both the CPI

Figure 3. Correlation between Polity IV political indicator and GDP per capita



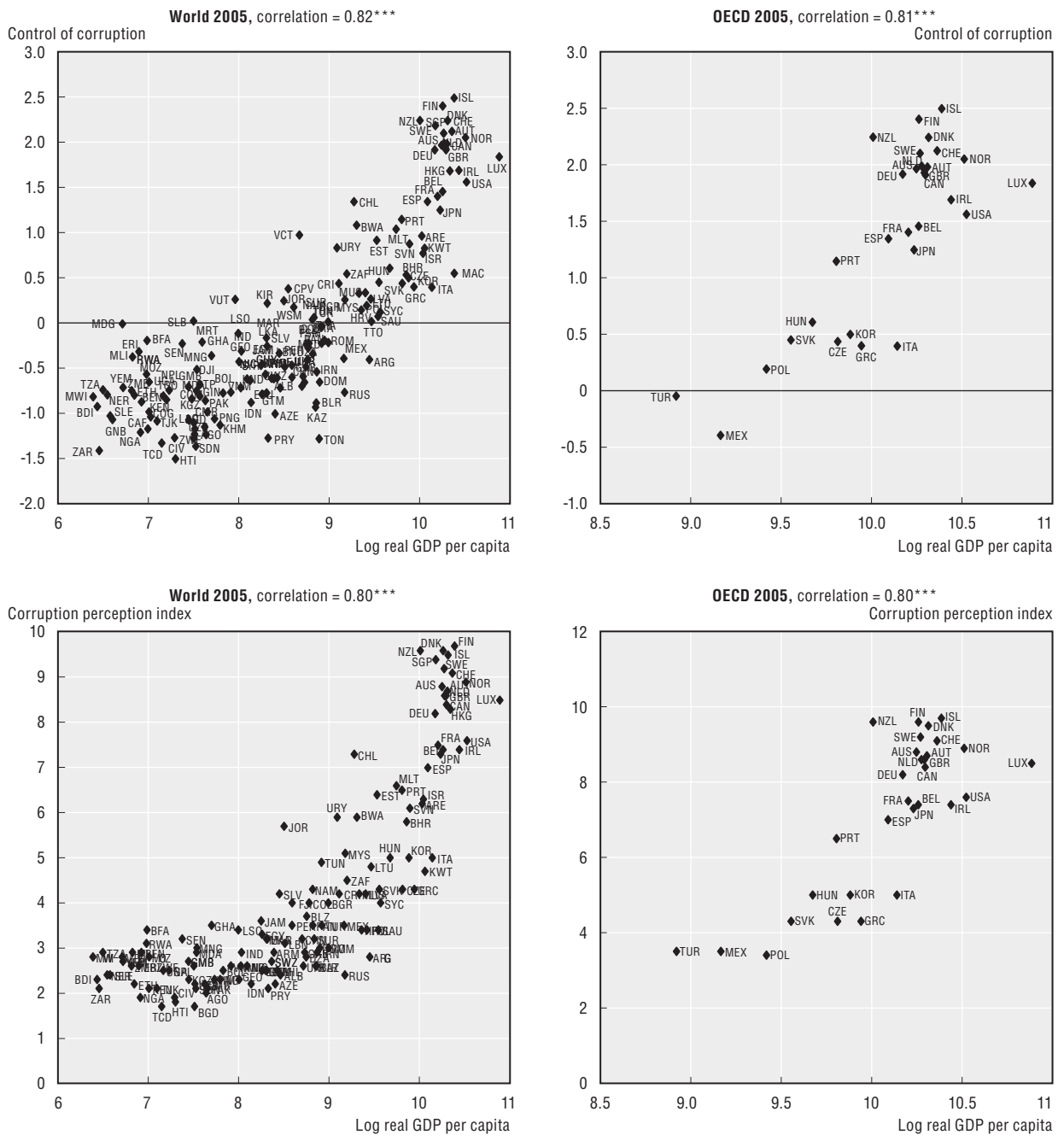
Note: \*\*\*, \*\*and \* denote significance at 1, 5 and 10%.

Sources: Polity IV project and World Bank.

and the control of corruption indicators are timely and appear well correlated with the level of GDP per capita, although clear income threshold effects are visible (Figure 4). The control of corruption index suffers nonetheless from the same limitations as the other indicators of Governance Matters (see above).

The corruption perception index from Transparency International is probably the most widely used and the one with the broadest geographical coverage, though the coverage can vary over time. It is a subjective index. Despite its label, this indicator does not measure the actual level of corruption, but provides a country ranking according to the degree of perceived corruption among public officials and politicians. The indicator is published together with standard errors, casting some light on the uncertainties surrounding the data. Information on its methodology and sources is easily accessible. However, the measure lacks consistency over time. The sources used for the CPI are indeed sometimes discontinued over the years with no reason even though the source is available. Only two sources have been used in every year the index has been published. It is also difficult to interpret the year-on-year change of score in the CPI, which could reflect the fact that different points of view have been collected and different questions asked rather than a change in the reality of corruption in a country. According to Transparency International, the CPI measure is a ranking that cannot be used as a measure of corruption: indeed, it emphasised the rank ordering of countries over internal reforms in countries. This means that this indicator cannot be used as an indicator of reform effort. In addition, this indicator suffers from selection bias (OECD, 2006). Finally the indicator draws on 12 sources, with different degrees of reliability.

Figure 4. Correlation between selected indicators of corruption and GDP per capita



Note: \*\*\*, \*\* and \* denote significance at 1, 5 and 10%.

Sources: World Bank, Transparency International.

### 2.1.6. Link with economic performance

The link between selected governance indicators and economic growth, or other measures of economic performance, has been examined in depth (Easterly, 2005). In general, high-quality governance institutions are found to matter for economic performance (Table 4). However, the direction of causality is not always clear: “deep” institutions are also highly endogenous, and it is not at all easy to identify their causal role

with respect to income levels or economic growth (Glaeser *et al.*, 2004; Acemoglu *et al.*, 2005). Moreover, the role of geographic factors and trade openness appears to be closely interrelated with institutions, making their identification difficult (Rodrick *et al.*, 2004; Boulhol and de Serres, 2008). In addition, there appear to be important threshold effects, with good institutions (*e.g.*, the absence of corruption) having very little effect at the two extremes of the income scale. Finally, it should be noted that the nature and limits of composite governance indicators are not always fully grasped by users, weakening the rigour and credibility of many studies. In addition, the results found in the literature are usually sensitive to changes in the econometric model used, to the variables included and to the underlying assumptions.

Table 4. **Governance and economic growth**

Institutional factors	Indicator or methodology and main results
North (1990, 2005)	Indicator: Formal and informal institutions (culture and unwritten values) The paper demonstrates the importance of a system of governance and its interaction with the behaviour of economic and political organisations for long-term economic growth, enhancement of human welfare and societal development.
Globerman and Shapiro (2002)	Indicator: Aggregate of the six Governance Matters indicators Countries that fail to achieve a minimum threshold of effective governance are unlikely to receive much FDI, and above that threshold the quality of governance infrastructure is an important determinant of the amount received.
Kaufmann and Kraay (2002)	Indicator: Six Governance Matters indicators Good governance tends to promote growth. However growth, <i>per se</i> , does not tend to promote better governance.
Kaufmann <i>et al.</i> (2008)	Institutions appear to play an important role in economic development, and countries with higher levels of GDP per capita have <i>much</i> higher quality institutions, according to many measures.
Johansson <i>et al.</i> (2008)	Methodology: Macro- and micro-based analysis The structure of the tax system has an impact on growth.
<b>Property rights</b>	
Jaumotte and Pain (2005)	Indicator: Cross-country index of intellectual property rights developed in Ginarte and Park (1997) and updated in Park and Singh (2002) Intellectual property rights have little effect on R&D spending.
Knack and Keefer (1995); Mauro (1995); Acemoglu, Johnson and Robinson (2001)	Less secure property rights are correlated with lower aggregate investment and slower economic growth.
<b>Political factors</b>	
Przeworski <i>et al.</i> (2000)	Indicator: Use objective criteria for distinguishing on a yearly basis between democratic and non-democratic governments (with two sub-categories: authoritarian and bureaucratic dictatorship) for 141 countries between 1950 and 1990 Democratic and non-democratic governments tend to grow on average at the same rate, but population grows faster in non-democracies so that GDP per capita grows more rapidly in democracies. Existence of a poverty trap: in the poorest countries, democracy makes no difference to economic growth.
Persson and Tabellini (2004)	Constitutional rules shape economy policy.
Persson and Tabellini (2003)	Methodology: Panel data from 1960 covering about 500 elections in over 50 democracies A broad classification of electoral rules into proportional and majoritarian does not seem to be strongly correlated with economic performance. It appears nonetheless that a parliamentary form of government is associated with better performance and better growth-promoting policies, measured by indexes for broad protection of property rights and of open borders in trade and finance. The negative effect of presidentialism is present only among the democracies with lowest scores for the quality of democracy. The authors classify countries in two groups according to the electoral formula and estimate the extent of electoral cycles in different specifications, including fixed country and time effects as well as a number of time-varying regressors. Governments in democracies that use plurality rule cut taxes and government spending during election years — the magnitude of both cuts is of the order of 0.5% of GDP. In proportional representation democracies, tax cuts are less pronounced, and no spending cuts are observed.
Milesi-Ferretti, Perotti and Rostagno (2002); Persson and Tabellini (2003, 2004); Gradstein (2008)	Relying on different data, these papers show that a statistically significant (but smaller) effect of the electoral system remains after controlling for other determinants of social security and welfare spending, such as the percentage of the elderly in the population, per capita income and the age and quality of democracy. Method: Theoretical model Low-quality institutions, concentration of political power and material wealth and underdevelopment are persistent over time. The possibility of two developmental paths is exhibited: with concentration of political and economic power, low-quality institutions and slow growth; and a more equal distribution of political and economic resources, high-quality institutions and faster growth.

Table 4. **Governance and economic growth** (cont.)

Institutional factors	Indicator or methodology and main results
Marshall and Cole (2008)	Indicator of state fragility A fairly strong relationship is found between income and the fragility of states in the global system. However, a wide variance in fragility scores at any level of incomes is also observed.
<b>Corruption</b>	
Lambsdorff (1999)	Method: Overview of the literature Corruption affects a variety of economic indicators such as government expenditures, total investment, capital flows and foreign direct investment, international trade, foreign aid and GDP per capita.
Kraay and Nehru (2004)	Indicator: CPIA indicators from 1997 to 2001 Significant inverse correlation between the quality of a country's institutions and probability of debt distress.
Welsh (2008)	Indicator: Transparency International average perceived corruption indicators This article uses self-rated subjective well-being as an empirical approximation of general welfare and shows that cross-national welfare is affected by corruption not only indirectly through GDP, but also directly through non-material factors.
Kaufmann <i>et al.</i> (2008)	Indicator of legal corruption Governance and corruption issues are key constraints to investment and business and are particularly significant in assessing countries' overall positions.

Source: OECD Secretariat.

## 2.2. Society

### 2.2.1. Health

Health can affect growth through several channels. First, health affects labour productivity, since healthier workers can work harder and for a longer period of time. Second, health favours human capital accumulation, since healthier students on average have higher cognitive functioning. Third, health encourages physical capital accumulation, since healthier workers who work for a longer period of time increase saving (for retirement) and thus investment, and since the increase in labour input from healthier workers will increase the marginal product of capital. Fourth, health influences population growth.

Health indicators can be subdivided into policy and outcome indicators. Health policy indicators are a combination of health care resources, lifestyle and socio-economic factors.<sup>2</sup> Health care resources usually are separated into monetary resources (public spending on health) and non-monetary resources (number of physicians, hospitals, medical machinery, etc.). While from a theoretical point of view health care resources are positively linked to health outcome indicators, the evidence is not conclusive from an empirical point of view.<sup>3</sup> In contrast, socio-economic factors (such as education) and lifestyle factors (tobacco, alcohol and nutrition) have been found to be strongly related to health outcomes. Data on health policy indicators are easily accessible and can be used to assess their impact on health outcomes (see the annex in Furceri and Mourougane, 2009). However, they suffer from endogeneity problems in relation to outcome indicators and GDP growth. Thereby, they have to be used very carefully in that context.

Outcome indicators aim to measure health outcomes. Those that have been usually considered in the literature are: mortality/longevity indicators (life expectancy at various ages), mortality indicators adjusted for the presence of a particular disease and quality of life, and other health-related indicators, such as public satisfaction for the health care system.<sup>4</sup> Different international organisations such as the OECD, World Health Organization and World Bank publish data on many of these outcome indicators, and data are available for a long timespan. The variable that has been used most in the literature on health and growth is a performance measure, life expectancy at birth. Data on life expectancy are available from official sources (OECD, IMF, World Bank, Eurostat and WHO)

and over a large timespan and for a broad set of countries. Quality-adjusted life years have been developed to refine gross measures of health outcomes such as life expectancy, but they are not exempted from methodological problems.

These indicators have been found in many studies to be positively linked to GDP per capita, GDP growth and total factor productivity (TFP) growth, although it is unclear in which direction the causality goes (Table 5).<sup>5</sup> On the one hand, life expectancy at birth clearly improves when living standards increase, but on the other hand life expectancy at birth can raise incentives to invest in education and increase labour supply if it extends the working life. The latter effect could be particularly important in economies where the population is ageing rapidly. Although micro studies based on individual and household data found a positive link between health outcomes and economic performance, the evidence of a link at the aggregate level is much less clear for developed countries (Price *et al.* 2008; Dormont *et al.* 2008). The weaker evidence found for developed countries could be due to a non-linear relationship, positive at low levels of development and insignificant or negative at higher levels. Moreover, it should be noted that the use of these indicators to assess the impact on growth has to be dealt with carefully, since problems of endogeneity and omitted variable bias may arise.

**Table 5. Selected results on health and economic performance**

	Indicator or methodology and main results
Barro (1996)	Indicator: Life expectancy Main result: The paper shows significant effects of health on growth for a panel of 84 countries from 1965 to 1990. Methodology: 3SLS; controlling for human capital and other covariates
Barro and Lee (1994)	Indicator: Life expectancy Main result: The paper shows significant effects of health on growth for a panel of 90 countries from 1965 to 1985. Methodology: SUR and random effects; controlling for human capital and other covariates
Barro and Sala-i-Martin (1995)	Indicator: Life expectancy Main result: The paper shows significant effects of health on growth for a panel of 90 countries from 1965 to 1985. Methodology: SUR and random effects; controlling for human capital and other growth and governance covariates
Bhargava, Jamison, Lau and Murray (2001)	Indicator: Adult survival rate Main result: The paper shows significant effects of health on growth for a panel of 92 countries from 1965 to 1990. Methodology: Dynamic random effects; controlling for fertility and other growth covariates
Bloom, Canning and Malaney (2000)	Indicator: Life expectancy Main result: The paper shows significant effects of health on growth for a panel of 92 countries from 1965 to 1990. Methodology: Pooled OLS; controlling for working age and growth covariates
Bloom and Williamson (1998)	Indicator: Life expectancy Main result: The paper shows significant effects of health on growth for a panel of 78 countries from 1965 to 1990. Methodology: Pooled OLS; controlling for growth covariates
Caselli, Esquivel and Lefort (1996)	Indicator: Life expectancy Main result: The paper shows significant effects of health on growth for a panel of 91 countries from 1960 to 1985. Methodology: GMM; controlling for human capital
Finlay (2007)	Indicator: Adult mortality Main result: The paper shows significant effects of health on growth for a panel of 62 countries from 1960 to 2000. Methodology: 2SLS; controlling for human capital, fertility and other growth covariates

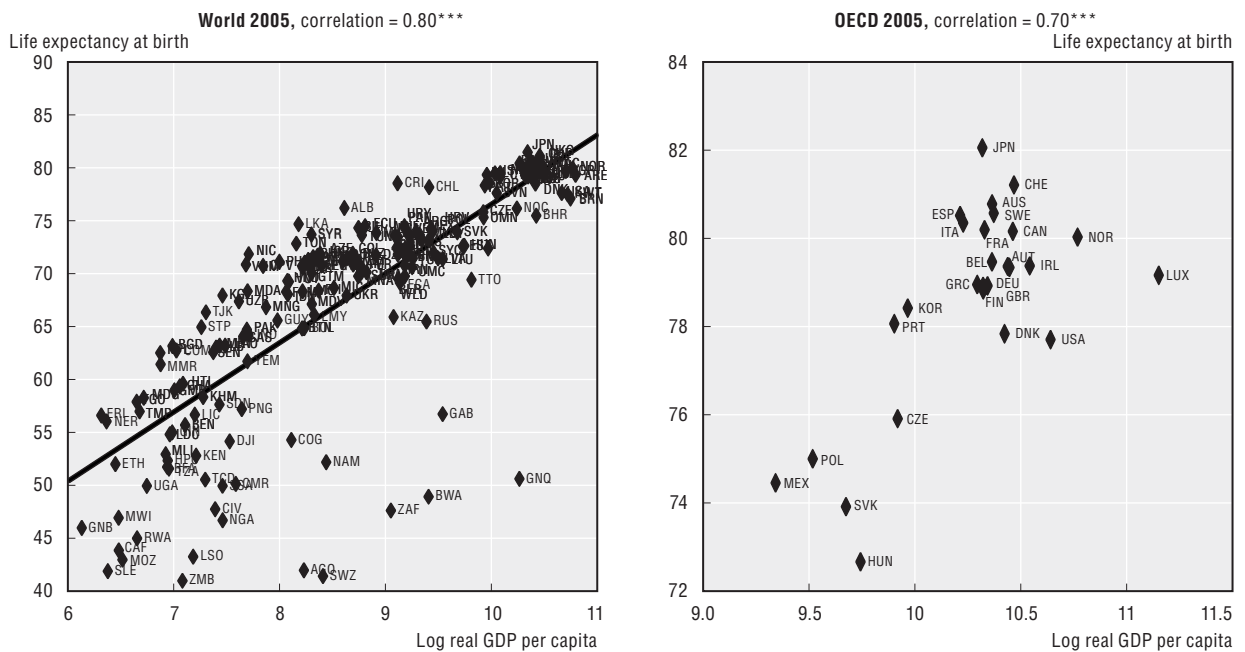


Table 5. Selected results on health and economic performance (cont.)

Indicator or methodology and main results	
Gallup and Sachs (2000)	Indicator: Life expectancy Main result: The paper shows significant effects of health on growth for a panel of 91 countries from 1960 to 1985. Methodology: GMM; controlling for human capital
Sachs and Warner (1997)	Indicator: Life expectancy and life expectancy squared Main result: The paper shows significant effects of health on growth for a panel of 97 countries from 1965 to 1990. Methodology: OLS; controlling for human capital, governance and growth covariates
Suhrcke and Urban (2006)	Indicator: Cardio-vascular disease Main result: The paper shows significant effects of health on growth for a panel of 74 countries from 1960 to 2000, especially for rich countries. Methodology: GMM; controlling for growth covariates

Source: OECD Secretariat.

Figure 5. Correlation between life expectancy and GDP per capita



Note: \*\*\*, \*\* and \* denote significance at 1, 5 and 10%.

Sources: World Bank, OECD.

### 2.2.2. Education

Investment in human capital at all ages is crucial for long-term growth and is often considered as a prerequisite to development (Table 6).

Data on early education and childcare are available in the OECD Family database, though it is mostly limited to childcare support, public spending on childcare or enrollment. No indication on the quality of the services is currently available on a cross-country basis.

For primary and secondary education, the OECD *Education at a Glance* database is a rich source of information and is updated every year. These data can be complemented by UNESCO data for non-OECD countries. In addition, the Programme for International Student Assessment (PISA) score, which is based on a series of tests passed by 15-year-old

Table 6. Selected results on education and economic performance

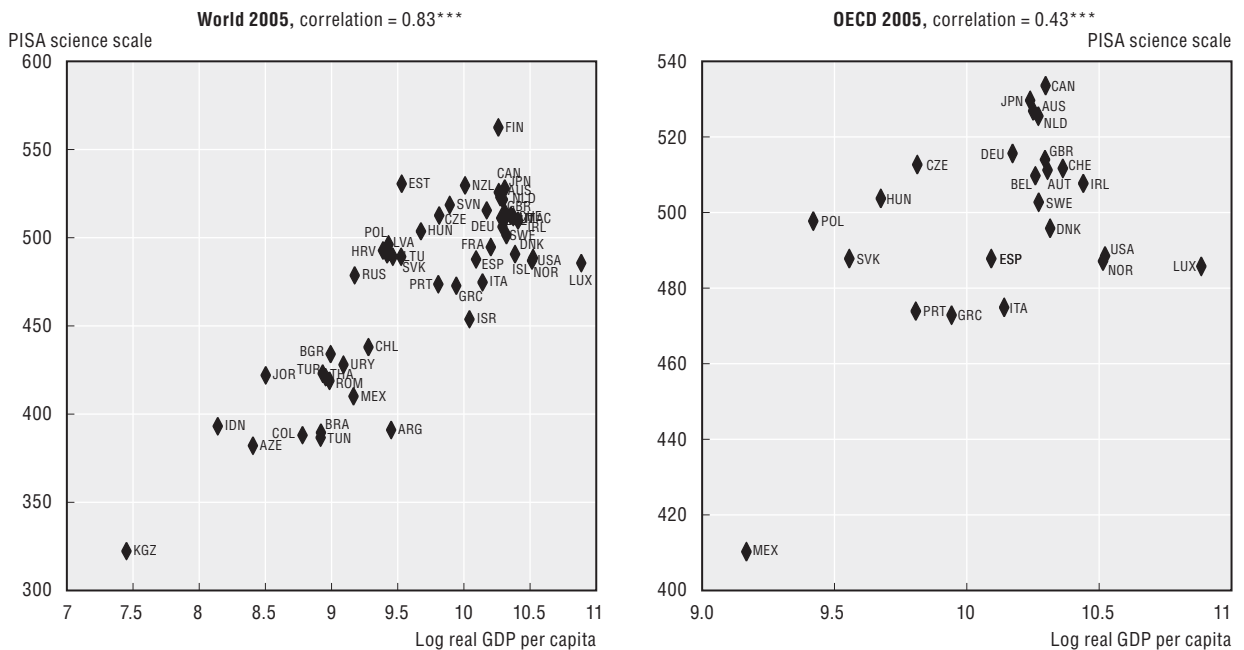
	Results
Barro (1991), Mankiw <i>et al.</i> (1992)	Educational factors have a positive impact on output levels.
Barro (1997)	An extra year of education raises economic growth by 1.2% per annum.
Toppel (1999), Oulton (1997)	The impact of an extra year of schooling is much smaller than in Barro (1997).
Harmond <i>et al.</i> (2001)	An additional year of schooling increases wages by around 6.5% across European countries.
Krueger and Lindhal (2001)	Find a significant effect of education on growth only for countries with the lowest level of education.
Cohen and Soto (2001), de la Fuentes and Domenech (2006)	Schooling indicators have an impact on standard growth specifications.
Hanuhek and Kimbo (2001), Coulombe (2004)	Using indicator of skills, the effect of education on output is found to be stronger than that estimated using attainment data.

Source: OECD Secretariat.

students, is now regularly published for different topics. The aggregate score is found to be well correlated with the level of GDP per capita, especially when developed countries are incorporated in the sample (Figure 6).

Investment in tertiary education is usually measured through indicators of education output (and not quality) such as enrollment, literacy, graduation ratios or the number of years of schooling. The main difficulty in using these data is generally their lack of comparability across countries. Harmonised graduation ratios have been produced by the OECD and UNESCO. Consistent time series for a relatively long period (usually 1991–2004) can be derived by combining these two sources. Data on international student enrollment can also be found in the UNESCO-OECD-Eurostat (UOE) data collection on education statistics. In addition, composite indicators have been built to measure supply-side factors,

Figure 6. Correlation between PISA scores and GDP per capita



Note: \*\*\*, \*\* and \* denote significance at 1, 5 and 10%.

Sources: World Bank, OECD.

such as a summary measure of the institutional set-up of tertiary education, or demand-side factors such as the internal rate of return to education (Oliveira Martins *et al.*, 2007). These data are available for many OECD countries, but only for some years (2005–2006 for the supply-side indicator and 2001 for the internal rate of return).

### 2.3. Labour market

Labour markets matter for growth through their impact on both labour utilisation and, to a lesser extent, labour productivity. A very large body of literature has examined these effects from a theoretical and empirical point of view. In particular, institutions are usually found to affect the structural unemployment rate, although some of these results sometimes suffer from a lack of robustness (Table 7).

Table 7. **Labour market indicators and performance**

Indicator	Papers	Impact on structural unemployment
Unemployment benefits	OECD (2006); IMF (2003); Nunziata(2002); Jimeno Rodriguez-Palenzuela (2002); Nickell <i>et al.</i> (2003); Belot and van Ours (2001); Morgan and Mourougane (2005); Blanchard and Wolfers (2000); Daveri and Tabellini (2000); Fitoussi <i>et al.</i> (2000); Elmeskov <i>et al.</i> (1998); Nickell (1997,1998); Scarpetta (1996); Nicoletti and Scarpetta (1995)	Positive (sometimes significant in most but not in all cases)
	Macculloch and DiTella (2002); Baker <i>et al.</i> (2004); Bertola <i>et al.</i> (2002); Fiori <i>et al.</i> (2007)	No effect
Active labour market policies	OECD (2006); Fitoussi <i>et al.</i> (2000); Elmeskov <i>et al.</i> (1998); Nickell (1997,1998); Scarpetta (1996); Boone and van Ours (2004)	Negative (sometimes significant in most but not in all cases)
	Baker <i>et al.</i> (2004)	No effect
Union density and/or bargaining coverage	IMF (2003); Morgan and Mourougane (2005); Blanchard and Wolfer (2000); Nickell (1997,1998); Scarpetta (1996)	Positive
	OECD (2006); Macculloch and DiTella (2002); Nunziata (2002); Baker <i>et al.</i> (2002); Daveri and Tabellini (2000); Fitoussi <i>et al.</i> (2000); Elmeskov <i>et al.</i> (1998)	No effect or negative
Centralisation and coordination of wage bargaining	OECD (2006); IMF (2003); Nunziata (2003); Baker <i>et al.</i> (2002); Jimeno and Rodriguez-Palenzuela (2002); Nickell <i>et al.</i> (2003); Blanchard and Wolfer (2000); Fitoussi <i>et al.</i> (2000); Nickell (1997,1998); Scarpetta (1996); Nicoletti and Scarpetta (1995); Fiori <i>et al.</i> (2007)	Negative
	Macculloch and DiTella (2002); Belot and van Ours (2001); Bertola <i>et al.</i> (2001)	No effect or positive
EPL	OECD (2006); Baker <i>et al.</i> (2004); Nunziata (2003); Nickell <i>et al.</i> (2003); Belot and van Ours (2001); Morgan and Mourougane (2005); Daveri and Tabellini (2000); Nickell <i>et al.</i> (2002); Nicoletti and Scarpetta (1995); Fiori <i>et al.</i> (2007)	No effect or negative
	IMF (2003); Bertola <i>et al.</i> (2002); Jimeno and Rodriguez-Palenzuela (2002); Blanchard and Wolfers (2000); Elmeskov <i>et al.</i> (1998); Scarpetta (1996)	Positive
Labour tax wedge	OECD (2006); IMF (2003); Nunziata (2002); Baker <i>et al.</i> (2004); Jimeno and Rodriguez-Palenzuela (2002); Nickell <i>et al.</i> (2003); Belot and van ours (2001); Bertola <i>et al.</i> (2002); Morgan and Mourougane (2005); Blanchard and Wolfer (2000); Daveri and Tabellini (2000); Elmeskov <i>et al.</i> (1998); Nickell (1997, 1998); Nicoletti and Scarpetta (1995)	Positive
	Macculloch and DiTella (2002); Fitoussi <i>et al.</i> (2000); Scarpetta (1996); Fiori <i>et al.</i> (2007)	No effect

Source: OECD Job Strategy.

Both policy and outcome indicators have been developed to monitor labour markets and are already well covered in the literature and in works published by international organisations (such as *Going for Growth* published by the OECD). Policy indicators produced at the OECD cover a vast range of labour market institutions ranging from employment protection legislation to data on trade unions. These data are generally available for specific years only and suffer from serious limitations (*e.g.*, EPL measure is a *de jure* measure and does not reflect effective employment protection). These data are usually constructed only for OECD countries and sometimes for large non-member countries. Other institutional variables such as unemployment benefit generosity or replacement rates are more timely but usually constructed for certain household or worker types. By contrast, a lot of detailed information is available for OECD countries and over a long time span on active labour market policies and labour taxes. Marginal effective tax rates are also regularly computed for different household types. Data on minimum wages are available in the OECD minimum wage database for countries that have a national statutory minimum wage.

Other international institutions also publish data on labour market institutions. A large set of institutional variables is collected in the European Commission's LABREF database and the ILO Laborsta database. Qualitative information on the wage system is freely available on the EIRO website. Perception-based measures on worker motivations and industrial disputes can also be found in the *Global Competitiveness Report* which is updated every year. In addition, time series for selected institutional data such as EPL have been constructed by Allard (2005) and Amable *et al.* (2007), but the method applied to construct these indicators is questionable.<sup>6</sup>

Outcome indicators include data on employment, unemployment, hours worked and labour force participation. Data are usually fact-based, timely and have broad country coverage. Efforts have been made over the years to harmonise the data across countries. Moreover, a breakdown by gender, age, skill and sector is also available. The structural (or equilibrium) unemployment rate is a different type of outcome indicator as it is non-observable. It can be estimated using different methodologies, *e.g.*, the OECD Economics Department uses a core price Phillips curve and Kalman filter technique. Indicators of the implicit tax on retirement have also been developed and regularly updated by the OECD.

#### **2.4. Product markets**

Well-functioning product markets affect positively productivity and consumer welfare through various channels (Table 8). Indeed, competition in product markets boosts efficiency in three ways. First, it enhances allocative efficiency. Second, productive efficiency or *x*-efficiency, *i.e.*, the ability of firms to produce output at minimum resource costs, can also be increased. Third, competition influences the incentives to innovate and invest, so-called dynamic efficiency. In addition, increased competitive pressures can spur employment growth. At the same time, regulations are important to address market failures stemming, for instance, from asymmetries of information and externalities. But they also increase firms' compliance costs.

A large number of indicators have been developed to measure access to markets and the degree of competition. They are usually based on questionnaires and can be either perception- or fact-based. Although they are usually considered as policy indicators, composite measures sometimes aggregate policy and performance sub-indicators.

Table 8. **Product market indicators and economic performance**

	Results
Nicoletti <i>et al.</i> (2001), Blanchard and Giavazzi (2003), Baissanini and Duval, Griffith <i>et al.</i> (2007)	Anti-competitive product market regulations have significant negative effects on employment rates.
OECD (2003a), Aghion and Griffith (2005), Conway <i>et al.</i> (2006), Arnold <i>et al.</i> (2008), Nicoletti and Scarpetta (2005), Scarpetta and Tressel (2002), Fiori <i>et al.</i> (2007)	Anti-competitive product market regulations are negatively associated with productivity performance.
Bayoumi <i>et al.</i> (2004)	Greater competition produces significant effects on macroeconomic performance, as measured by standard indicators. It may also improve macroeconomic management by increasing the responsiveness of wages and prices to market conditions. Finally, greater competition can generate positive spillovers to the rest of the world through its impact on the terms-of-trade.
Bassaini and Ernst (2002)	Positive impact of deregulation on R&D activity
Scarpetta and Tressel (2002)	Strict regulation hinders the adoption of exiting technologies, possibly by reducing competitive pressures, technology spillovers or the entry of new high-tech firms.
Bartelman <i>et al.</i> (2003)	Deregulation has a positive impact on the expansion of successful firms.

Source: OECD Secretariat.

Among the policy indicators, the World Bank *Doing Business* report has attracted a lot of attention because of its broad country coverage and its annual updates. Its objective is to track reforms aimed at simplifying business regulations, strengthening property rights, opening up access to credit and enforcing contracts by measuring their impact on ten indicator sets. The indicators are then aggregated into an overall ranking comparing ease of doing business across countries. One of the main advantages of this database is that the methodology is transparent, data are comparable across countries and easily replicable, and reliability checks are done through the production process. However, the data may not be fully representative of the extent of regulation at the national level, as they focus on some specific regions or types of firms. Some data on administrative burdens and labour market institutions have been criticised as being too rough. In addition, some of the data are perception-based. The data also cover only domestically owned, limited-liability companies and a limited set of transactions. Moreover, it is assumed that firms have full information on requirements and procedures, and the data may underestimate firms' compliance burden.

Another well-known indicator is the Product Market Regulation (PMR) indicator published by the OECD, and its sectoral time-series variants. These are composite indicators summarising information on laws and regulations, as well as the compliance burden born by firms. These indicators are already extensively used in the context of multilateral structural surveillance, in the *Going for Growth* report or in country *Economic Surveys*. They have also been extensively used in academic research. They are based on a combination of responses to a questionnaire filled in by country officials and external data sources. The data are thus fact-based and highly transparent so that it is possible to reproduce the score of the indicator from the results used to derive it. The final outcomes, as well as the underlying data and the methodology, are subject to peer review. The weighting procedure has recently been simplified but comparability over time has been ensured through the construction of past data using the same methodology. Moreover, confidence bands are provided, helping the users to assess the reliability of the data. The data are updated every two to three years, usually with improvements in the methodology. Lately non-tariff data in the service sector have been included and complement the tariff data already included in the PMR indicator. The country coverage has been extended over the years and now also covers China and India. Looking forward, the indicator will be

enriched by the integration of the indicator of sectoral regulator independence which is found to be closely related to investment in infrastructure (Sutherland *et al.*, 2009).

The Business Competitiveness Index (BCI) produced by the World Economic Forum is a composite indicator constructed using a combination of survey and hard indicators, including a measure of intellectual property protection and the stringency of environmental regulation. Their focus is on capturing factors that matter for competitiveness at the micro-economic level. The construction process is fully transparent. However, the selection of the different indicators is nonetheless not straightforward and some may be strongly inter-correlated (*e.g.*, intellectual property protection and property rights). Finally, the weights are determined using factor analysis at a lower level of aggregation and regression on GDP per capita at a higher level of aggregation. It is unclear whether the ranking from the BCI is robust to an alternative weighting choice. Finally, there is no information on measurement errors.

Overall, past analysis points to a strong correlation between these various indicators for OECD countries. The correlation between the ease of doing business and the OECD product market regulation indicator is 0.7.

A new indicator is the questionnaire-based measure of whether a sector is subject to incentive price regulation, generally in the form of a price cap,<sup>7</sup> constructed by the OECD. The indicator is available for all OECD countries except Poland and Greece over the period end 2007 to early 2008. The sectoral coverage varies across countries. Thus far there is no plan to update the questionnaire. The methodology is transparent and the data have been subject to peer review. There is evidence that this indicator has a positive impact on investment in infrastructure in the presence of an independent regulator (Sutherland *et al.*, 2009), even though the indicator does not account for quality changes in infrastructure. Indicators summarising the main features of the regulatory institutions have been constructed in Høj (2007a). The indicators cover both general and sector-specific competition policies.

A large number of outcome indicators (*e.g.*, firm creation and destruction) are also available but most of the time at a national or sectoral level and updated only infrequently. Indices of concentration (such as the Herfindal index) are sometimes computed, but not on a regular basis or for a sufficient number of countries. Mark-ups have also been developed in OECD studies and elsewhere (Høj *et al.*, 2007b).

## 2.5. Infrastructure

The impact of infrastructure on output (and output growth) is difficult to pin down and the direction of causality hard to determine empirically (Table 9). However, there is some empirical evidence that investment has positive effects that go beyond the impact to be expected from a larger capital stock (Sutherland *et al.*, 2009). In particular, infrastructure investment appears to have on average a stronger long-term effect on growth at lower levels of provision, though the effect is different between developing and developed countries. It should be noted, however, that the definition of infrastructure varies from one study to another.

Data on infrastructure available over a relatively long time period and comparable across countries are scarce. Capital stock data published by national statistical offices lack harmonisation. They can usually be complemented by physical measures of infrastructure

Table 9. **Infrastructure and economic performance**

	Results
Ford and Poret (1991)	Infrastructure can have a growth-enhancing effect but the relation is weak and unstable.
Bonaglia <i>et al.</i> (2000)	Infrastructure makes a positive contribution to productivity in some Italian regions.
Kozarec <i>et al.</i> (2001)	There is a strong positive contribution of telecom and electricity, gas and water to productivity in the United States and Europe.
Sutherland <i>et al.</i> (2009)	There is evidence that infrastructure has a positive effect that goes beyond the expected impact from capital stock.
Hurlein (2006), Bougheas <i>et al.</i> (2000), Sutherland <i>et al.</i> (2009)	There is evidence that the link between infrastructure and growth is non-linear.

Source: OECD Secretariat.

provision, but the latter cannot be easily aggregated. Moreover these measures fail to capture the quality of infrastructure.

A composite indicator measuring how countries exploit the potential benefits of Public and Private Partnerships (PPPs) have recently been developed by the OECD. The data are available for 19 countries, though not for the United Kingdom, which has made extensive use of PPPs in the past. Data are questionnaire-based. No update is, however, currently planned.

## 2.6. International trade

The last three decades have witnessed rapid economic integration. This has spurred the development of economic analysis on the effects of trade on growth and living standards, both from a theoretical and an empirical point of view.

From a theoretical point of view, there are different channels through which trade can stimulate growth and improve living standards. First, according to the theory of comparative advantages, trade based on specialisation increases domestic output due to higher productivity. Second, trade is a means to increase worldwide competition in production and to enhance efficiency. Third, trade guarantees a greater choice of products. Fourth, it expands potential markets and permits domestic firms to take advantage of economies of scale. Fifth, trade allows the diffusion of knowledge and technological innovation.

From an empirical point of view there is a large literature showing that economies that are more open to international trade have higher rates of growth, as a result of higher investment, human capital accumulation, higher technology diffusion and sustained gains in factor productivity.<sup>8</sup>

These empirical works, however, differ in the approach of measuring trade openness. In particular, it is possible to classify the empirical research investigating the relation between trade and growth in two branches: those that use policy indicators as measures of trade openness, and those that use outcome indicators (in terms of trade intensity).

Trade policy indicators describe the institutional features of a country's attitude toward the rest of the world. The most common policy indicators are tariff barriers (or the effective tariff). However, there are many different policy instruments, *i.e.*, non-tariff barriers (such as quotas, exemptions, special permits and discriminatory practices) which can affect trade and which can be considered a better proxy for trade openness, especially in developed countries.<sup>9</sup> Thus, other indicators such as the one provided by the Heritage Foundation, Sachs and Warner (1995) and Wacziarg (2001) have used both tariff and non-

tariff barriers to construct an indicator for trade openness. The main advantage of these indicators is the (almost) absent problem of endogeneity with respect to growth. In contrast, the main limitation is their limited availability, and the fact that they usually reflect the legal framework in which agents operate, but not the effective degree of protection they face.

A policy indicator of trade openness has been constructed by the Heritage Foundation. The indicator is transparent in the way it is constructed and data are available for a very broad set of countries (161) from 1995 to 2007, based on well-documented sources.<sup>10</sup> The indicator is based on both trade and non-tariff barriers. While this has an advantage over other indicators based exclusively on tariff barriers, it has the main disadvantage that non-tariff barriers are difficult to construct and often require subjective judgments. However, the indicator is positively correlated with outcome indicators such as GDP's share of total exports and imports, and it shows a strong and positive correlation with GDP per capita.<sup>11</sup> This suggests that the indicator is reliable (measures what it pretends) and matters for living standards.

An alternative would be to restrict the construction of the indicator to tariff barriers. The OECD collects tariff data for most of its member countries. However, the outcome does not seem to be well correlated with openness, suggesting that abstracting from non-tariff barriers would lead to a serious bias and lower the usefulness of the data.

Another policy indicator is the FDI restrictiveness index constructed by Golub (2003) and updated in Koyama and Golub (2006). The indicator is available for OECD economies and 13 non-OECD economies. It covers three categories of restrictions: limitations on foreign ownership, screening or notification procedures and management or operational restrictions.

Outcome indicators describe the volumes and values of existing trade. The outcome indicator that has been mostly used to investigate the relation between trade and growth is export growth (see Table 10) and the share of total exports and imports to GDP. Other indicators of the same type are the structure-adjusted trade intensity (which is the ratio of real imports plus real exports to real GDP, corrected for transportation costs, country size and country income) and the ratio of imports to aggregate consumption. These indicators are all fact-based, and easy to construct. Moreover, many international organisations collect data on exports and imports (differentiated by structure, destination and origin) and these indicators are easy to compute. The main drawback of this type of indicator is the endogeneity problem with respect to growth (Frankel and Romer, 1995).

Table 10. **Trade growth and economic performance: Effects of real export growth on real GDP growth**

Average coefficient value	0.220
Median coefficient value	0.189
Average t-statistic	3.460**
Maximum coefficient value	1.851
Minimum coefficient value	-1.433
Average standard error	0.021
Average 95% confidence interval	±0.042
Average Kurtosis distribution	11.502
Average skewness	-0.134

Note: \*\*Significant at the 95% level. Based on 196 regressions.

Source: Lewer and Van den Berg (2003).



## 2.7. Financial markets

Financial markets influence capital accumulation and productivity growth through their intermediation role. They foster the efficient allocation of capital, facilitate international capital flows and allow the pooling of risks and spread of information about investment opportunities.

From an empirical point of view there is a large literature finding that economies with more developed financial markets have higher rates of growth. In particular, according to cross-country comparisons, individual country studies as well as industry- and firm-level analyses, a positive link exists between the sophistication, the depth and the effective functioning of the financial system and economic growth (see Table 11).

To assess the effect of financial markets on economic growth, two sets of indicators have been used: policy indicators and outcome indicators.

Financial policy indicators try to measure aspects of domestic and financial markets mostly related to the regulatory stance, as regards stability, competition and liberalisation. The main advantage of these indicators is the (almost) absent problem of endogeneity with

Table 11. **Financial markets and economic growth**

	Indicator used or methodology and results
De Serre <i>et al.</i> (2007)	A set of indicators of banking and regulation created from the World Bank Regulation and Supervision database for 25 OECD countries Regulation that is more conducive to competitive and efficient financial markets has a positive impact on output and productivity.
Atje and Jovanovic (1993) and Levine and Zervos (1998)	Stock market trading as a share of GDP Positive correlation between stock market trading and growth
Levine (1998, 1999) and Levine <i>et al.</i> (2000)	Use GMM and a country's legal origin as an instrument for financial development Establish a causal link between finance and growth
Aghion <i>et al.</i> (2005)	Same technique as in Levine <i>et al.</i> (2000) Financial development influences the speed of growth convergence rather than the steady state.
Benhabib and Spiegel (2000)	Indicators of financial development are correlated to both TFP growth and to the accumulation of physical and human capital. But the indicators that are strongly correlated with TFP growth differ from those boosting investment.
Rioja and Valev (2004a, 2004b)	The impact of financial development on growth may vary with the level of financial development and of income.
Loayza and Rancière (2005)	Evidence that a positive long-run relationship between financial intermediation and output growth can co-exist with a negative short-run relationship
Edison <i>et al.</i> (2002, 2004)	Use a wide variety of measures of international financial integration and of equity market liberalisation. Introduce an interaction variable: GDP*capital account liberalisation International financial integration does not, in general, accelerate economic growth after controlling for financial and institutional characteristics. But interaction variables are found to be significant.
Rajan and Zingales (1998)	Estimate measures of the financial dependence of industries ( <i>i.e.</i> , a reliance on financing from outside) and interact this measure with measures of financial development There is a significant and sizeable causal effect from the state of financial markets to economic growth.
Demirguc-Kunt and Maksimovic (1998)	In countries with better financial development, relatively more firms grow faster than predicted by internal accounting data.
Beck <i>et al.</i> (2004)	Financial development exerts a positive growth effect on industries that are technologically more dependent on small firms.
Becker and Sivadasan (2006)	Financial development may mitigate financial constraints of firms and enhance investment.

Source: OECD Secretariat.

respect to growth. Moreover, while until the last decade data were not easily available, today many organisations have undertaken (IMF, World Bank) or in the process of undertaking (OECD) projects to construct databases on financial policy indicators. Similarly, the importance of financial liberalisation for living standards and economic growth has encouraged independent organisations (such as the Heritage Foundation) to build their own policy indicators.

Outcome indicators describe the depth, the efficiency and the concentration of domestic financial markets, and the degree of financial liberalisation. The Fraser Institute has constructed an index that measures the freedom to exchange with foreigners called Economic Freedom of the World. With regard to the domestic financial market, Beck *et al.* (2007) construct perhaps the most comprehensive data set of indicators that measure the size, activity and efficiency of financial intermediaries and markets (some of these indicators are, for example, financial market capitalisation, bank concentration, net interest rate margin, credit and bank deposits and other measures of financial depth). With regards to international finance, outcome indicators often follow the same methodology of trade outcome indicators. Examples of these indicators are: the financial liberation indicator (overall stock of external liabilities and assets to GDP) and the financial freedom indicator (the share of portfolio equity and FDI to GDP, and the share of equity liabilities in total liabilities).<sup>12</sup> Data on the variables used to calculate the indicators are from official sources (IMF, World Bank) and are available for a large time span and very broad set of countries. Moreover, the indicators seem to matter for living standards. In fact, they are positively and significantly associated with GDP, both across countries and over time (Figure 7).

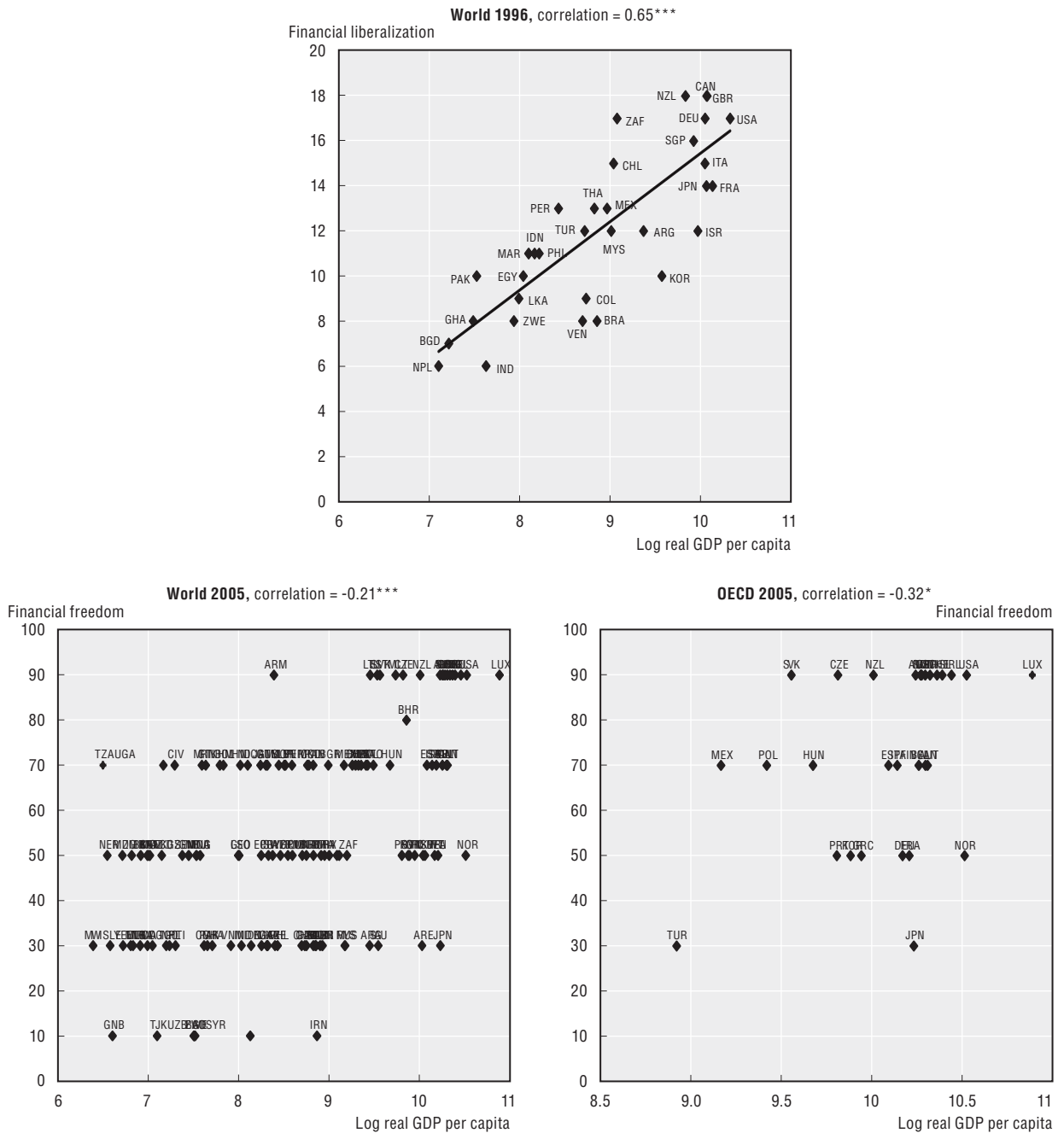
While all these indicators are easy to measure and can be used to assess the implication of the financial structure and liberalisation on growth, their main drawback is the presence of endogeneity problems with respect to growth. Thus, their use to assess the impact of financial markets on growth has to be considered jointly with the use of policy indicators (as instruments).

## **2.8. Reform and composite indicators**

Measuring progress in structural reforms is crucial to formulate policy recommendations. Information on individual reforms is currently collected by the European Commission in its MICREF database for EU countries. These data often come from other international organisations or one-off studies. Indicators of reform intensity have been constructed as the average of labour (or product) market institutions for OECD countries (Høj *et al.*, 2006). There have been some interesting attempts to construct summary measures of reform progress by aggregating variables in different areas (Lora and Panizza, 2002; Eicher and Röhn, 2007). These indicators suffer from the drawbacks associated with composite indicators, in particular, the difficulty of interpreting them and the arbitrariness of the chosen weights. It also remains to be seen whether these indicators could be updated at a sufficient frequency to allow a regular monitoring of progress.

Among the composite indicators that cover a large number of areas, it is worth mentioning the Global Competitiveness Index from the World Economic Forum, which takes into account both macroeconomic and microeconomic foundations of competitiveness. Its scope is very large in terms of areas covered and country coverage. The indicator is a weighted average of indicators gathered in 12 pillars.<sup>13</sup> Weights of the different pillars depend on the country's level of development, but robustness checks suggest that the index is not sensitive to the weights. This indicator is regularly updated.

Figure 7. Correlation between selected indicators of financial developments and GDP per capita



Note: \*\*\*, \*\* and \* denote significance at 1, 5 and 10%.

Sources: World Bank, IMF.

However, regular changes in the methodology (in terms of data source or composition of the index)<sup>14</sup> cast doubts on its comparability over time.

### 3. Conclusion

The analysis undertaken in this paper has identified a number of areas that matter for living standards, but are currently not well captured by existing indicators. Although

numerous indicators in these areas are currently available, there is still a clear need for the development of new policy indicators. Governance is clearly a domain that matters for living standards, but is currently absent in the framework. However, existing good governance measures are mostly perception-based and cannot be credibly used for policy recommendations. Further work will be required to develop fact-based indicators in several dimensions of governance. It will be particularly helpful to construct an indicator of property rights and continue to work on developing indicators of government management systems.

Depending on their use, the question of the regular update of these indicators can also be vital. Most of the structural indicators are, however, usually developed in the context of a one-off study and/or are not updated at regular intervals. This prevents their use in empirical work where time series are needed or in a surveillance process where reform progress is closely monitored.

## Notes

1. Legal corruption is corruption that is undertaken within the legal framework.
2. It could be argued, nonetheless, that only a part of these two dimensions is purely policy-driven.
3. See, for example, Berger and Messer (2002), Self and Grabowski (2003), Soares et al. (2007), Joumard et al. (2008).
4. See Joumard et al. (2008).
5. See Bloom et al. (2004) and Jamison et al. (2005) for a review of studies assessing the impact of health on economic growth.
6. In particular, it can be argued that the additional information used to derive the new indicator cannot be easily assigned to EPL sub-indicators.
7. The regulator specifies a price basket that can increase in line with an exogenous measure of input costs minus measures of efficiency gains.
8. In particular, Wacziarg (2001) considers six channels through which trade affects growth: 1) macroeconomic policy quality, 2) government size, 3) price distortions from the existence of black market premium, 4) investment share of GDP, 5) technology, and 6) foreign direct investment. His results show that the most important channel is investment, accounting for 63% of trade's total effect on growth, while the technology channel and the stabilising channel account for the rest of the effect. For other empirical results see Lewer and Van den Berg (2003), which presents a critical survey of the literature on this topic.
9. Existing standards or regulations regarding safety or environmental issues are another form of non-tariff barriers. These barriers may be more stringent for developed countries than more traditional forms of non-barriers.
10. The authors used the following sources to determine scores for trade policy, in order of priority: World Bank, *World Development Indicators 2007* and *Data on Trade and Import Barriers: Trends in Average Tariff for Developing and Industrial Countries 1981-2005*; World Trade Organization, *Trade Policy Reviews, 1995-2007*; Office of the US Trade Representative, *2007 National Trade Estimate Report on Foreign Trade Barriers*; World Bank, *Doing Business 2008*; US Department of Commerce, *Country Commercial Guide, 2004-2007*; Economist Intelligence Unit, *Country Report, Country Profile, and Country Commerce, 2004-2007*; and official government publications of each country.
11. The indicator has a strong and positive relation both over time and cross country with GDP per capita. It is important to stress, however, that cross-country variation is the most important source of variability.
12. See Lane and Milesi-Ferretti (2007).
13. Institutions, macroeconomy, health, primary education, higher education and training, goods market efficiency, labour market efficiency, financial market sophistication, technological readiness, market size, business sophistication and innovation.

14. For instance, the exchange rate has been recently removed from the index.

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